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Does the Internet Displace Health Professionals?

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Scholars have paid close attention to the effects of the rapidly changing health information environment. The issue of how Internet use for health information affects the frequency of contact with health professionals, however, has not been examined. Directly addressing this issue, a two wave panel dataset is used with a U.S. national representative sample gathered in 2005 and 2006. Overall, the results show that Internet use at Wave 1 positively predicts health professional contact at Wave 2, controlling for Wave 1 health professional contact and other potential confounders. The implications that these findings can have for future research in this area are discussed.

Traditionally, health care services have been described as paternalistic. Health care services have been experiencing rapid changes, however, due to factors such as consumerism and managed care (Beisecker & Beisecker, 1993; Blumenthal, 1996; Emanuel & Dubler, 1995; Hardey, 2001; Ong, De Haes, Hoos, & Lammes, 1995). By defining these new trends in the health care arena as "a consumer-driven health care system" (Niederdeppe, Frosch, & Hornik, 2005, p. 4), scholars have argued that there is an increasing expectation that the general public will participate more actively in the medical decision-making process (Brashers, Haas, Klingle, & Neidig, 2000).

These dramatic changes are to be facilitated by a readily available and rapidly increasing amount of health information that the public can freely access, given that the traditional imbalance of power between health professionals and the general public derives partly from a medical-knowledge gap between the former and the latter (Hardey, 1999, 2001; Lowrey & Anderson, 2006; Robinson, Patrick, Eng, & Gustafson, 1998). Mass media such as television, newspapers, and magazines have put more emphasis on their health sections to meet people's growing interests in health issues. Of more importance is the fact that the Internet has become a new health information source for the general public. The Internet allows people to access a wide variety of health information, thereby enabling them to learn—by themselves—about health or medical issues (Bylund, Sabee, Imes, & Sanford, 2007; Cline & Haynes, 2001; Fox & Rainie, 2000).

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With regard to this increasing use of the Internet, scholars (e.g., Benigeri & Pluye, 2003; Eysenbach, Powell, Kuss, & Sa, 2002; Shepperd, Charnock, & Gann, 1999) have expressed anxiety that the quality of health information on the Internet is problematic and have tried to assess the quality of health information on the Internet. In contrast, the issue of how Internet use affects the frequency of health professional contact has not been fully addressed yet. In fact, there have been almost no empirical studies of this issue.

Then, what influences does Internet use for health information have on the frequency of contact with health professionals? Does the Internet facilitate patients' access to health professionals by reducing time and money required for contact with health professionals? Or, does the Internet reduce the amount of physician–patient contact by serving as a functional alternative to physician visits?

Internet Use and Health Professional Contact

Some scholars in the medical community have provided a rationale for predicting the effects that Internet use has on the frequency of contact with health professionals (e.g., Bylund et al., 2007; Gerber & Eiser, 2001; Kassirer, 2000; Murray et al., 2003). They have argued that Internet use contributes to realizing the interpretative and deliberative types of physician–patient relationship. If people use interactive features of the Internet (e.g., emails) to contact health professionals, their total time for conversation with health professionals is likely to increase. Also, if they develop better knowledge about health issues by using the Internet before visiting their physicians, their visits are likely to be more productive. These increasing opportunities for a more satisfactory relationship with physicians may lead patients to contact health professionals more frequently.

In addition to the debates in a medical community, there have been continuing controversies between technological advancement and physician–patient relationships in medical sociology. The sociology literature on the medical profession suggests that health professionals' control of knowledge is central to their dominance over their work area (Child & Fulk, 1982; Light & Levine, 1988; Wolinsky, 1988). Given that medicine is the area that is characterized by health professionals' high levels of expertise, scholars in this area have argued that health professionals' power primarily derives from "the clients' ignorance relative to the professionals' expertise" (Child & Fulk, p. 171).

Focusing on the role of computer technology, Haug (1973, 1988), a medical sociologist, argued that *deprofessionalization* is a significant trend in postindustrial society. Specifically, she defined *deprofessionalization* as the professions' loss of "their monopoly over knowledge, public belief in their service ethos, and expectations of work autonomy and authority over the client" (1973, p. 197). She argued that, by diffusing health or medical knowledge previously reserved only for health professionals, technological advancement continues to weaken health professionals' control over their work areas.

Extending Haug's (1973, 1988) hypothesis to the discussion about the effects that the Internet has on health professional contact, one can hypothesize that the Internet facilitates the breakdown of health professionals' monopolies over their own knowledge base. Because the Internet facilitates the public's search for alternative health information sources, the Internet may lessen people's dependency on

health professionals in regard to health information. If this is the case, then the Internet may lead people to withdraw themselves from health professionals.

In sharp contrast, another medical sociologist, Freidson (1984, 1985), stressed the enduring status of *professional dominance* by positing that, despite people's increasing access to physicians' knowledge base, physicians exercise their monopolies over at least some segments of medical knowledge. He contended that the knowledge gap between health professionals and the general public remains in place because new knowledge constantly emerges and presents itself, first, to health professionals. Also, because *uncertainty* and *error* underlie medical knowledge, the responsibility for making "discretionary interpretations and applications" as a way to navigate these uncertainties and these errors falls chiefly on health professionals—not on the general public (Nilson, 1979, p. 571).

Following this logic, even though the Internet gives people more access to an increasing amount of health information, people still may have difficulties in understanding and making use of the information. Therefore, the increasing reliance on the Internet does not necessarily lead to the lessened dependence on health professionals. Furthermore, one can expect that health professional contact even may increase as people go online for health information acquisition and as they thus encounter more uncertainties and difficulties with regard to understanding health or medical information.

Differential Effects of Internet Use

To resolve these contradictory predictions, this study turns to communication theories concerning the relationship between new media and old media (e.g., the uses and gratification theory, the media substitution theory, and the niche theory). These theories posit that a new medium *displaces* or *replaces* old media if the following two conditions are met: (1) the new medium is more convenient, cheaper, and more accessible than the old media and (2) the new medium satisfies—to an equal or superior extent—the same needs for which people have relied on old media (Dimmick, Chen, & Li, 2004; Dimmick, Kline, & Stafford, 2000; Ferguson & Perse, 2000; Kaye & Johnson, 2003; Nguyen & Western, 2006).

This argument leads to the need to differentiate the role of health professionals into two categories with blurred boundaries.[1] Health professionals provide health and medical information (e.g., prevention advice, diagnosis of illness based on reported symptoms, etc.) and they also provide physical services, particularly in the context of illness (e.g., physical exams, blood tests, prescriptions, treatments, etc.). One can argue that the Internet competes only in the first category and only rarely in the second. Of course, even for interactions that require some physical exchange, the Internet may play a role. For example, it is quite possible, if illegal, to obtain prescriptions on the Internet; there is also a growing industry of providing diagnostic tests for diseases by companies that recruit users on the Internet. Nonetheless, it is easier to view the current Internet as a competitor in the information category than in the physical care category.

[1]This study assumes that health professional contact is a type of health information channel like other mass media. This view is different from the traditional approach to patient–physician interaction that has been taken by interpersonal communication scholars (Parrot, 2004).

Moreover, the Internet is more accessible, less expensive, and more convenient than health professionals in the United States (Cline & Haynes, 2001; Fox & Rainie, 2000). The ease with which people use the Internet to get practical daily-life health information is greater than the ease with which people visit health professionals to get the same information. Therefore, one can argue that the Internet, by playing the role of health information provider, displaces to a certain extent health professionals in the category of health information provider.

It is reasonable to predict, however, that the physical care functions of health professionals may escape the effects of the increasing dependence on the Internet as a new health information source, insofar as few information channels, by themselves, can fulfill all needs of individuals (Dimmick et al., 2004; Dimmick et al., 2000). Thus, it can be argued that Internet use partially displaces health information seeking through health professionals but that the frequency of physician visits for treatment of ailments will remain unchanged. Therefore, in order to address the effects that the Internet has on health professional contact, this study differentiates *health professional contact for health information* and *physician visit for ailment treatment* as outcomes.

These two types of contacts are distinct even though they are not perfectly independent. Those who receive physical treatment and highly rely on their physicians may not actively seek health information from their physicians (Bylund et al., 2007; Makoul, 1998). It is also possible that people call or visit health professionals only for health information without seeking any physical treatment (Viswanath, 2005).

Hypotheses

On the basis of the above considerations, the following hypotheses are derived:

> *Hypothesis 1. Internet use for health information* will decrease the frequency of *contact with health professionals for health information*.
>
> *Hypothesis 2. Internet use for health information* will have no effect on the frequency of *physician visits for ailment treatment*.

Methods

This study uses two-wave panel dataset from the Annenberg National Health Communication Survey (ANHCS), which was conducted by Knowledge Networks for the Annenberg Schools for Communication at the University of Pennsylvania and the University of Southern California, with support from the Annenberg Trust at Sunnylands. The ANHCS was designed to collect *nationally representative data* over the Internet every month about the American public's health-related media exposure, health-related behavior, health-related knowledge and beliefs, and health policy preferences and beliefs.

In total, 4,957 first-wave cases were collected from January 2005 through May 2006. The ANHCS sample is a national probability sample of civilian, noninstitutional adults (18 and above) in the United States. Knowledge Networks developed a panel of respondents using random digit dialing (RDD) procedures and provided selected households who did not have home Internet access with free

hardware (Web TV) and Internet access. Of those recruited for the panel, 30.3% agreed to participate. Of those who were in the panel and were asked to participate, 74.3% agreed to participate in the ANHCS first-round questionnaire. Thus, the response rate for the Wave 1 study was 22.5%, the product of the recruitment rate and the cooperation rate.

The follow-up study was limited to the 1,486 respondents who were first interviewed between March 2005 and July 2005. They were eligible to be included in the one-year follow-up survey conducted from March 2006 through July 2006. By that time, 21.9% had dropped out of the panel, leaving 1,161 who were eligible for recontact. Of those, 89.9% cooperated with the follow-up survey. The product of the original recruitment rate, the first-wave cooperation rate, and the second-wave non-dropout and cooperation rates, however, means the final response rate for the two-wave study was 15.8%. Although there were 1,044 cases available for the two-wave study, the sample size for this study ranges from 496 to 501 because the survey items of two types of *health professional contact* and *Internet use for health information* were asked only to a random half of all respondents. See Table 1.

Analyses Procedures

The hypotheses were first tested by examining the cross-sectional association of reported Internet use for health information with two types of health

Table 1. Descriptive characteristics of the sample

	Wave 1		Wave 2	
	N	Percent	*N*	Percent
Age				
18–29	926	18.7	149	14.3
30–44	1,420	28.6	278	26.6
45–59	1,416	28.6	286	27.4
60+	1,195	24.1	331	31.7
Gender				
Male	2380	48.0	488	46.7
Female	2577	52.0	556	53.3
Race/ethnicity				
Hispanic	480	9.7	82	7.9
Non-Hispanic White	3765	76.0	821	78.6
Non-Hispanic Black or African American	497	10.0	85	8.1
Non-Hispanic (other or multiple)	215	4.3	56	5.4
Household Income				
<$50,000	2,904	58.6	579	55.5
>=$50,000	2,053	41.4	465	44.5
Educational attainment				
<=High school graduate	2,307	46.5	493	47.2
>High school graduate	2,650	53.5	551	52.8

Note: Wave 1 refers to the total first wave dataset (i.e., respondents from January 2005 through May 2006).

professional contact.[2] This alone, however, would not support any substantial inference about influence of Internet use on health professional contact. Two crucial threats to inference remain: the possibility that some confounders (e.g., age, gender, education, income, etc.) might influence both Internet use and health professional contact and the possibility that health professional contact leads to Internet use rather than the reverse. To address these two threats, analyses took explicit account of a range of measured confounders, and then evidence for causal order was provided by examining the lagged association of Internet use at wave one with health professional contact (both for health information acquisition and for ailment treatment) at wave two, while controlling for health professional contact at wave one. The central analyses used ordinary least squares (OLS) hierarchical regression. All analyses were done with unweighted samples. The use of weights inflates standard errors and thus decreases sensitivity to effects. Since this study was focused on tests of theory rather than on making claims about the national population, this tradeoff—more statistical power for reduced confidence in representativeness—was preferred. As is noted below, however, the weighted data produced estimates essentially the same as the results presented here.

Health Professional Contact

Health professional contact includes two variables that substantially map on to the two categories of health professional contact (i.e., health information acquisition and ailment treatment) described previously. First, to tap *health professional contact for health information*, respondents were asked to rate on a four-point scale (1 = "not at all," 2 = "a little," 3 = "some," 4 = "a lot") "How much have you actively looked for information about a specific health concern or medical problem that you or a family member had from your doctor or other health care professionals in the past 30 days?" (Wave 1: $M = 2.18$, $SD = 1.17$; Wave 2: $M = 2.18$, $SD = 1.15$). Second, to measure *physician visit for ailment treatment*, respondents were asked to present themselves on an 11-point scale (1 = "never," 2 = "once a year," 3 = "twice a year," 4 = "once every 3 months," 5 = "once every 2 months," 6 = "once a month," 7 = "once every 3 weeks," 8 = "once every 2 weeks," 9 = "once a week," 10 = "twice a week," 11 = "more than twice a week") "On average, how often do you go to a doctor's office or medical clinic for treatment of any ailments you have?" (Wave 1: $M = 3.03$, $SD = 1.69$; Wave 2: $M = 3.14$, $SD = 1.67$).[3]

[2]For the cross-sectional analyses, this study used the total first-wave dataset (i.e., respondents from January 2005 through May 2006) rather than the first-wave dataset that has the follow-up survey (i.e., respondents from January 2005 through July 2005) for the following reasons. First, the former increases the statistical power of the tests. Second, the t test did not show any material differences in terms of the theoretical variables (i.e., Internet use for health information, two types of health professional contact) between the two first-wave samples.

[3]This study did not use nonparametric tests for the following reasons. First, many Monte Carlo studies have revealed that the violation of the interval assumption is not that problematic (Asher, 1983). Of course, they are not arguing that one can violate the interval requirement easily in all cases. When the ordinal variable has a large number of categories like in this measure, however, one can enjoy the advantages of parametric tests by treating ordinal variables as interval variables. Second, this study found that physician visits for ailment treatment was normally distributed. Third, nonparametric tests have less power than the appropriate parametric tests (Green & Silverman, 1994).

Internet Use for Health Information

Internet use for health information is an index that consists of two dimensions: *health information seeking* and *health information scanning*. First, *online health information seeking* is a four-point item asking respondents, "How much have you actively looked for information about a specific health concern or medical problem that you or a family member had from the Internet in the past 30 days?" with the following response options: 1 = "not at all," 2 = "a little," 3 = "some," 4 = "a lot." Second, *online health information scanning* is a four-point item asking respondents, "How often have you read health information in the Internet when you were not trying to find out about a specific health concern in the past 30 days?" with the following response options: 1 = "not at all," 2 = "less than once per week," 3 = "once per week," 4 = "a few times a week." These two dimensions were summed to create an index of *Internet use for health information* (Wave 1: $M = 3.64$, $SD = 1.81$; Wave 2: $M = 3.55$, $SD = 1.76$).[4]

The conceptualization of Internet use in this study is worthy of note here. People sometimes intentionally visit specific health-related Internet sites in order to learn about health issues. Also, the Internet environment facilitates people's unintended exposure to health information because of the Internet's hypertextuality and its pop-ups or banner advertisement. That is, an Internet site that is only tangentially related to health issues may direct the site's users to a site that specializes in health information. Therefore, following Hornik and his colleagues (for an overview, see Niederdeppe et al., 2005),[5] this study included both *online health information seeking* and *online health information scanning* in the measure of *Internet use for health information*.

Other Antecedent Variables

The regression models included health information acquisition from other sources because it is possible that those who go online for health information may have high levels of interest in health; they may watch television news health sections, read health-related articles from diverse print media, and talk about health issues with family or friends. To detect the pure effects of Internet use, these other sources were controlled.

First, *print media use for health information* includes two four-point items (1 = "not at all," 2 = "less than once per week," 3 = "once per week," 4 = "a few times a week"): "Some newspapers or general magazines have sections that report on health matters. About how often have you read such health sections in the past 30 days?" and "Some special health or medical magazines or newsletters focus on health issues. About how often have you read such magazines or newsletters in the past 30 days?" (Wave 1: $M = 3.86$, $SD = 1.70$; Wave 2: $M = 3.71$, $SD = 1.63$).

[4]This ordinal variable has relatively few categories, which raises concerns about the use of OLS. When analyses were run with a dummy variable version of this variable, however, no material difference in the level of association was detected.

[5]Hornik and his colleagues (e.g., Niederdeppe et al., 2005) defined *health information scanning* as health information exposure during routine media use. And they defined *health information seeking* as active and goal-oriented health information gathering.

Second, *television use for health information* includes two four-point items asking respondents the following: "Some local or national television news programs include special segments of their newscasts which focus on health issues. About how often have you watched such health segments in the past 30 days?" and "Sometimes television shows (other than news programs) address issues about health or focus on doctors or hospitals. About how often have you watched such shows in the past 30 days?" (Wave 1: $M = 4.32$, $SD = 1.82$; Wave 2: $M = 4.26$, $SD = 1.83$).

Third, *interpersonal health communication* was measured by asking respondents to rate themselves on a four-point scale: "Some people talk with family or friends about health issues. About how often have you talked with family or friends about health in the past 30 days?" (Wave 1: $M = 2.59$, $SD = .99$; Wave 2: $M = 2.58$, $SD = 1.01$).

This study also controlled for a number of potential confounding variables: age (Wave 1: $M = 46.97$, $SD = 16.66$; Wave 2: $M = 50.36$, $SD = 17.52$), gender (Wave 1: 52.0% females; Wave 2: 53.3% female), formal education in years (Wave 1: $M = 13.48$, $SD = 2.63$; Wave 2: $M = 13.49$, $SD = 2.59$), income (Waves 1 and 2: median household income between $40,000 and $49,999), employment status (Wave 1: 60.4% employed; Wave 2: 58.5% employed), and current marital status (Wave 1: 60.7% currently married; Wave 2: 64.4% currently married).

Employment status was operationalized as 0 (temporarily unemployed; works for someone else part time; retired and not employed; disabled, student, etc., and not employed; full-time homemaker) or 1 (works for someone else full time; self-employed). Current marital status was also coded as either 0 (widowed; separated; divorced; never married) or 1 (married).

In addition, *current health status* was controlled because this has been shown to precede the relationship between health-related Internet use and health professional contact (e.g., Grilli, Ramsay, & Minozzi, 2002). Respondents rated their general health status on a six-point scale (1 = "very poor," 2 = "poor," 3 = "fair," 4 = "good," 5 = "very good," 6 = "excellent"; Wave 1: $M = 4.22$, $SD = .97$; Wave 2: $M = 4.18$, $SD = .96$).

Results

About 60% of the respondents (i.e., 58.1%) were found to use the Internet to attain health information in the past 30 days in 2005. Likewise, in 2006, 62.3% of the respondents reported that they acquired health information on the Internet.

The cross-sectional tests of the primary hypotheses are presented in Table 2, which presents four models, two for each of the two types of health professional contact. In each case, the first model presents the correlations of each independent variable with the health professional contact measures, and the second presents the final model that includes all variables.

The confounders (i.e., sociodemographics and current health status) accounted for a relatively small portion of the variance in health professional contact for health information (incremental $R^2 = 6.1\%$, $p < .001$). Even after controlling for other sources (i.e., TV, print media, and interpersonal health communication) as well as for sociodemographics and current health status, Internet use was positively linked with health professional contact for health information ($\beta = .258$, $p < .001$). Thus, Hypothesis 1 was not supported. To the contrary, Internet use had positive, rather than negative, association with health professional contact for health information.

Table 2. Hierarchical multiple regression predicting health professional contact: Cross-sectional analysis

	Health professional contact for health information		Physician visit for ailment treatment	
	Zero-order correlation coefficient	Final standardized regression coefficient	Zero-order correlation coefficient	Final standardized regression coefficient
Block 1: control variables				
Age	.120***	.063**	.201***	.113***
Gender (female = 0, male = 1)	−.113***	−.030	−.074***	−.035
Education	−.032	−.048*	−.074***	.007
Income	−.069***	−.030	−.097***	−.001
Current marital status	.018	.020	−.001	−.024
Employment status	−.167***	−.061**	−.237***	−.115***
Current health status	−.169***	−.114***	−.336***	−.293***
Incremental R^2 (%)		6.1***		15.8***
Block 2				
TV use for health information	.248***	.068**	.127***	.019
Print media use for health information	.261***	.085***	.113***	.017
Interpersonal health communication	.277***	.136***	.161***	.088***
Internet use for health information	.331***	.258***	.100***	.062**
Incremental R^2 (%)		14.6***		1.7***
Total R^2 (%)		20.6***		17.5***
N	2,132		2,099	

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

When it comes to physician visits for ailment treatment, the variance explained by sociodemographics and current health status was almost 16% (Incremental $R^2 = 15.8\%$, $p < .001$). The significant final beta showed that Internet use was positively related to physician visits for ailment treatment, after controlling for not only sociodemographics and current health status but also for other sources ($\beta = .062$, $p < .01$). This result did not support Hypothesis 2.

In addition to these cross-sectional analyses, the two-wave panel design allowed examination of the direction of the relationship between Internet use and health professional contact. While the focus of this article is on the effects of Internet use on health professional contact (e.g., increased Internet use leads to greater information seeking through health professionals), one also can hypothesize that health professional contact leads to increased Internet use. Furthermore, the relationship between Internet use and health professional contact can be reciprocal. In order to

understand the nature of the relationships between these two groups of variables, this study performed OLS hierarchical regression analyses using the two types of health professional contact at Wave 2 and Internet use at Wave 2 as the criterion variables. In these analyses, the Wave 1 variables were controlled (see Tables 3 and 4).

Table 3 provides parallel analyses to Table 2, but the outcome variables are Wave 2 health professional contacts, and Wave 1 health professional contacts are included among the predictors.

Health status, sociodemographics, other sources, and Wave 1 health professional contacts accounted for 17.1% of the variance in health professional contact

Table 3. Hierarchical multiple regression predicting health professional contact: Two-wave panel design

	Health professional contact for health information (W2)		Physician visit for ailment treatment (W2)	
	Zero-order correlation coefficient	Final standardized regression coefficient	Zero-order correlation coefficient	Final standardized regression coefficient
Block 1: Control Variables				
Age	.206***	.143**	.281***	.108*
Gender (female = 0, male = 1)	−.086*	−.045	−.058	−.023
Education	−.068	−.064	−.110**	−.006
Income	.000	.045	−.105**	−.047
Current marital status	.051	.009	.066	.050
Employment status	−.156***	.008	−.269***	−.029
Current health status	−.152***	−.020	−.372***	−.117***
TV use for health information (W1)	.160***	.021	.138***	.004
Print media use for health information (W1)	.167***	.028	.095*	.007
Interpersonal health communication (W1)	.150***	.006	.136***	−.030
Health professional contact for health information (W1)	.326***	.206***	.246***	.028
Physician visit for ailment treatment (W1)	.267***	.154***	.653***	.562***
Incremental R^2 (%)		17.1***		46.6***
Block 2: Health Information Acquisition				
Internet use for health information (W1)	.196***	.145**	.096*	.078*
Incremental R^2(%)		1.5**		0.4*
Total R^2(%)		18.6***		47.1***
N		501		501

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

for health information at Wave 2. As expected, Wave 1 health professional contact for health information was the strongest predictor. With regard to physician visit for ailment treatment, health status, sociodemographics, other sources, and Wave 1 health professional contacts accounted for 46.6% of the variance.

The results indicated that Internet use for health information leads to two types of health professional contact in the panel data analysis (see Table 3). That is, the greater the Internet use at Wave 1, the more health professional contact for health information at Wave 2 ($\beta = .145$, $p < .001$), even after controlling for the strongest predictor, health professional contact for health information at Wave 1, which shows that Hypothesis 1 was rejected. Also, the finding that Internet use at Wave 1 positively affected physician visits for ailment treatment at Wave 2, even after controlling for physician visits for ailment treatment at Wave 1, was unexpected. The effect was small but statistically significant ($\beta = .078$, $p < .05$). Thus, both the cross-sectional and panel analyses did not support Hypothesis 2.

The two-wave data allows the examination of the additional possibility that the cross-sectional association between Internet use and health professional contact, as reported in Table 2, were partly the results of the effects of health professional contact on Internet use. Internet use at Wave 2 was regressed on the two types of health professional contact at Wave 1, after controlling for Internet use at Wave 1 (see Table 4).

There was no evidence in support of a reciprocal effect. Neither type of health professional contact at Wave 1 affected Internet use at Wave 2, when Internet use

Table 4. Panel analysis of internet use for health information

	Internet use for health information (W2)
Block 1: control variables	
Age	−.049
Gender	.017
Education	.024
Income	.061
Current marital status	−.037
Employment status	−.033
Current health status	−.035
TV use for health information (W1)	.041
Print media use for health information (W1)	.052
Interpersonal health communication (W1)	−.031
Internet use for health information (W1)	.551***
Incremental R^2 (%)	34.1***
Block 2: Health professional contact	
Health professional contact for health information (W1)	−.043
Physician visit for ailment treatment (W1)	.019
Incremental R^2 (%)	0.2
Total R^2 (%)	34.3***
N	496

*$p < .05$; **$p < .01$; ***$p < .001$. Cell entries are final standardized regression coefficients.

at Wave 1 was controlled (see Table 4). These results demonstrate that Internet use affects health professional contact rather than the reverse.

Discussion

These results provide the first evidence that Internet use for health information increases the frequency of health professional contact. It was found that when people got health information on the Internet, they were more likely to seek health information from health professionals and to visit them for ailment treatment.

Three findings from this study deserve to be highlighted. First, the category of health professional contact constrains the effects that Internet use had on health professional contact. The sizes of the effects of Internet use differed in relation to the two types of health professional contact. In the cross-sectional analysis, Internet use was positively related to both types of health professional contact. Likewise, the panel analysis showed that Internet use positively affected both types of health professional contact (for health information acquisition and ailment treatment). Despite these similar patterns, the effects of Internet use on health professional contact for health information were substantially stronger (see Tables 2 and 3).

It is obvious that the results did not support the displacement hypothesis. Indeed, the results stand in contrast to the initial expectation, with Internet use leading to more physician information contact and, more surprisingly, leading to additional treatment visits. Thus, the hypothesis that there would be no effects of Internet use on treatment contact was not supported. One explanation for the results may be that people who use the Internet to find health information may become more sensitive to their health conditions and thus more likely to visit their doctors for physical care than are people who do not use the Internet in this way. There was evidence for differential effects, however, with less effect on treatment contact than information contact. That differential effect, if not so extreme as originally hypothesized, still may support a uses and gratifications framework. Type of use did predict the size of the effect, demonstrating that these two outcomes are distinct.

Second, it was found that even though use of the Internet may strengthen people's ability to question health professionals and increase people's skepticism about health professionals by heightening people's health knowledge and health awareness, people who obtain health information on the Internet still need to contact health professionals to make sense of and make use of the information. This reflects the uncertainty that is inherent in health knowledge (Freidson, 1984, 1985). In this sense, the results of this study lend some support to Freidson's conception of *professional dominance*.

Third, the result that Internet use increased the frequency of health information seeking through health professionals unlike the hypothesis demonstrates that people's health information channel consumption is not a zero-sum game. Just as a new medium can *coexist* with or *complement* old media, the Internet as a new health information provider complemented, according to the results, health professional contact.

Limitations

The major concern with this observational study is the possibility that unmeasured confounders might account for the observed relationships. For example, access to

health insurance and type of health insurance coverage can influence health professional contact, and were not controlled for in this study. By chance, while the survey did ask health insurance-related questions, they were asked of the random half sample not given some of the questions central to this analysis. Thus, these health insurance items were not available for this study. It is unlikely, however, that these results would have disappeared had access to insurance been included. First, around 88% of the other half of the sample had insurance coverage; given random assignment, this can be assumed to be true for the respondents kept in the study. Thus, the size of the effects of insurance coverage would have been limited. Second, likely predictors of insurance access (i.e., gender, age, income, and education) were included as controls. Third, Internet use for health information was not associated with insurance access in the cross-sectional survey for the random half with both types of information available. Finally, the lagged analyses included Wave 1 levels of the health professional contact; presumably Wave 1 insurance access would have been reflected in Wave 1 health professional contact. Thus, the absence of a health insurance measure would be unlikely to affect the inferences from the lagged analyses unless a large number of people changed their insurance status between waves. Looking at the random half of the sample with insurance information at both waves, we find that the percentage who changed insurance status between waves was only 19.5%. All of these reduce the concern that the failure to include a measure of health insurance explains the results.

It is possible, however, that other confounders may have influenced Internet use at one time and health professional contact at a later time, but they were unmeasured in this study. For example, if someone were concerned about slow-developing symptoms of an illness, they might look at the Internet earlier and independently of that visit a physician later. Or, someone generally interested in their health might use the Internet for health purposes and also be more likely to visit health professionals when mild illness strikes, without one influencing the other. For these reasons no definitive claim of a causal effect can be made.

Finally, it should be noted that the response rate for the Wave 2 sample is fairly low (15.8%) and thus the claim for national representativeness is rather limited. This is less problematic, however, in the following respects. First, the Wave 2 sample was not different from the baseline sample on the three critical variables (i.e., Internet use for health information, health professional contact for health information, and physician visit for ailment treatment). Second, weighting the original sample to the U.S. population distribution on crucial variables (e.g., gender, education, race-ethnicity, region, etc.) did not materially affect the distribution of this study's three critical variables, nor the coefficients in the regression results. Thus, it appears that the poor response rate did not substantially affect the representativeness of the sample.

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