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Rice, Ronald E

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INFLUENCES, USAGE, AND OUTCOMES OF INTERNET HEALTH INFORMATION SEARCHING: MULTIVARIATE RESULTS FROM THE PEW SURVEYS

Ronald E. Rice
Dept. of Communication, 4840 Ellison Hall
University of California, Santa Barbara, CA 93106-4020
Ph: 805-893-8696; Fax: 805-893-7102; rrice@comm.ucsb.edu

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This paper provides results from seven major nationally representative datasets (two in detail) from the Pew Internet and American Life Project to answer two primary questions: (1) What influences people to seek online health information, and (2) what influences their perceived outcomes from having access to this information? Cross-tabulations, logistic regressions, and multidimensional scaling are applied to these survey datasets. The strongest and most consistent influences on ever, or more frequently, using the Internet to search for health information were sex (female), employment (not fulltime), engaging in more other Internet activities, more specific health reasons (diagnosed with new health problem, ongoing medical condition, prescribed new medication or treatment), and helping another deal with health issues. Internet health seeking is consistently similar to general Internet activities such as email, news, weather, and sometimes hobbies. A variety of outcomes from or positive assessments of searching for Internet health information are predicted most strongly by sex (female), engaging in other Internet activities, Internet health information seeking including more frequent health seeking, more specific health reasons, belonging to an online support group sharing health interests, and helping another deal with an illness or major health condition.

INFLUENCES, USAGE, AND OUTCOMES OF INTERNET HEALTH INFORMATION SEARCHING: MULTIVARIATE RESULTS FROM THE PEW SURVEYS

The Internet makes it much easier for many, though not all, people to seek health information themselves, become more exposed to a wider array of health information, and become more involved in their own healthcare, for good and bad. Using the Internet for health and medical information has a variety of advantages (availability of a wide array of information, support for interpersonal interaction and social support, tailored information, anonymity), disadvantages (cost, technical language, unequal access), obstacles (overload, disorganization, complex searching commands and medical language, impermanence), and dangers (lack of peer review, inaccurate or misleading information, risk-promoting messages, online reinforcement of pathologies, addiction) (Cline & Haynes, 2001; Rice & Katz, 2001).

The Pew Internet and American Life Project has been conducting nationally representative random-digit telephone surveys on general and specific aspects of Internet use since early in 2000. This Project and the resulting surveys and reports constitute an extensive, consistent, and over-time resource for beginning to understand the range of, influences on, and outcomes from, Internet health information seeking. While the Pew Project has made available many descriptive and cross-tabulation reports from their surveys, and while there has been considerable research on Internet and health communication (see Rice & Katz, 2001), as yet, however, there has been no integrated, multivariate analysis of this exceptional resource.

This paper provides summary and integrated results from seven major datasets from the Pew Project to answer two primary questions: What influences people to seek online health information, and what influences their perceived outcomes from having access to this information? It also answers a secondary question: what other Internet activities are similar to health information seeking? The paper first summarizes (briefly!) relevant research, and basic descriptive Pew Project results, concerning basic aspects of Internet health information searching: usage, motivations, topics, source and evaluation of health information, and general outcomes. Then it introduces the seven major datasets analyzed here. Due to space limitations, detailed results are provided only from two of the datasets – one very large and general, the other very specifically focused on Internet health seekers – based on bivariate, multivariate and multidimensional scaling analyses, though summary tables from the other five datasets are provided in an Appendix. It ends by summarizing the results from all seven of the analyses through tables and a general model.

GENERAL OVERVIEW OF INTERNET HEALTH INFORMATION SEEKING, WITH DESCRIPTIVE RESULTS FROM PEW STUDIES

Usage

Even in 1997, in what appears to be the earliest national random survey comparing users to non-users regarding healthcare, 41% of US Internet users had gone online to access healthcare information resources (Katz & Aspden, 2001; Katz & Rice, 2002). Based on Pew Internet and American Life reports, the percent of Internet users has risen from around 50% in mid-2000 to around 60% by the end of 2002; the percent of those users who had ever sought health information online has risen from about 55% to about 66%; the percent of users who had sought health information the day before remained a steady 5-7%; the percent who go to health web sites that provide information or support for specific conditions or personal situations rose from 36% in June 2000 to 54% in December 2002 (Fox & Fallows, 2003). These percentages translate into 46 million adult Americans using the Internet to find health care information in March 2002; by October 2002, 73 million, and by November 2004, 95 million (Fox, 2005). The Pew reports emphasize, however, that most people search for health information only infrequently: 3-5% the prior day, 2% every day, 4% several times a week, 14% several time a month, 32% every few months, and 46% less often (Fox & Fallows, 2003). From a special sample of 500 online health seekers surveyed June-August 2001, more than half (58%) do so

every few months or less, with 4% doing so every day, 13% several times a week, and 25% several times a month (Fox & Rainie, 2002b).

In March 2001, the Pew Internet and America Life Project re-surveyed 500 respondents from those who had reported in the March 2000 survey that they had sought health information online (Horrigan & Rainie, 2002b). The average "health seeker" goes "online without a definite research plan. The typical health seeker starts at a search site, not a medical site, and visits two to five sites during an average visit. She spends at least thirty minutes on a search. She feels reassured by advice that matches what she already knew about a condition and by statements that are repeated at more than one site. She is likely to turn away from sites that seem to be selling something or don't clearly identify the sources of the information. And about one third of health seekers who find relevant information online bring it to their doctor for a final quality check" (p. 4).

From the national survey in March, 2002 (n=2410 overall) (Fox & Fallows, 2003) 62% of Internet users had gone online for health information or medical advice, with more online women (72%) than men (51%) doing so, and more online people who are older (between 50 and 64 years, 71%) than younger (between 18 and 29 years, 53%) doing so. Health seeking rises with education (from 44% for those with less than high school to 69% for college graduates), essentially no difference by race (from 60 to 62%), and more with greater Internet experience (from 46% by those with less than 6 months experience to 68% of those with three or more years experience).

The most recent Pew report surveying 537 Internet users (Fox, 2005), finds that by the end of 2004, 79% have searched online for health information Again, those most likely seeking online health information were "women, those under 65, college graduates, those with more online experience, and those with broadband access" (p. ii). However, there are no statistically significant increases in online health seekers in 2004 compared to 2002, with respect to gender, race, ethnicity, age or education. Increased years of Internet experience, and broadband access, are seen as major influences on the rise of more spontaneous and more diverse online health information seeking.

However, Internet health information, as with other Internet resources, remains inaccessible to large and specific parts of the population (Cline & Haynes, 2001; Katz & Rice, 2002). In a national survey in 2000, the Internet was used for health information less (by 32%) than were magazines (60%) and television (56%), and only a bit more than radio (30%) (Licciardone, Smith-Barbara & Coleridge, 2001). Least likely to have the tools to seek health information online are those with preventable health problems or without health insurance (Eng et al., 1998). Statistically speaking, both race and gender gaps in general Internet use is closing if they have not disappeared entirely, when other demographic variables are controlled for. Studies show that educational achievement and income, not race or gender, are the primary drivers of inequality in Internet access in the US (Katz & Aspden, 1997; Katz & Rice, 2002; Mead et al., 2003; Peterson & Fretz, 2003). Indeed, a "reverse" gender gap may emerge, as women are more likely to use the Internet for health care than are men. Physically impaired and disabled persons, though, are clearly still at a disadvantage despite the shift towards a networked society (Davis, 2002). Fox and Rainie (2002b) reported that only 38% of Americans with disabilities go online, versus 58% of all Americans, and of disabled health seekers, one-fifth report that their disability makes it difficult to go online (Fox & Fallows, 2003).

Motivations for Health Seeking

The main reasons the respondents to the June 2001 survey (Fox & Rainie, 2002b) go online for health information are: someone they know has been diagnosed with a medical condition (81%), they have been diagnosed with a new health problem of their own (58%), they are being prescribed a new medication or course of treatment (56%), they are dealing with ongoing medical condition (47%), they have unanswered questions after a doctor's visit (47%), they are deciding to change their diet or exercise habits (46%), and they are a caregiver to

someone else (38%). In December 2002, of those who had ever sought health information online (n=1017), the last time they went online for health or medical information, 37% looked for information related to their own situation, 49% for someone else's and 8% both (Fox & Fallows, 2003).

Topics

The August 2000 survey (Fox & Rainie, 2002a) indicated that online health seekers look far more for illness (91% for physical illness, 26% for mental health information) than for fitness (13%) or health care news (11%). From the June 2001 survey (Fox & Rainie, 2002b), the most frequent topics sought were a particular illness or condition (93%), nutrition/exercise/weight control (65%), prescription drugs (64%), gathering information before visiting a doctor (55%), alternative or experimental treatments or medicines (48%), mental health issue such as depression or anxiety (39%), a sensitive health topic that is difficult to talk about (33%; in the August 2000 survey, this was 16%), and a particular doctor or hospital (32%). Based on the December 2002 tracking survey data, the most popular health topics searched for by Internet users include: specific disease or medical problem (63%), certain medical treatment or procedure (46%), diet/nutrition/vitamins/nutritional supplements (44%), exercise or fitness (35%), prescription or over-the-counter drugs (345, alternative treatments or medicines (28%), down to Medicare/Medicaid (9%), problems with drugs or alcohol (8%) and how to quit smoking (6%) (Fox & Fallows, 2003). In November 2004, users were looking for primarily the same topics with the same frequency, though with increases in diet/nutrition/vitamins (51%), exercise/fitness (42%), prescription/overcounter drugs (40%), health insurance (31%), a particular doctor/hospital (28%) and experimental treatments/medicines (23%) (Fox, 2005).

Online Health Information as Social Capital

The concept of social capital provides one way to think about possible influences on, and outcomes from, seeking health information online. Social capital is a common set of expectations, a set of shared values, and a sense of trust among people (Coleman, 1988), which allows both the individual and their community to accomplish more with their physical and mental capacities than can individuals alone (Bourdieu, 1986; Putnam, 2000). Social capital, such as the value of belonging to a network or community, grows much more rapidly than the number of participants, because it is the total number of possible relationships generates potential resources (Katz & Rice, 2002). The Internet is especially suited to facilitate increased relationships. These relationships foster reciprocity norms and networks of civil engagement, inherent components of social capital. Johnsen (2003) and Kollock and Smith (1999) see the Internet, at least the non-commercial sites, as primarily a "gift economy" involving participants in ongoing relations, rather than a site for commodity transactions among self-interested, independent actors. Online communities may even provide better and different kinds of social capital than strong, familial ties. For example, online communities of patients with various kinds of terminal or serious illnesses can supply both the anonymity and objectivity that patients cannot or may not receive from family and friends, who may try to protect the patient by not providing complete feedback, or who may not feel either comfortable, or experienced enough, to provide insight about the patient's condition (Rice & Katz, 2001). However, mediated communication and information-seeking may decrease social capital as weak ties replace former strong, kinship-based ones (Magdol & Besser, 2003), and as physical and social distance are ruptured (Beniger, 1987; Calhoun, 1986; Crow et al., 2002; Gergen, 1991; Turkle, 1996).

Online Health Information as a Source for Support and Interaction

Online websites and support groups provide information, support, acceptance and a sense of real-time understanding to patients and their families and friends, and can promote better informed patients who engage their physicians more, stimulated by information they have found online (Aspden & Katz, 2001; Celio et al., 2000; McKay et al., 2001; Paterniti et al., 1999; Rice, 2001, 2003; Preece & Ghozati, 2001; Sharf, 1997; Till, 2003; Wellman, 1995; Wikgren, 2001; Williams et al., 2002; Winzelbert et al., 2003). Nine percent of health seekers in both the August

2002 (Fox & Rainie, 2002a) and the June 2001 survey (Fox & Rainie, 2002b) said they had ever participated in an online support group concerned about a particular health or medical issue, though, in the second survey, more frequent health seekers (several times a month or more) were more likely to have done so (13%). Pre-cardiac surgery patients using the Internet reported increased social support, decreased anxiety, and positive attitudes toward the upcoming surgery (Scherrer-Bannerman et al., 2000), and were helped in coping with the stress and anxiety about such surgery (Murero, D'Ancona & Karamaoukian, 2001).

41% of health seekers who got Internet information prior to a visit discussed this information with their doctors, and those that did rated the quality of the information higher (Diaz et al., 2002). The August 2002 survey (Fox & Rainie, 2002a) indicated that while only 9% have communicated online with a doctor, 61% of those who sought health information for themselves looked for Web resources in connection with a visit to the doctor. 18% of health information seekers in the June 2001 survey (Fox & Rainie, 2002b) diagnosed or treated a medical condition on their own without consulting their doctor. Only 14% asked others for advice about where to look on the Internet for health information, primarily from friends (38%) or family (38%), but sometimes from a doctor or nurse (25%). Concerning their most recent online search, 37% indicated they later talked to a doctor or health care professional about the information they found, and 79% of those said the doctor was interested in that information. See Rice & Katz, 2006, for a review and analysis of the role of online health information seeking in physician-patient interactions.

Some Problems: Evaluation, Credibility, Accuracy

Many studies report problems or concerns. Zeng et al. (2004) conducted personal interviews and observations with 97 health care consumers (from public waiting areas in cardiology clinic, and a hospital), where they asked a user to first state their health search goal, then search for that info on MEDLINEplus website, and then evaluate their searches. Concerning their most recent prior online search, 55% reported they had been successful, and 29% unsuccessful; based on their results from the experimental search, 74% indicated they would use the Internet to find more information on the topic. A study involving post-surgery patients reported that 83.3% had difficulties completely understanding the information, and a third felt the retrieved information was overwhelming (Murero, D'Ancona & Karamaoukian, 2001). And Berland et al. (2001) reported low readability of Internet health information. A national representative phone survey in 2000 found that half strongly agreed or agreed that they were comfortable using the Internet for health information (Licciardone, Smith-Barbara & Coleridge, 2001). Only 30% of respondents in an experiment by Williams et al. (2002) said they found the information they were looking for (33% maybe and 37% no), and 37% said they would use the information, 5% maybe and 58% no. The most common problems mentioned were: no new information, information too general, confusing interface/organization, and too much information to process.

An assessment of 121 websites on five common health topics evaluated their credibility (source, currency, evidence hierarchy), and their content accuracy. While nearly all (93%) described the source, only 49% exhibited currency and 18% provided an evidence hierarchy (Kunst et al., 2002). Only 24% of the sites met more than two-thirds of the published health guidelines for that health topic; 35% met between one and two-thirds, and 41% less than a third of the guidelines. Higher levels of two credibility measures -- source and evidence hierarchy – were not significantly associated with accuracy, while even currency credibility was only weakly associated with accuracy (r=.21). Berland et al. (2001) also reported that Internet health information provides poor and inconsistent coverage of important clinical information. Not that experts' ratings of health-related Internet sites are necessarily consistent or reliable either. An analysis of 8 randomly selected threads from a total of 61 threads (beginning with a start question and followed by several responses) of an Internet newsgroup about a common chronic

illness found that experts' ratings themselves had very low reliability (Craigie, Loader, Burrows & Muncer, 2002).

So many conclude, as does Culver et al. (1997, p. 47), that online support groups are a mixture of "snake oil" and "self-help," preventing appropriate diagnosis and treatment. Indeed, researchers consistently find problems with the quality of online health information, in commercial sites as well as on discussion lists, Usenet newsgroups, and online support groups. Internet health and medical information often deviates from recognized safety standards, is seldom updated, does not offer advice on avoiding drug interactions, and promotes unconventional medicine (Cline & Haynes, 2001; Consumers International, 2003; Currò et al., 2003; Potts & Wyatt, 2002; Rice, 2001, 2003; Rose et al., 1998; Veronin, 2002; Wikgren, 2001).

Internet users are naturally more likely to expect that they could obtain reliable information about health or medical conditions than non-users (81% vs. 45% in the September 2002 survey) (Horrigan & Rainie, 2002a). Further, almost half (46%) of Internet users (compared to 8% of nonusers) feel that the next time they need reliable information about health or medical conditions they would try to find it online, while 47% (vs. 79% of nonusers) report they would contact a medical professional (Horrigan & Rainie, 2002a). Of those in the September 2002 survey (n=2092 respondents, 1318 Internet users) (Horrigan & Rainie, 2002a) who do seek health care information online, 58% report they would first go online for reliable health care information, while 35% say they would first contact a medical professional. Percentages for all Americans were 31% turning to the Internet and 59% contacting a medical professional (Horrigan & Rainie, 2002a). Nonetheless, only slightly more than half (52%) of all users in the Pew March-August 2000 survey of 521 online health information users felt they could believe most of the Internet health info, with no difference across health status (Houston & Allison, 2002).

Concerning assessment of the credibility of health sites, about one quarter of the Pew June 2001 respondents (Fox & Rainie, 2002b) say they always check the source, date, and privacy policy of a site; one quarter say they check the source, date and privacy policy most of the time; and half say the hardly ever or never check these. These least vigilant health seekers report the lowest levels of improvement in the way they take care of their health due to the Internet, visit fewer sites, spend less time during their searches, and less likely to take to a medical professional about their retrieved health information.

A variety of approaches have been proposed or developed for assessing and indicating the quality of Internet health information (Agency for Health Care Policy and Research 1999; Wilson, 2002); however, Risk (2002) is skeptical about the utility of any of these approaches. There are also many technical, legal, economic, and attitudinal barriers to the widespread or largely beneficial use of online health information and services (Berg, 2002; Katz, Rice, & Acord, 2004; Rice, 2003).

Outcomes

In the August 2000 survey (Fox & Rainie, 2002a), 91% of online health seekers reported they had learned something new, 55% said it improved how they get medical and health information, 48% said the online advice had improved the way they take care of themselves, and 47% who had looked for health information for themselves during their last Internet search indicated the information affected their decisions about care and treatments. In the June 2001 survey (Fox & Rainie, 2002b), 16% of online health information seekers said it had a major impact, and 52% said a minor impact, on their own health care routine or the way they helped care for someone else. Of the online health information seekers in the December 2002 survey (Fox & Fallows, 2003), 73% reported that the Internet had improved the health and medical information and services they received, and 14% said it had not improved.

80% of health seekers in the June 2001 survey reported that they found most or all of what they were looking for online, with slight declines with greater age. Those who completed successful searches reported these outcomes: affected a decision about how to treat an illness or

condition (44%), led them to ask a doctor new questions or get a second opinion (28%), changed their approach to maintaining their own health or health of someone they care for (34%), changed the way they think about diet, exercise, and stress (30%), changed the way they cope with a chronic condition or manage pain (25%), and affected a decision about whether to see a doctor or not (17%). Based on a Pew January 2002 survey (n=1415 Internet users) (Kommers & Rainie, 2002), 26% of Internet users who helped another person deal with a major illness, and 24% who dealt with a major illness themselves, said that the Internet played a crucial or important role (Kommers & Rainie, 2002).

Other Related Research

Of course, there is extensive prior research on health website credibility, accuracy, user evaluation, and psychological and behavioral outcomes. Books are now beginning to review and integrate this literature (Rice & Katz, 2001; Murero & Rice, 2006), including health benefits (Baker, Wagner, Singer & Bundorf, 2003; Moyer et al., 2002; Murero, D'Ancona & Karamaoukian, 2001; Pastore, 2001; Scherrer-Bannerman, 2000) and online health information quality (Berland et al., 2001; Bock et al., 2004; Craigie, Loader, Burrows & Muncer, 2002; Culver, Gerr, & Frumkin, 1997; Donald, Lindenberg & Humphreys, 1998; Dutta-Bergman, 2003; Greenspan, 2002; Houston & Allison, 2002; Kunst et al., 2002; Licciardone, Smith-Barbara & Coleridge, 2001; Michael et al., 2003; Murero, D'Ancona & Karamaoukian, 2001; Oravec, 2000; Pastore, 2000; Pastore, 2001; Stephen and McLeod, 1998; Williams et al., 2002; Zeng et al., 2004). The following analyses are limited to the evaluation and outcomes measures included in the Pew studies, however.

GOALS AND METHOD

The general goal of the following analyses is to identify more precisely the influences on both online health information seeking, on reported benefits from such health seeking, and similarities among Internet activities, than the descriptive statistics and cross-tabulation results provided by the Pew reports. Because the Pew reports provide descriptive and cross-tabulation results, this paper provides four succinct summary analyses on the two datasets.

(1) Cross-tabulations and other bivariate associations of health seekers/non-health seekers with relevant Internet measures, demographics, and other relevant variables as they are available in the particular dataset, are used to identify significant bivariate associations with health-seeking. (2) When available, multiple Internet activities along with health-seeking activity measures are multidimensionally scaled to identify how online health-seeking fits into the overall pattern of Internet information-seeking activities. (3) The significant individual predictors are entered into a regression explaining health-seeking, and (4) health seeking and its predictors, as well as other relevant/available measures of health seeking, are entered into a regression to explain the outcomes measured in each dataset.

The data analyzed below were obtained through telephone interviews, using stratified national random sampling and random digit dialing, conducted by Princeton Survey Research Associates, for the Pew Internet in American Life Project, and, along with the reports and methodological and sampling details, are posted on the Pew Project website (www.pewinternet.org). General-purpose surveys, called "tracking" surveys, are conducted regularly, and sometimes combined at the end of each year to provide a year-long summary of responses. They necessarily include only a few questions about any specific topic (and thus only a few health seeking measures). Special-purpose surveys consist of smaller samples of specific kinds of Internet users identified from prior surveys. Table I lists and provides sample sizes for the seven Pew datasets analyzed here. Detailed analyses are based upon one large-sample general "tracking" survey (study A) and one small special survey focusing on health seekers in particular (study G), but results from all seven datasets are summarized in final tables and a visual model, and Appendix A provides summary regression results from studies B through F.

-- Table I Goes About Here --

A. INTERNET HEALTH INFORMATION SEEKING, 2000

Data and Measures

This data set combines all the individual rolling surveys for most of the year in 2000 (Pew Internet and American Life, 2001). Nearly two-thirds (62.8%, n=13978) of those who responded to the question ("Do you ever go online to access the Internet or World Wide Web or to send and receive email?") had ever used the Internet. Of those Internet users, 56.3% reported they had sought health information on the Internet ("Do you ever….Look for health or medical information"). A total of 15 reported Internet activities, other than health seeking, for which there were at least 8,600 respondents was computed (mean = 6.48, s.d. = 2.8, range 0-14).

Results

The detailed associations between three categories of users (non-users, Internet users but not health-seekers, and Internet health-seekers) and primary demographic, media, and initial Internet usage are not provided here because general issues and analyses of Internet digital divide have been extensively analyzed elsewhere (see Rice & Katz, 2001). However, to summarize those cross-tabulation differences, women are more likely to be health seekers, or not Internet users, than men, but less likely to be Internet users and not health seekers. Those who are younger are more likely to be Internet users, and at every age group above 24, Internet users are more likely to be health seekers than not. Those with more education are more likely to be users, and as more education, they are disproportionately more likely to be health seeker than just Internet users. The decreasing order of Internet use and of health seeking by race is Whites, Other, Hispanic, then Blacks. Those with greater income are more likely to be Internet users, and more likely to be health seekers than non-health-seeking Internet users. Those who first started using the Internet earlier are more likely to be health seekers, and new users are disproportionately less likely to be online health seekers. Fulltime workers and those who are married (or living as married) are least likely to be Internet users but not health seekers.

-- Table II Goes About Here --

Table II shows the cross-tabulations considering Internet users who have not sought Internet health or medical information, and users who have. Internet health information is associated with being female, older, higher education and income, white/non-Hispanic, non-fulltime employment, married or living as married, parent or guardian of a child under 18 living at home, read newspaper yesterday, watched TV news yesterday, more years since first went online, and being engaged in more other Internet activities.

Figure One shows the results from a multidimensional scaling of the 15 separate Internet activities from this dataset. Looking for health information is located in the upper-right quadrant, characterizable as a mostly general interest with a mostly specific goal, in the same area as using the Internet for email, hobbies, news, weather, buy online product, financial information, and doing research for a job. It is most distant from sports, downloading music, and listening to music online.

-- Figure One Goes About Here --

To explain whether one is an online health information seeker or not (a binary variable), a binary logistic regression was used. Total Internet activities and time since first starting to use the Internet were entered conditionally in the first block, and the significant bivariate demographic variables entered conditionally in the second block. Table III shows that the final significant explanatory variables were more total other Internet activities, female, older, not fulltime employment, and slightly lower income (R-sq=.16).

-- Table III Goes About Here --

Finally, the influences on the one reported benefit from online health information seeking in this dataset: "the way you get information about health care" (1=a lot, 15.7%; 2=some, 20.7%; 3=only a little, 17.2%; 4=not at all, 46.4%; m=2.94, s.d. = 1.14, n=1903) were analyzed by linear multiple regression. Again, online health information seeking, total of other Internet activities, and time since first going online were entered stepwise in the first block, with the demographic variables entered stepwise in the second block. Table III also shows that the final significant

explanatory variables were seeking online health information, more total other Internet activities, slightly lower education, and nonwhite (adjusted R-sq=.29).

G. HEALTH SEEKERS SURVEY, JUNE 2001

Data and Measures

500 Internet users who go online for health care information were telephone interviewed from June 19 – August 6, 2001 (Fox & Rainie, 2002b). They were identified from a pre-screened sample of Internet users who in past surveys had identified themselves as seekers of health information on the Internet, with a 54% response rate. Thus, this sample may be biased to the extent that those willing to be interviewed again had different situations or behaviors than those who were originally surveyed and used the Internet for health information or advice, but did not respond to the callback survey.

As this survey focused on health and medical issues, it contained a large number of health-related items. These were analyzed for dimensionality and reliability in order to prepare a smaller set of relevant scales.

Seven <u>reasons for going online to seek health information or advice</u> were subjected to principal components analysis, varimax rotation. Each of the items was answered as 1=yes or 2=no, so higher values mean less of these reasons. Three components emerged. The first consisted of "Health" reasons: Being diagnosed with a new health problem of your own (loading = .81), Dealing with an ongoing medical condition, like diabetes or high blood pressure (.72), Being prescribed a new medication or course of treatment (.66), with explained variance of 24.1%. A "health" mean scale was constructed, with an alpha reliability of .60. The second consisted of "Access" reasons: Not having the time to visit your physician (.83), and Being unable to get a referral or an appointment with a specialist (.78), with explained variance 19.5%. As the reliability was .50, only the first variable was used. The third consisted of "Significant Other" reasons: Someone you know being diagnosed with a medical condition (.77) and Being a caregiver to someone else (.76), explained variance 18.3%. As the alpha was .38, only the first variable was used.

Seven <u>reasons for deciding NOT to use information found on a health web site</u> were subjected to principal components analysis, varimax rotation, resulting in a single component explaining 41.2% of the variance. The constituent items and their loadings were: The site appeared sloppy or unprofessional (.65), You couldn't determine the source of author of the information (.70), You couldn't determine when the information was last updated (.63), The site was too commercial and seemed more concerned with selling products than providing accurate information (.67), The site lacked the endorsement of an independent organization you trust (.64), The information disagreed with your own doctor's advice (.51) and The site contained other information you knew to be wrong (.67). The resulting mean scale had an alpha reliability of .76. Each of the items was answered as 1=yes or 2=no, so higher values mean less of these reasons.

Nine items asked about <u>types of health information sought during use of the Internet</u> were subjected to principal components analysis, varimax rotation. While three components emerged (explaining 17.5%, 16.2% and 12.8% variance, respectively), none of the resulting scales had an alpha reliability exceeding .5. Therefore, we used only the highest-loading item on each of the three components: Diagnose or treat a medical condition on your own, Look for information about a sensitive health topic that is difficult to talk about, and Look for information about a particular doctor or hospital. Each of the items was answered as 1=yes or 2=no, so higher values mean less of these types of information.

Six items asking about <u>effects of the information found online</u> were subjected to principal components analysis, varimax rotation. The first component included Change your overall approach to maintaining your health or the health of someone you help take care of (.79) and Change the way you think about diet, exercise, or stress management (.81), with explained variance of 29.9%, and a resulting mean scale alpha reliability of .60. The second component

had only one sufficiently high-loading item, so that item was used separately: Lead you to ask a doctor new questions, or to get a second opinion from another doctor? Each of the items was answered as 1=yes or 2=no, so higher values mean less of these effects.

Two items representing whether the user engaged in more dialogic or interactive health communication online were subjected to principal components analysis, varimax rotation: Ever participated in an online support group or email list for people concerned about a particular health or medical issue (.79) and Ever signed up for an electronic newsletter that emails the latest health news or medical updates (.79), with an explained variance of 63.1%. As the resulting scale reliability was .40, these two items were used separately. Each of the items was answered as 1=yes or 2=no, so higher values mean less interactive communication with online health sources.

Results

The first set of analyses focuses on how more frequent users of the Internet for health information or advice differ from less frequent users. General characteristics were Motivations, Outcomes, Use and Evaluations, Health History, and Demographics. Frequency of using Internet to look for advice or information about health or health care was measured on the survey as 1=every day (4%), 2=several times a week (13%), 3=several times a month (25%), 4=every few months (43%), or 5=less often (15%). For cross-tabulation analyses, this was dichotomized into 0=low (every few months, or less often) or 1=high (several times a month or more often), but was maintained in its original coding for regressions.

-- Table IV Goes About Here --

Table IV presents results of simple tests of mean differences, or, chi-square tests of cross-tabulations for categorical characteristics. For each category of characteristics, more frequent online health seekers were more likely to do the following:

- Demographics – Have lower family income; Rate their own health less positively
- Motivations -- Seek online health information for health reasons; Seek online health information because of problems with physician access; Use the Internet to diagnose or treat a medical condition on your own, without consulting your doctor; and Look for information about a sensitive health topic that is difficult to talk about
- Use and Evaluations – Engage in dialogic online interaction; Believe the health information they see on the Internet
- Outcomes – Say that the Internet had improved the way you take care of your health.

The results from a multiple linear regression of those dichotomized categorical variables, or non-categorical variables, listed above that had significant mean differences (except relating to specific search engines or websites), on extent of online health seeking (not dichotomized) are shown in Table V. More frequent online health seeking is explained by (R-sq=6%) by more health reasons for going online, greater belief in the credibility of online health information, and a lower rating of one's current health.

-- Table V Goes About Here --

Finally, we analyzed influences on the five outcome variables, using the extent of online health seeking, and the variables significantly associated with online health seeking as indicated above. We first assessed whether these outcome variables represented one or two underlying dimensions. A principal components analysis found one dimension indicated by three outcomes: able to find information (loading=.62), health reasons (.70), and improve how one takes care of health (.69). The three-item alpha reliability was .33, and the five outcome variables were only intercorrelated from .10, n.s. to .31 p<.01, so five separate regressions were run.

Table V provides the results. (1) An improvement in the way one takes care of their health was predicted by more health reasons for going online, more frequent online health seeking, participation in an online support group, and greater perceived credibility of online health information (25% variance explained). (2) A greater ability to find the online health information one is looking for was predicted only by perceived online health information credibility (11%). (3) Whether using Internet health information changed how one deals with

their medical condition or health was predicted by more health reasons for going online, looking for sensitive health topics that are difficult talk about, and diagnosing a medical condition on one's own without consulting a doctor (5%). (4) Being more likely to ask one's doctor new questions or seek a second opinion from another doctor only for those who have more health reasons for going online (4%). (5) Reporting oneself or another being significantly helped by following online health information was predicted by participating in an online support group, looking for sensitive or difficult to talk about topics, and diagnosing a medical condition without consulting a doctor (7%).

DISCUSSION

This paper has summarized results from seven major datasets (two in detail) from the Pew Internet and American Life Project; developed scales from sets of items that represented influences, usage, and outcomes; assessed how health seeking is located multidimensionally among Internet activities; and applied multivariate analyses that controlled for usage and related Internet activities to explain health seeking and outcomes associated with that health seeking. These analyses considerably extend the ongoing descriptive and cross-tabulation results from the Pew Project surveys that included, or emphasized, Internet health information seeking, as the individual studies of Internet and health communication by prior researchers.

These results show that some aspects of the digital divide associated with general Internet usage are also associated with health seeking; however, they are fewer, less powerful, and in many cases no longer influential once they are considered in a multivariate fashion. Table VI summarizes the explanatory variables that are significant bivariate or multivariate explanations for Internet health seeking, or frequency of such health seeking. Income and sex continue to influence health seeking, but more exposure to Internet usage (typically between years 2 and 3), and to other Internet activities, seem to be consistent factors explaining health seeking. Certainly individual health concerns, such as poorer personal health condition, more health-oriented reasons for going online, having a disability/handicap/chronic disease that prevents participation in activities, and seeking information about sensitive topics that might be difficult to talk about with others (including one's doctor) influence using the Internet for health information seeking.

-- Table VI Goes About Here --

Not only is health seeking related (slightly) to the total number of other Internet activities one engages in, but the multidimensional scaling analyses of up to 25 other Internet activities locate health seeking as fairly close to the set of general Internet activities (news, weather, email, finding information about a service, product or hobby) but is a bit more specific or goal-oriented. Further, it is quite different than online transaction activities, or very niche-oriented activities (making reservations, online auctions, stocks, listening to or downloading music).

-- Table VII Goes About Here --

As Table VII shows, the reported outcomes from searching for Internet health information (except for one survey, very simply measured) are predicted by health information seeking, other Internet activities, time since first going online, and number of specific health-related searches – all reasonable behavioral influences. Participating in online support groups, credibility, difficulties in gaining access to a doctor, being non-white, looking for sensitive topics that are difficult to talk about, and making one's own diagnoses also played a role, depending on the nature of the outcome.

This set of analyses extends our understanding of two of the basic questions concerning Internet health information seeking – what influences that activity, and what outcomes seem to follow from that activity. Both the range and the specificity of these analyses, derived from seven major Pew surveys, provide more context, as well as general support, for some of the significant claims concerning Internet use in general and health information in particular. Of course, these analyses also stimulate additional questions and approaches. Certainly we know much more today than even a few years ago about the problems, uses, nature, and outcomes associated with Internet health information seeking.

AUTHOR'S NOTE

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Table I.
Reports and Datasets Used in the Present Study.

Study	Survey date	Report or codebook	Sample sizes
Representative surveys: General and specific			
A	Mar 2000 – Dec 2000	*Codebook for Pew Internet and American Life's Year 2000 Tracking Dataset.* Pew (2001).	26,094 during the year 8265 nonusers 13978 users 7846 health seekers 3851 missing
B	Jul 2000 - Aug 2000	*Codebook for Pew Internet and American Life's Year July-August 2000 Tracking Dataset.* Pew (2000).	2109 1115 users 627 health seekers
C	Mar 2000 - Dec 2002	*Internet Health Resource.* July 16, 2003 Fox, S. & Fallows, D. (2003).	2463 1494 users 987 health seekers
D	Jan 2002	*Use of the Internet at Major Life Moments.* May 8, 2002 Kommers, N. & Rainie, L. (2002).	2391 1478 users 865 health seekers
Specifically sampled surveys: Internet health and medical information seekers			
E	Mar 2000 and Mar 2001	*Getting Serious Online.* Mar 3, 2002 Horrigan, J. & Rainie, L. (2002b).	Mar 2000: 723 users of 956 412 health seekers Mar 2001: 862 users of 1501, with data from many of those who also answered the Mar 2000 survey answered both (42%) 521 health seekers
F	Jul 2000 - Aug 2000	*The Online Health Care Revolution.* Nov 26, 2000 Fox, S. & Rainie, L. (2002a).	521 health seekers
G	June 2001	*Vital Decisions.* May 22, 2002 Fox, S. & Rainie, L. (2002b).	500 health seekers

Table II.
Demographics and Media Use by Internet/Health Information User (Mar-Dec, 2000) (Pew, 2001) (Study A).

Variables	Search for health or medical information			
Sex	Yes have done this		No have never done	
Men	42.5%		60.7%	
Women	57.4		39.3	
Chi-sq = 445.7 ***		7846		6082
Age				
18-24	12.9%		23.7%	
25-34	24.3		24.0	
35-44	28.1		21.3	
45-54	21.1		17.4	
55-64	9.0		8.5	
65+	4.7		5.2	
Chi-sq = 309.5 ***		7697		5951
Education				
< High School	2.6%		4.7%	
HS Grad	22.9		28.0	
Some College	30.0		28.7	
College +	44.4		38.6	
Chi-sq = 105.7 ***		7805		6045
Race				
White Non-Hisp	79.7%		77.6%	
Bl Non-Hisp	8.6		8.3	
Hispanic	5.9		7.5	
Other	5.8		6.6	
Chi-sq = 18.8 ***		7712		5986
Income				
<$10K	3.2%		4.4%	
<$20K	6.2		6.4	
<$30K	11.5		12.6	
<$40K	14.7		14.1	
<$50K	13.4		13.4	
<$75K	22.5		21.2	
<$100K	13.6		13.2	
>$100K	14.9		14.7	
Chi-sq = 17.2 *		6519		4915
Employment				
Full time	65.1%		67.0%	
Otherwise	34.9		33.0	
Chi-sq = 5.3 *		7804		6041
Marriage				
Married/living as	63.4%		53.3%	
Otherwise	36.6		46.7	
Chi-sq = 144.1 ***		7787		6025
Parent/guardian (child<18)				

Yes	44.7%	36.4%
No	55.3	63.6
Chi-sq = 97.8 ***	7823	6061
Read newspaper yesterday		
Yes	45.2%	42.3%
No	54.8	57.5
Chi-sq = 11.3 ***	7844	6078
Watched TV news yesterday		
Yes	64.1%	58.6%
No	35.9	41.4
Chi-sq = 43.1 ***	7824	6068
Watched non-News TV Yesterday		
Yes	55.0%	56.5%
No	45.0	43.5
Chi-sq = 1.2	2887	2406
When first started going online		
< 6 mos	10.6%	15.7%
1 year	18.1	20.0
2-3 years	33.4	33.1
> 3 years	37.9	31.2
Chi-sq = 118.6 ***	7832	6058
Sum 14 other Internet activities	m=7.1 (sd 2.7)	m=5.7 (sd 2.7)
t-test = 30.2 ***	7836	6040

Table III.
Explaining Seeking Internet Health or Medical Information and Improved Way of Getting Information about Health Care (Mar-Dec, 2000) (Pew, 2001) (Study A).

Binary Logistic Regression Explaining Seeking Internet Health or Medical Information (0=no 1=yes).

Explanatory variables	B (unstandardized) coefficient
Sex (1m 2f)	1.01 ***
Age	.02 **
Income	-.03 *
Employment (1full 2other)	.11 *
Time since first went online	.08 ***
Total other Internet activities	.23 ***
	Negelkerke R-sq = .16, Chi-sq = 1467.2 ***, n=11400

Linear Multiple Regression Explaining Improved Way of Getting Information about Health Care (1=lot to 4=not at all).

Explanatory variables	Standardized beta coefficient
Education	.06*
Race (0nonwhite 1white)	.07***
Total other Internet activities	-.16***
Seek online health information	-.47***
	Adj R-sq = .29, F = 187.4 ***, n=1868

* *p*<.05; ** *p*<.01; *** *p*<.005

Table IV.
Mean Differences Between Low and High Internet Health Information Seekers for Motivations,
Uses and Evaluations, Health History, Demographics, and Outcomes; Cross Tabulations between
Low/High Health Seekers and Search Characteristics (June, 2001) (Fox & Rainie, 2002b) (Study
G).

Variables	N	Mean	Frequency of using Internet to look for advice or information about health or health care (every few months or less vs several times month or more) Means for low users / high users if t-test significant
Demographics			
Sex (1m 2f)	500	1.61	
Age (in years)?	492	44.09	
What is the last grade or class you completed in school? (0=none - 7=postgrad)	496	5.28	
Race (0=nonwhite, 1=white)	488	.91	
Last year, that is in 2000, what was your total family income from all sources, before taxes. (1=<$10K - 8=>$100K)	406	5.44	5.61/5.2 *
Employment (1=fulltime, 2=other)	493	1.38	
Marriage (1=married/living as married, 2=other)	495	1.32	
Parent or guardian of any children under age 18 now living in your household? (1y 2n)	498	1.56	
How many telephone lines or numbers does your household have, including those that you receive calls on, as well as those you use for computers or fax machines?	491	1.58	
Motivations			
Reasons to seek health info online: Specific health, a=.60 diagnosed with new health problem; ongoing medical condition; prescribed new medication or treatment. (1y 2n)	500	1.46	1.51/1.39 ***
Reasons to seek health info online: not have time to visit physician. (1y 2n)	499	1.86	1.90/1.81 **
Reasons to seek health info online: unable to get referral or appt. (1y 2n)	499	1.92	1.94/1.89 ***
Reason to seek health info online: someone you know diagnosed wth a new health problem. (1y 2n)	499	1.40	
Reasons not to use health info online: Mean scale, a=.76; 7 negative characteristics. (1y 2n)	464	1.66	
Used Internet to...diagnose or treat a medical condition on your own, without consulting your doctor? (1y 2n)	500	1.82	1.86/1.77 **
Used Internet to...look for information about a	499	1.67	1.71/1.62 *

sensitive health topic that is difficult to talk about? (1y 2n)			
Used Internet to...look for information about a particular doctor or hospital? (1y 2n)	500	1.68	1.72/1.62 *
Health history			
In general, how would you rate your own health? (1=excellent - 4=poor)	499	1.86	1.77/1.98 ***
Does anyone else in your household have a disability, handicap, or chronic disease that keeps them from participating fully in work, school, housework, or other activities, or not? (1y 2n)	500	1.91	
In the past 12 months, have you been treated for a serious or life-threatening health condition? (1y 2n)	497	1.89	
In the past 12 months, how many times have you, yourself...Made a doctor visit?	496	3.05	
In the past 12 months, how many times have you, yourself... Had an overnight stay in a hospital? (0=none - 7=7 or more)	495	.19	
In the past 12 months, how many times have you, yourself... Gone to an emergency room for medical treatment? (0=none - 7=7 or more)	495	.31	
Use and evaluations			
How much of the health information you see on the Internet do you think you can believe? (1=all or almost all - 4=none)	500	2.1	2.2/1.98 ***
About how many different web sites do you usually visit or browse when looking for health information? (1=2-3 - 5=>20)	423	1.81	
How often do you look to see who provides the information on the health web sites you visit? (1=always - 5=never)	431	2.41	
Assess privacy, date, source of health information (1=indifferent, 2=casual, 3=vigilant)	497	1.81	
Before you began your search, did you get advice from friends, family members, or a health care provider about where on the Web to look for health information? (1y 2n)	500	1.86	
Overall, would you say it was easy or difficult to find online the health information you were looking for? (1=very easy - 4=somewhat difficult)	390	1.49	
Online interaction: online support group. (1y 2n)	499	1.91	1.94/1.87 **
Online interaction: e-newsletter. (1y 2n)	497	1.81	1.86/1.74 ***
Outcomes			
Online info affected health care routine: a=.66. how to treat condition; overall approach to maintain health; way cope with condition or pain; way think about diet, exercise, stress. (1y 2n)	383	1.67	
Did the information you found online... Lead you to ask a doctor new questions, or to get a second opinion from another doctor? (1y 2n)	391	1.62	

Overall, how much has getting health and medical information on the Internet improved the way you take care of your health? (1=lot - 4=not at all)	500	2.41	2.58/2.17 ***
When you go online to look for information about health or health care, how often are you able to find the information you are looking for? (1=always - 5=never)	499	1.96	
Have you or has anyone you know been significantly helped by following medical advice or health information you found on the Internet? (1y 2n)	482	1.67	

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

Table V.
Explaining Frequency and Outcomes of Internet Health Seeking (June, 2001) (Fox & Rainie, 2002b) (Study G).

Multiple Linear Regression Explaining Frequency of Internet Health Seeking.

Explanatory variables	Frequency of using Internet to look for advice or information about health or health care (1=daily to 5=less than every few months)
Mean health reasons for going online (diagnosed with new health problem; ongoing medical condition; prescribed new medication or treatment; 1y 2n)	.19 ***
How much of the health information on Internet think you can believe? (1=all or almost all – 4=none)	.13 **
Rate own health (1=excellent - 4=poor)	-.14 **
	Adj R-sq = .06, F-ratio = 12.2 ***, n = 497

Multiple Linear Regressions Explaining Outcomes from Internet Health Information Seeking.

Explanatory variables	Improved way take care of your health? (higher = less)	Able to find info looking for? (higher = less)	Change how deal with condition or health? (1y 2n)	Ask doctor new questions, or get 2nd opinion from another doctor? (1y 2n)	You or other significantly helped by following online health info? (1y 2n)
How often go online for information about health or health care (1=daily – 5=less than every few months)	.16 ***				
Mean health reasons for going online (diagnosed with new health problem; ongoing medical condition; prescribed new medication or treatment; 1y 2n)	.30 ***		.11 *	.21 ***	
Online support group (1y 2n)	.17 ***				.19 ***
How much of the health information you see on the Internet do you think you can believe? (1=all or almost all - 4=none)	.21 ***	.33 ***			
Look for info about a sensitive health topic that is difficult to talk about? (1y 2n)			.12 *		.12 *
Diagnose or treat a medical condition on your own, without consulting your doctor? (1y 2n)			.15 **		.11 *
Adjusted R-sq	.25	.11	.05	.04	.07
F-ratio	42.1 ***	60.9 ***	8.0 ***	17.7 ***	12.1 ***
N	494	493	380	388	476

Note: Values are standardized beta coefficients; * p< .05; ** p<.01; *** p<.001

Table VI.
Summary of Significant Bivariate and Multivariate Influences on Internet Health or Medical Information Seeking (Binary Seeking, or Frequency of Seeking), by Pew Dataset.

	Representative samples; non-health seekers and health seekers					Health seekers only	
	A	B	C	D	E	F	G
Dataset and overall sample size	26094	2109	2463	2391	1501	521	500
Dependent health seeking variable	seek	seek	seek	seek	seek	freq	freq
R-sq explained	.16	.32	.18	.28	.28	.05	.06
Explanatory variables							
Sex	bm *	bm *	bm *	bm *	bm *	--	--
Age	bm	bm	b	bm	--	--	--
Education	b	bm	--	b	--	--	--
Race	b	--	b	--	--		--
Income	bm	--	--	--	--	b	b
Employment	bm	bm *	--	--	--		--
Marriage	b	b	bm	b	--		--
Parent/guardian (child<18)	b		b	bm			--
Read newspaper yesterday	b	b	b	--	--		
Watched TV news yesterday	b	b	--	--	--		
Watched non-News TV Yesterday	--						
When first started going online	bm	b	b	b		--	
Sum current year other Internet activities	bm *	b	bm	bm *	bm		
Sum prior year other Internet activities					bm *		
Search prior year for health or medical information					bm		
How important this way might use Internet to get health info: anonymously		b					
How important this way use Internet to get health info: get any time		bm					
How important this way use Internet to get health info: more info online than other sources		b					
In past 12 mos, visited Dr. or medical clinic			b				
Diability, handicap, chronic keep you from participating			b				
Multiple specific health reasons			bm *				

In last 2 yrs, dealt with own major illness/health condition	b			
In last 2 yrs, helped another deal with major illness/health condition	bm *			
11 major life events	--			
Outgoing		--		
Group sociability		--		
Public sociability		--		
Family closeness		--		
Friend closeness		--		
Ever looked about physical illness or condition that you or someone you know has		--		
Ever bought medicine or vitamins online		--		
Ever participated in online support group about health issue	b			
Ever used email or web site to communicate with a doctor	b			
Ever described medical condition/problem online for advice from online doctor	b			
Had your own health web site	b			
If searched for health information for yourself, when, relative to visiting doctor/clinic	b			
Search for weather information			bm *	
In general, how would you rate your own health?			bm	bm
How much of the health information you see on the Internet do you think you can believe?				bm
Participate in online support group				b
Subscribe to e-newsletter				b
Reason: multiple specific health issues				bm *
Reason: not have time for physician				b
Reason: unable to get referral				b
Reason: diagnose self				b
Reason: sensitive topic				b
Reason: info on doctor or hospital				b

Note:

Dependent health seeking variable:

seek=seeker of Internet health and medical information or not

freq=frequency of seeking Internet health and medical information

Explanatory variable:

blank = not in dataset

-- = in dataset but not significant influence

b = significant in bivariate analyses (cross-tabulation, t-test)

m = significant in multivariate analyses (binary logistic regression, linear multiple regression)

* = strongest influences (largest B or Beta coefficients)

Table VII.
Summary of Significant Multivariate Influences on Evaluations/Outcomes of Internet Health
Information, by Pew Dataset.

Dataset, sample size	Outcome variables	Variance explained	Explanatory variables
Representative samples; non-health seekers and health seekers			
A 26094	Improved way of getting information about health care	29%	Internet activities * Health seeking * Education; Race
C 2463	Improved health and medical information services received	9%	Health seeking Read newspaper yesterday Multiple specific health reasons * Disability/handicap
D 2391	Internet played role in how you dealt yourself with a major illness or other health condition	13%	Internet activities * Health seeking
	Internet played role in how you helped another deal with a major illness or other health condition	14%	Internet activities * Health seeking Helped deal w/major illness of self, other
E 1501	Improved way of getting information about health care	38%	Internet activities same year Health seeking same year * Health seeking prior year * Sex
Health seekers only			
F 521	How useful was the online health information	4%	Health seeking frequency * Health web site
	If searched for health information for others, affect decisions about health treatments or the way you take care of others	7%	Health seeking frequency * Health web site
G 500	If searched for health information for yourself, affect decisions about health treatments or the way you take care of yourself	25%	Health seeking frequency Multiple specific health reasons * Online support group Credibility
	Able to find information looking for	5%	Credibility *
	Affect how to deal with condition or health	4%	Multiple specific health reasons * Sensitive topic; Diagnose self
	Lead you to ask doctor new questions, or opinion from 2nd doctor	11%	Multiple specific health reasons
	Significantly helped you or other	7%	Online support group * Sensitive topic; Diagnose self

Note: Dataset B did not include a health outcome variable.
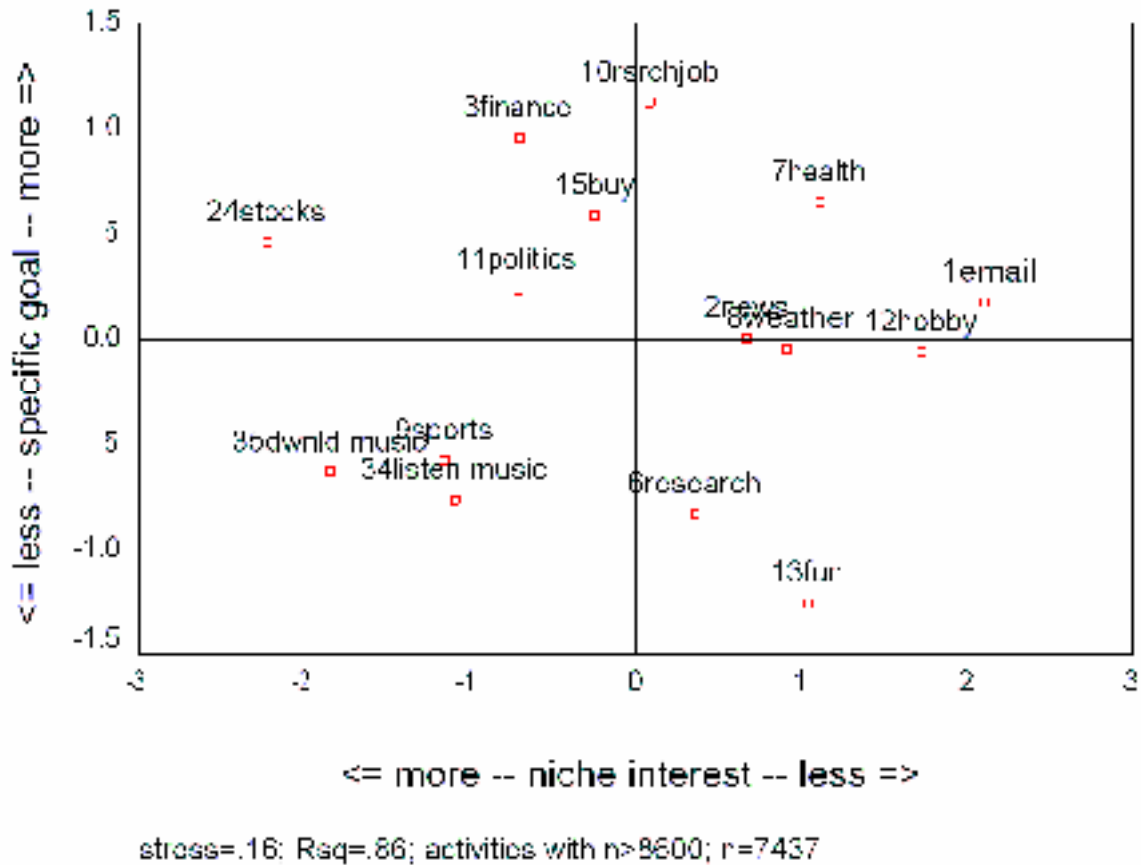* = strongest influences (largest B or Beta coefficients)

Figure 1.
Multidimensional Scaling Plot of 15 Internet Activities, Including Health Seeking (Mar-Dec, 2000) (Pew, 2001).

Note: Activites are *Buy* (buy a product online, such as books, music, toys or clothing); *Dwnldmusic* (download music files onto your computer so you can play them at any time you want); *Email* (send or read email); *Finance* (get financial information such as stock quotes or mortgage interest rates); *Fun* (go online for no particular reason, just for fun or to pass the time); *Health* (look for health or medical information); *Hobby* (look for information about a hobby or interest); *Listenmusic* (listen to music online at a web site for a radio station, music store, recording artist or music service); *News* (get news online); *Politics* (look for news or information about politics or the campaign); *Research* (do research for school or training); *Rsrchjob* (not including email, do any type of work or research online for your job); *Sports* (check sports scores and information); *Stocks* (buy or sell stocks, mutual funds, or bonds); and *Weather* (look for weather or forecast information).

Appendix A.
Summary Regression Results from Studies B-F.

Study B (Jul-Aug, 2000) (Pew, 2000):

Binary Logistic Regression Explaining Seeking Internet Health or Medical Information (0=never 1=ever)	
Explanatory variables	**B (unstandardized) coefficient**
Sum 17 other Internet activities	.21 ***
Sex (1m 2f)	.93 ***
Age (yrs)	.03 ***
Education	.24 **
Employment	.45 **
How important this way might use Internet to get health info: get any time	-.76 ***
	Negelkerke R-sq = .32, Chi-sq = 279.5 ***, n=1046

Note: Internet use (sum other Internet activities, years since first going online) were entered conditionally in the first block, and other variables significant in cross-tabulations were entered conditionally in the second block.

Study C (Dec, 2002) (Fox & Fallows, 2003):

Binary Logistic Regression Explaining Seeking Internet Health or Medical Information (0=No 1=yes)	
Explanatory variables	**B (unstandardized) coefficient**
Total other Internet activities	.23 ***
Sex (1m 2f)	.61 ***
Married (1marr/livmarr 2 other)	-.31 *
Specific searching scale (specific disease or medical problem, certain medical treatment, experimental treatments or medicines, alternative treatments or medicines, prescription or OTC drugs)	3.8 ***
	Negelkerke R-sq = .38, Chi-sq = 479.6 ***, n=1482

Note: Usage variables (years since first going online, total Internet activities) entered forward conditionally in first block; then demographics and health variables entered forward conditionally in second block.

Linear Multiple Regression Explaining Improved the Health and Medical Information and Services You Receive (1=no improvement, 2=both/neither, 3=improved)	
Explanatory variables	**Standardized beta coefficient**
Internet health seeking (0n 1y)	.06 ***
Read newspaper yesterday (1y 2n)	.06 *
Specific searching scale (specific disease or medical problem, certain medical treatment, experimental treatments or medicines, alternative treatments or medicines, prescription or OTC drugs) (Mean 1y)	.21 ***
Disability, handicap, chronic keep you from participating (1y 2n)	.07*
	Adj R-sq = .09, F = 27.5 ***, n=1132

Note: Usage variables (years since first going online, total Internet activities, health seeking) entered in first block, stepwise; then demographics and health measures entered in second block, stepwise.

Study D (Jan, 2002) (Kommers & Rainie, 2002):

Multiple Regression Explaining Seeking Internet Health or Medical Information (0=never 1=ever)	
Explanatory variables	**B (unstandardized) coefficient**
Sum 13 other Internet activities	.35 ***
Sex (1m 2f)	.74 ***
Age (yrs)	.03 ***
Parent/guardian (1y 2n)	-.27 *
In last 2 yrs, dealt with, or helped another deal with, major illness or health condition (sum 0n, 1y)	.73 ***
	Negelkerke R-sq = .28, Chi-sq = 318.3 ***, n=1366

Note: Internet use (sum other Internet activities, years since first going online) were entered conditionally in the first block, and other variables significant in cross-tabulations were entered conditionally in the second block.

Multiple Regression Explaining Role of Internet in Dealing with Major Illness/Health Condition, for Self and for Helping Another (1=crucial – 4=no role)		
	How you dealt yourself	**How you helped another deal**
Explanatory variables	**Standardized beta coefficient**	**Standardized beta coefficient**
Use Internet to seek online health or medical information	-.17 **	-.14 ***
Total number of 13 other Internet activities	-.27 ***	-.29 ***
In last 2 yrs, dealt with own major illness/health condition; helped another deal with major illness/health condition (sum, 0n 1y)	--	-.08 *
	Adj R-sq = .13, F = 19.3 ***, n=250	Adj R-sq = .14, F = 30.7 ***, n=552

Note: Internet use (sum other Internet activities, years since first going online, online health seeking) were entered stepwise in the first block, and other variables significant in the binary logistic regression predicting Internet health information seeking were entered stepwise in the second block. Then, to maximize sample size, only the significant predictors in that regression were used, entered stepwise, in the final regression.

Study E (March 2000 and March 2001) (Horrigan & Rainie, 2002b):

Binary Logistic Regression Explaining Seeking Internet Health or Medical Information in 2001 (0=no 1=yes)	
Explanatory variables	**B (unstandardized) coefficient**
Internet health seeking 2000	1.6 ***
Total other Internet activities 2000	-.05 ns
Total other Internet activities 2001	.15 ***
Sex (1m 2f)	.51 ***
	Negelkerke R-sq = .28, Chi-sq = 150.6 ***, n=653

Note: Health seeking and total other Internet activities from 2000 entered forward conditionally first block; total other Internet activities 2001 and time since first going online entered forward conditionally second block; sex entered third block. Internet activities 2000 kept in final equation, even though non-significant, to control for prior Internet usage.

Binary Logistic Regression Explaining Improved Way of Getting Information about Health Care in 2001 (1=lot to 4=not at all)

Explanatory variables	Standardized beta coefficient
Internet health seeking 2000	-.21 ***
Internet health seeking 2001	-.41 ***
Total other Internet activities 2001	-.15 ***
Sex	-.13 ***
	Adj R-sq = .38, F = 102.8 ***, n = 655

Note: Health seeking and total other Internet activities from 2000 entered stepwise first block; healt seeking and total other Internet activities 2001 and time since first going online entered stepwise second block; sex entered third block.

Study F (Jul-Aug, 2000) (Fox & Rainie, 2002a):

Explanatory variables	Standardized Beta Coefficients
Multiple Regression Explaining Frequency of Seeking Internet Health or Medical Information (1=once/week – 4=less than every few months)	
Ever check online weather reports and forecasts (1y 2n)	.20 ***
Own health condition (1=excellent – 4=poor)	-.12 **
	Adj R-sq = .05, F = 13.1 ***, n=517
Multiple Regression Explaining Overall, How Useful Was the Health Information You Got Online? (1=very useful – 4=not at all useful).	
Frequency of online health information seeking (1=once/week – 4=less than every few months)	.14 **
Have own health web site (1y 2n)	.12 **
	Adj R-sq = .04, F = 10.9 ***, n=512
Multiple Regression Explaining If Searched for Health Information for Others, Affect Decisions About Health Treatments or the Way You Take Care of Others (1y 2n)	
Frequency of online health information seeking (1=once/week – 4=less than every few months)	.18 **
Have own health web site (1y 2n)	.18 **
	Adj R-sq = .07, F = 9.8 ***, n=221

Note: The few relevant significant bivariate predictors were entered together stepwise.

p<.05; ** *p*<.01; *** *p*<.005