

When Do Older Adults Turn to the Internet for Health Information? Findings from the Wisconsin Longitudinal Study

Kathryn E. Flynn, PhD,¹ Maureen A. Smith, MD, MPH, PhD,² Jeremy Freese, PhD^{3,4}

¹Center for Clinical and Genetic Economics, Duke University, Durham, NC, USA; ²Department of Population Health Sciences, University of Wisconsin Medical School, Madison, WI, USA; ³Department of Sociology, University of Wisconsin, Madison, WI, USA; ⁴Robert Wood Johnson Scholars in Health Policy Research Program, Harvard University, Cambridge, MA, USA.

BACKGROUND: Understanding how and when patients use nonphysician sources of health information is important to facilitate shared decision making within provider outpatient visits. However, little is known about which older adults seek health information on the internet or when.

OBJECTIVE: To determine how patient characteristics are related to seeking health information online and to the timing of these searches in relation to doctor visits.

PARTICIPANTS: Six thousand two hundred and seventy-nine respondents (aged 63 to 66 years) who completed the 2004 round of phone and mail surveys (70% response) as part of the Wisconsin Longitudinal Study Graduate Sample.

MEASUREMENTS: Self-reported use of the internet to search for health information and timing of use.

RESULTS: One-third of respondents had searched online for information about their own health or health care. Half of these searched for health information unrelated to their last doctor visit, while 1/3 searched after a visit, and 1/6 searched before. Among respondents with internet access at home or work, years of education (odds ratio [OR]=1.09, confidence interval [CI]=1.06 to 1.13) and openness-to-experience (OR=1.26, CI=1.16 to 1.36) were positively associated with searching online for health information irrespective of timing in relation to doctor visits. Compared with those who had never sought health information online, sicker individuals (especially those with cancer, OR=1.51, CI=1.14 to 1.99) were more likely to seek information online after a doctor visit. Attitudinal and personality factors were related to seeking health information online before or unrelated to a visit.

CONCLUSIONS: There are important differences in the timing of online health information searches by psychological and health characteristics among older adults with internet access.

KEY WORDS: medical informatics; aging; decision making; doctor-patient relationships; survey research.

DOI: 10.1111/j.1525-1497.2006.00622.x
J GEN INTERN MED 2006; 21:1295-1301.

Patients' desire for health information is well established.^{1,2} However, physicians are often unable to satisfy patients' need for information, as the U.S. health care system was designed to deliver tests, procedures, and drugs rather than knowledge.³ At the same time, increased patient autonomy in making treatment decisions is encouraged.⁴ The trend toward fuller patient participation in health care decision making has resulted in specific recommendations in medical school curricula to promote shared decision making between providers and patients.⁵ Yet, one study testing a well-established model of shared decision making⁶ showed little evidence

of patient involvement in information exchange during prescription drug consultations.⁷

Understanding how patients use nonphysician sources of health information is important to facilitating shared decision making within doctor visits. There is substantial evidence that patients obtain health information from sources other than physicians.⁸⁻¹² Given the explosion of the internet as a means of sharing information, it is not surprising that it is an increasingly common source of health information as well.^{11,13,14} Patients who have researched their conditions on the internet report improved understanding of health care issues,¹⁵ and many feel empowered by their expertise.¹⁶

Still, many people do not use the internet to look for health information. Previous research suggests that females, younger people, and those with more education or higher incomes are more likely to seek health information online;^{8,13,17-19} however, these differences are not explained by access alone (the so-called digital divide).²⁰ Even among people with internet access there are still differences between those who use it to seek health information and those who do not. While some studies have suggested positive associations between better health and using the internet to gather health information,^{8,13,17} others suggest the opposite effect of health status,¹⁵ with those self-reporting fair or poor health more frequently using the internet for health information and subsequently discussing the information found online with their health care provider.²¹ Previous studies have also shown motivational factors (e.g., high risk for disease, outcome expectancy, self-efficacy) to predict using the internet as a health information resource.²²⁻²⁵

Previous research has examined who seeks health information online, but less is known about when patients turn to the internet for health information and whether characteristics of the patient or the doctor-patient relationship are related to the timing of this search. Preparing for an upcoming health care visit by seeking information online *before* that visit may help patients participate in decision making during a visit. Conversely, seeking information *after* a visit may suggest that patients need more information or support than they received at their health care visit. Seeking information online *instead* of visiting a doctor could be problematic given the variable quality of health information on the internet.²⁶ Formal strategies that physicians can use to assist patient participation in health care decision making (e.g., decision aids) may be more successful if we better understand how patients are using nonphysician sources of health information, such as the internet, to seek health information.

We examine use of the internet to look for health information as well as the timing of use in relation to a doctor visit using

No conflicts of interest to declare.

Address correspondence and requests for reprints to Dr. Flynn: Center for Clinical and Genetic Economics, Duke Clinical Research Institute, PO Box 17969, Durham, NC 27715 (e-mail: kathryn.flynn@duke.edu).

Manuscript received February 6, 2006

Initial editorial decision May 31, 2006

Final acceptance August 15, 2006

data from the Wisconsin Longitudinal Study (WLS), a large-scale, population-based cohort of older adults. In addition, we examine associations between online health information seeking and sociodemographic, cognitive, health, personality, attitudinal, and doctor-patient relationship characteristics.

METHODS

Data Collection

The WLS graduate survey is composed of a 1/3 random sample ($N=10,317$) of men and women who graduated from Wisconsin high schools in Spring 1957. Surveys have been conducted in 1957 (in school), 1975 (phone), 1992 (phone and mail), and 2004 (phone and mail). The WLS has collected information on social background, youthful aspirations, schooling, military service, labor market experiences, family characteristics, social participation, psychological characteristics, health, well-being, and retirement. Additional information about the WLS is available online.²⁷ In 2004, all surviving WLS graduates ($N=9,018$, most aged 63 to 66) were fielded for contact via telephone and consented for research. Phone interviews were conducted and audio-recorded using computer-assisted techniques. WLS graduates were also mailed a 55-page paper mail-back survey. The overall response rate for the telephone and mail surveys was 70% (Table 1). Our analysis sample included everyone who completed the 2004 phone and mail surveys and reported having internet access at home or using the internet at work ($N=4,528$). This study was approved by the Institutional Review Board at the University of Wisconsin-Madison.

Variables

Our 2 dependent variables were measured using new items from the 2004 mail survey. The first asked, "Have you ever used the internet to look for advice or information about YOUR health or health care?" The second assessed timing, "The last time you looked for information for yourself, did you happen to go looking for this health information . . ." with answer categories "before visiting a doctor or clinic," "after visiting a doctor or clinic," "instead of visiting a doctor or clinic," and "unrelated to visiting a doctor or clinic."

Sociodemographic characteristics included gender, marital status, number of children, rural or farm origin, high school cognitive score (Henmon-Nelson test of Mental Ability,²⁸⁻³⁰ 1954 revision, standardized to have a mean of 0 and standard deviation [SD] of 1), educational attainment (in years), and health insurance status. Insurance was self-reported and recoded into 5 categories—private insurance, Medicare and supplemental private insurance, Medicare with or without additional public insurance, Medicaid or military coverage, and uninsured.

Measures of health included the physical and mental component summary scores of the SF-12,³¹ which are standardized to have a mean of 50 and SD of 10 in the general population,³² with higher scores indicating better health. We also included the number of common illnesses and conditions according to the Duke Older Americans Resources and Services (OARS) schedule.³³ We included indicators for 8 of these conditions: asthma, cancer, diabetes, irritable bowel syndrome, chronic heart disease, stroke, high blood pressure, and joint problems. Lastly, we included a count of the number of prescription medications taken regularly.

Personality was assessed using a 5-factor model that includes extraversion, agreeableness, conscientiousness, neuroticism, and openness-to-experience.³⁴ Twenty-nine items, a subset of the BFI-54,³⁵ represented this 5-factor model of personality (5 items for neuroticisms, 6 per factor otherwise). Response categories were measured on a 6-point scale from 1=agree strongly to 6=disagree strongly. Items were reverse scored when appropriate, summed, and then standardized to have a mean of 0 and SD of 1, where higher values correspond to more of that factor. For individuals who did not answer all items in a given factor ($N=414$), we imputed a score based on gender and the 1992 mail survey measures of the same construct.

We included one variable to assess respondents' perceived effort toward their own health. It read, "I work hard to stay healthy," coded on a 5-point scale from 1=agree strongly to 5=disagree strongly. Four items assessed preferences for information exchange and decision making with physicians during health care visits based on the Charles model of decision-making process.³⁶ These items were reverse scored when necessary so that a higher value indicates a preference for more information exchange or personal participation in decisions. Informa-

Table 1. Response Rates, Internet Access, and Use in the WLS

Year or Survey Item	#	Comment
1957 in school survey	10,317	1/3 random sample of all Spring 1957 high school graduates
2004 viable sample	9,018	Not confirmed dead
2004 phone survey completed	7,265	80% response rate
2004 mail survey completed	6,845	76% response rate
Participants: 2004 phone and mail surveys completed	6,279	70% response rate
Have computer at home	4,698	75% of participants
Have internet access at home	4,286	68% of participants
Use internet at work	1,621	Asked of 50% random subsample. 1,379 of these had access at home
Access: self-reported internet access at home or used at work	4,528	72% of participants
Ever searched for health information online	2,123	34% of participants, 47% of those with access
Timing of last online health search*		
Before doctor visit	305	14% of online health seekers
After doctor visit	645	30% of online health seekers
Instead of doctor visit	54	3% of online health seekers
Unrelated to doctor visit	1,073	51% of online health seekers

*Percentages do not sum to 100 due to 2% nonresponse on this survey item.
WLS, Wisconsin Longitudinal Study.

tion exchange items read, "When there is more than one method to treat a problem, I should be told about each one,"³⁷ and "I believe that my doctor needs to know everything about my medical history to take good care of me." Items assessing preference for participation in decisions read, "I would rather have my doctor make the decisions about what's best for my health than to be given a whole lot of choices,"³⁸ and "The important medical decisions should be made by my doctor, not by me."³⁷

Length of relationship with a usual provider was measured in years, with those who did not report having a usual provider coded as 0.

Statistical Analysis

For each covariate, we calculate adjusted odds ratios (ORs) and 95% confidence intervals (CIs) for 2 multivariable models: (1) binary logistic regression model of the use of the internet for health information and (2) multinomial logistic regression model of the timing of information seeking. Data were analyzed using SAS 9.1³⁹ and Stata SE 9.1.⁴⁰

We conducted 2 sensitivity analyses. To examine whether there were differences related to internet access, we expanded analyses to include all respondents who completed both the phone and mail surveys, regardless of access ($N=6,279$). The results from this sample were very similar to those from the main analyses, but when they were different we note it in our results. Because we were concerned that attitudinal and preference variables may be endogenous (as they were measured simultaneously with the dependent variables), we re-estimated our models after excluding the attitudinal and preference variables. No differences were seen in other explanatory variables, so we present results of the models that include both attitudinal and preference variables.

RESULTS

The WLS has maintained extremely high response rates over time for the original sample (Table 1). Among all participants, 1/3

had searched for health information online. Of the 4,528 respondents who had internet access at home or used the internet at work, 47% had searched for health information online. Of these, over half of respondents' most recent internet searches about health were unrelated to a doctor visit, about 1/3 occurred after a visit, and the remaining 1/6 before a visit. For regression analyses, we combined "instead of" and "unrelated to" responses because of small numbers in the "instead of" category. We refer to the combined category as "unrelated to."

Sample characteristics are described in Table 2.

Factors Predicting Internet Use and Timing of Use

Females were significantly more likely than males to have searched the internet for health information compared with not searching, while those with more children were significantly less likely (Table 3). More years of education and higher high school cognitive scores corresponded to increased odds of online information seeking compared with not seeking.

When internet use was further described by the timing of use, being female was associated with seeking information unrelated to a visit. Having more children was associated with decreased odds of seeking unrelated to a visit. Higher high school cognitive ability was associated with seeking information before or after a visit. Educational attainment was associated with information seeking irrespective of timing. Compared with individuals with private insurance, individuals with Medicare (with no supplemental insurance) had less than half the odds of seeking information online before a doctor visit compared with never seeking health information online.

Sensitivity analysis suggested that among all participants (not just those with access), marital status (OR=1.32, CI=1.12 to 1.55) and rural or farm origin (OR=0.84, CI=0.72 to 0.98) were significant predictors of seeking health information online, while number of children was no longer statistically significant. The effect of high school cognitive

Table 2. Unadjusted Characteristics of WLS Respondents with Internet Access ($N=4,528$)

Variable	Percent	Variable	Mean (SD)
Female	52	# Of children	3.1 (1.7)
Married	82	High school cognitive ability*	0 (1)
Rural or farm origin	19	Educational attainment (years)	14.1 (2.4)
Health insurance		SF-12 [†]	
Private	57	Physical component	49.2 (9.4)
Medicare+other private	30	Mental component	55.6 (6.2)
Medicare without private	8	# Of OARS conditions [‡]	3.5 (2.4)
Other public	2	# Of prescription medications	2.7 (2.5)
None	3		
Specific diseases and conditions		Personality [§]	0 (1)
Asthma	9	Work hard to stay healthy	4.1 (0.74)
Cancer	11	Want to be told all options	4.6 (0.55)
Diabetes	11	Want doctor to know entire medical history	4.5 (0.63)
Irritable bowel syndrome	9		
Chronic heart disease	15	Want many choices	3.6 (1.13)
Stroke	3	Want to make decisions	3.5 (1.14)
High blood pressure	47	Length with usual provider (years)	9.1 (8.9)
Joint problems	57		

*Measured in high school using Henmon-Nelson test, 1954 version, standardized.

[†]Short Form-12 summary scores.

[‡]Duke Older Americans Resources and Services schedule of common conditions.

[§]Five-factor model, standardized.

^{||}Measured on a 5-point scale, 1=agree strongly to 5=disagree strongly.

WLS, Wisconsin Longitudinal Study; OARS, Older Americans Resources and Services.

Table 3. OR (95% CI) Comparing Never Sought Health Information on the Internet to Ever Sought and the Timing of Seeking by Sociodemographic Characteristics* Among WLS Respondents with Internet Access (N=4,528)

Variable	Ever sought health information on internet (N=2,123)	Sought info before doctor visit (N=305)	Sought info after doctor visit (N=645)	Sought info instead of or unrelated to doctor visit (N=1,127)
Female	1.23 (1.06, 1.43)	1.34 (0.99, 1.81)	1.12 (0.9, 1.4)	1.30 (1.09, 1.56)
Married	1.07 (0.89, 1.29)	0.86 (0.61, 1.22)	1.10 (0.84, 1.43)	1.09 (0.87, 1.36)
# Of children	0.95 (0.91, 0.99)	1.03 (0.96, 1.12)	0.97 (0.91, 1.02)	0.92 (0.88, 0.97)
Rural or farm origin	0.91 (0.77, 1.07)	0.93 (0.67, 1.31)	0.92 (0.72, 1.18)	0.92 (0.76, 1.13)
High school cognitive ability [†]	1.14 (1.05, 1.24)	1.18 (1.00, 1.38)	1.25 (1.12, 1.41)	1.09 (0.99, 1.2)
Education	1.09 (1.06, 1.13)	1.12 (1.05, 1.19)	1.07 (1.03, 1.13)	1.10 (1.06, 1.14)
Health insurance				
Private	1.00	1.00	1.00	1.00
Medicare+other private	1.12 (0.97, 1.3)	1.23 (0.92, 1.63)	1.08 (0.87, 1.34)	1.14 (0.95, 1.36)
Medicare without private	1.00 (0.77, 1.3)	0.44 (0.22, 0.89)	0.96 (0.65, 1.4)	1.21 (0.89, 1.63)
Other public	1.21 (0.75, 1.96)	0.39 (0.09, 1.66)	1.61 (0.88, 2.95)	1.13 (0.62, 2.05)
None	1.25 (0.81, 1.93)	1.20 (0.52, 2.79)	0.87 (0.43, 1.78)	1.52 (0.93, 2.49)

*Adjusted for all other variables in the table as well as health, psychological, and doctor-patient relationship characteristics.

[†]Measured in high school using Henmon-Nelson test, 1954 version, standardized.

OR, odds ratio; CI, confidence interval; WLS, Wisconsin Longitudinal Study.

ability was a significant predictor across all timing categories (point estimates were the same).

While SF-12 mental and physical health scores were not significant predictors of seeking health information online, other health measures did predict seeking health information online (Table 4). Having more OARS conditions corresponded to increased odds of seeking versus not seeking, with similar effects across all timing categories. Most notably, having been diagnosed with cancer corresponded to a nearly 50% increased odds of seeking health information online after a doctor visit compared with never seeking. The number of regularly taken prescription medications also significantly increased the odds of seeking information online after a doctor visit compared with never seeking.

With one exception, personality and attitudinal variables predicted seeking health information online before or unrelated to a visit (Table 5). An SD increase in conscientiousness, which is associated with self-discipline and ambition,³⁴ corresponded to decreased odds of searching for health information online unrelated to a visit compared with never searching. An SD increase in neuroticism, which is associated with anxiety, self-

consciousness, and emotional instability,³⁴ was associated with a 20% increased odds of seeking health information online before a doctor visit. An SD increase in openness-to-experience, which is associated with creativity and a preference for novelty,³⁴ corresponded to 26% increased odds of seeking regardless of timing. A 1-point increase in reporting working hard to stay healthy (measured on a 5-point scale) corresponded to a 17% increased odds of ever seeking health information online and a 40% increase in odds of seeking that information before a doctor visit.

Doctor-patient relationship variables were not significantly associated with seeking information, with one exception. A preference for being given a lot of choices rather than letting a doctor make decisions about what's best for health was associated with increased odds of seeking health information online before or unrelated to a doctor visit.

DISCUSSION

There has been some question about true usage of the internet for seeking health information, with estimates ranging from 20% of all U.S. adults¹⁵ to over 50%.⁴¹ In the WLS sample,

Table 4. OR (95% CI) Comparing Never Sought Health Information on the Internet to Ever Sought and the Timing of Seeking by Health Characteristics* Among WLS Respondents with Internet Access (N=4,528)

Variable	Ever sought health information on internet (N=2,123)	Sought information before doctor visit (N=305)	Sought information after doctor visit (N=645)	Sought information instead of or unrelated to doctor visit (N=1,127)
SF-12 [†]				
Physical	1.00 (0.99, 1.00)	0.98 (0.97, 1.00)	0.99 (0.98, 1.00)	1.00 (0.99, 1.01)
Mental	1.00 (0.98, 1.01)	1.00 (0.98, 1.02)	0.99 (0.98, 1.01)	1.00 (0.99, 1.01)
# Of OARS conditions [‡]	1.10 (1.05, 1.16)	1.09 (1.00, 1.19)	1.09 (1.02, 1.17)	1.11 (1.05, 1.18)
Asthma	1.06 (0.82, 1.37)	1.03 (0.64, 1.66)	0.86 (0.6, 1.24)	1.18 (0.88, 1.59)
Cancer	1.10 (0.89, 1.36)	1.30 (0.88, 1.92)	1.51 (1.14, 1.99)	0.82 (0.63, 1.07)
Diabetes	0.95 (0.75, 1.19)	1.21 (0.79, 1.85)	0.84 (0.61, 1.16)	1.00 (0.75, 1.32)
Irritable bowel syndrome	1.05 (0.82, 1.35)	1.31 (0.85, 2.02)	1.25 (0.89, 1.75)	0.89 (0.65, 1.21)
Chronic heart disease	0.97 (0.79, 1.2)	1.04 (0.69, 1.55)	0.96 (0.72, 1.29)	0.96 (0.74, 1.24)
Stroke	1.18 (0.77, 1.8)	0.88 (0.38, 2.07)	1.19 (0.68, 2.09)	1.29 (0.78, 2.14)
High blood pressure	0.90 (0.77, 1.05)	1.06 (0.78, 1.43)	0.90 (0.72, 1.12)	0.84 (0.7, 1.01)
Joint problems	1.01 (0.86, 1.18)	1.07 (0.77, 1.47)	0.96 (0.76, 1.21)	1.00 (0.83, 1.22)
# Of prescription medications	1.02 (0.98, 1.05)	1.00 (0.93, 1.07)	1.07 (1.02, 1.13)	0.99 (0.94, 1.03)

*Adjusted for all other variables in the table as well as sociodemographic, psychological, and doctor-patient relationship characteristics.

[†]Short Form-12 summary scores.

[‡]Duke Older Americans Resources and Services schedule of common conditions.

OR, odds ratio; CI, confidence interval; WLS, Wisconsin Longitudinal Study; OARS, Older Americans Resources and Services.

Table 5. OR (95% CI) Comparing Never Sought Health Information on the Internet to Ever Sought and the Timing of Seeking by Psychological and Doctor-Patient Relationship Characteristics* Among WLS Respondents with Internet Access (N=4,528)

Variable	Ever sought health information on internet (N=2,123)	Sought information before doctor visit (N=305)	Sought information after doctor visit (N=645)	Sought information instead of or unrelated to doctor visit (N=1,127)
Personality				
Extraversion	0.96 (0.9, 1.04)	0.97 (0.84, 1.11)	0.96 (0.87, 1.07)	0.96 (0.89, 1.05)
Agreeableness	0.99 (0.92, 1.07)	0.90 (0.78, 1.05)	1.05 (0.94, 1.17)	0.97 (0.88, 1.06)
Conscientiousness	0.92 (0.86, 1.00)	0.94 (0.82, 1.09)	0.98 (0.88, 1.09)	0.88 (0.81, 0.97)
Neuroticism	1.03 (0.95, 1.11)	1.20 (1.03, 1.41)	1.08 (0.96, 1.21)	0.96 (0.87, 1.05)
Openness-to-experience	1.26 (1.16, 1.36)	1.29 (1.11, 1.5)	1.28 (1.15, 1.43)	1.24 (1.13, 1.36)
Attitudes				
Work hard to stay healthy	1.17 (1.06, 1.29)	1.40 (1.15, 1.71)	1.10 (0.95, 1.26)	1.15 (1.02, 1.3)
Want to be told all options	1.11 (0.97, 1.27)	1.20 (0.91, 1.58)	1.00 (0.82, 1.22)	1.16 (0.99, 1.37)
Want doctor to know history	1.02 (0.91, 1.15)	0.95 (0.76, 1.18)	1.07 (0.91, 1.27)	1.01 (0.88, 1.16)
Want many choices	1.10 (1.03, 1.18)	1.20 (1.03, 1.39)	1.07 (0.96, 1.18)	1.11 (1.02, 1.21)
Want to make decisions	1.01 (0.95, 1.09)	0.99 (0.86, 1.14)	1.08 (0.97, 1.19)	0.99 (0.91, 1.07)
Relationship with usual provider				
Length (in years)	1.00 (0.99, 1.00)	0.99 (0.98, 1.01)	0.99 (0.98, 1)	1.00 (0.99, 1.01)

*Adjusted for all other variables in the table as well as sociodemographic and health characteristics.

OR, odds ratio; CI, confidence interval; WLS, Wisconsin Longitudinal Study.

34% of respondents had used the internet to search for information about their own health or health care. It is worth pointing out that having internet access at home or work was not a necessary condition for using the internet to search for health information, as 6% of the WLS respondents who had searched for health information online did not report such access.

In addition to education and other factors previously associated with online health seeking behavior, our results show a large number of additional factors that explain variation in use. Furthermore, examination of the timing of this information seeking in relation to doctor visits offers important insight into when older adults are using the internet to supplement the information they receive at visits: (1) educational attainment and openness-to-experience predicted ever using the internet to look for health information irrespective of the timing of searches in relation to doctor visits, (2) health and disease-related variables predicted seeking health information after or unrelated to a visit, while (3) psychological variables (with one exception) predicted seeking health information before or unrelated to a visit. It appears that for "health-minded" or otherwise anxious individuals, when the internet is used for information gathering, it is done so before a visit. This behavior may be preparation for a visit or it may have even prompted the visit (e.g., in the case of more neurotic patients). Conversely, for sicker individuals, when the internet is used for information gathering, it is done after doctor visits, perhaps to assist in processing health information.

In some studies, better health has been associated with increased health information seeking online,^{8,13} while in others the opposite effect of health status has been found.¹⁵ In the WLS sample, those with more diagnosed conditions or illnesses were more likely to have ever sought health information online, and those with more regularly taken prescription medications were more likely to have sought information online after a doctor visit specifically. These results offer support for a "procrastination hypothesis," in which individuals delay health education until they are actually presented with a health crisis.⁴²

Although personality factors have not been related previously to seeking health information online, we were not surprised to see that openness-to-experience was related to health

information seeking on the internet, given that openness is associated with adopting new technologies and using technologies for new purposes.³⁴ Likewise, it is reasonable that individuals who reported working hard to stay healthy were most likely to seek health information online before a visit, as this is a concrete way to prepare for a visit and make the most of limited time with a provider.

We were intrigued by the result showing that a preference for being given many treatment choices was a significant predictor of health information seeking but a preference for who (doctor or patient) makes the important decisions was not. Previous research has demonstrated large differences between preferences for complete information and choices versus preferences for actually making decisions,^{10,37,43,44} and our results again highlight these differences. Patients clearly want information and treatment choices from their doctors regardless of their desire to actually make the final treatment decision. It is essential that strategies to promote shared decision making recognize this distinction.

The main limitation of this study is the generalizability of our results. Although WLS graduates are generally representative of non-Hispanic white women and men with a high school education, constituting approximately 67% of all Americans aged 60 to 64,⁴⁵ they are not a random sample of the country. African American cancer patients have previously been shown to have high desires for health information, comparable with white patients,^{44,46} while Mexican and Korean Americans have demonstrated more family-centered views with regard to information.⁴⁶ Moreover, the question of how minority groups use the internet to look for health information in relation to doctor visits remains unanswered by our data and requires future examination. Lastly, our dependent variables are based on respondent self-reporting of behaviors. The most serious problem with nonthreatening behavioral questions is that human memory is fallible. We used several techniques to reduce this potential bias including asking specific close-ended questions and asking only about whether an event had occurred and not the number of times.⁴⁷

The internet's potential to facilitate patients in gathering information is unparalleled, and there are significant differ-

ences among older adults, not only in who is searching the internet for health information, but in the timing of this behavior in relation to doctor visits. Our results corroborate previous findings regarding sicker people's online health seeking as well as offer new insights into how psychological mechanisms affect information seeking behavior outside of doctor visits. An important next step will be to determine the outcomes associated with patients seeking health information online⁴⁸ and whether these outcomes vary by the timing of or motivation for seeking. Examples of significant outcomes might be increased patient confidence in interacting with physicians, improved patient understanding of health information, and reduced visit- or disease-related anxiety. While at least one study has suggested that seeking health information online affects patients' involvement in the decision-making process,¹⁶ that has been challenged elsewhere,¹⁵ and further investigation is warranted. It will also be important to further clarify what role physicians ought to play in encouraging patients to use the internet to supplement the information exchange in visits.⁴⁹

Kathryn Flynn was supported by dissertation grant R36-HS015544 from the Agency for Healthcare Research and Quality and a postdoctoral research fellowship awarded by Johnson & Johnson.

This research uses data from the Wisconsin Longitudinal Study (WLS) of the University of Wisconsin-Madison. Since 1991, the WLS has been supported principally by the National Institute on Aging (AG-9775 and AG-21079), with additional support from the Vilas Estate Trust, the National Science Foundation, the Spencer Foundation, and the Graduate School of the University of Wisconsin-Madison. A public use file of data from the Wisconsin Longitudinal Study is available at <http://www.ssc.wisc.edu/wlsresearch>. The opinions expressed herein are those of the authors.

REFERENCES

- Jenkins V, Fallowfield L, Saul J. Information needs of patients with cancer: results from a large study in UK cancer centres. *Br J Cancer*. 2001;84:48-51.
- Benbassat J, Pilpel D, Tidhar M. Patients' preferences for participation in clinical decision making: a review of published surveys. *Ann Behav Med*. 1998;24:81-8.
- Woolf SH, Chan EC, Harris R, et al. Promoting informed choice: transforming health care to dispense knowledge for decision making. *Ann Intern Med*. 2005;143:293-300.
- McNutt RA. Shared medical decision making: problems, process, progress. *JAMA*. 2004;292:2516-8.
- Institute of Medicine. Improving Medical Education: Enhancing the Behavioral and Social Science Content of Medical School Curricula. Washington, DC: National Academies Press; 2004.
- Charles C, Gafni A, Whelan T. Shared decision-making in the medical encounter: what does it mean? (or it takes at least two to tango). *Soc Sci Med*. 1997;44:681-92.
- Stevenson FA, Barry CA, Britten N, Barber N, Bradley CP. Doctor-patient communication about drugs: the evidence for shared decision making. *Soc Sci Med*. 2000;50:829-40.
- Cotten SR, Gupta SS. Characteristics of online and offline health information seekers and factors that discriminate between them. *Soc Sci Med*. 2004;59:1795-806.
- Wagner TH, Baker LC, Bundorf MK, Singer S. Use of the internet for health information by the chronically ill. *Prev Chronic Dis*. 2004;1:A13.
- Czaja R, Manfredi C, Price J. The determinants and consequences of information seeking among cancer patients. *J Health Commun*. 2003; 8:529-62.
- Peterson MW, Fretz PC. Patient use of the internet for information in a lung cancer clinic. *Chest*. 2003;123:452-7.
- Shuyler KS, Knight KM. What are patients seeking when they turn to the Internet? Qualitative content analysis of questions asked by visitors to an orthopaedics Web site. *Med Internet Res*. 2003;5:e24.
- Fox S. Health Information Online. Washington, DC: Pew Internet & American Life Project; 2005.
- Pautler SE, Tan JK, Dugas GR, et al. Use of the internet for self-education by patients with prostate cancer. *Urology*. 2001;57:230-3.
- Baker L, Wagner TH, Singer S, Bundorf MK. Use of the Internet and e-mail for health care information: results from a national survey. *JAMA*. 2003;289:2400-6.
- Ziebland S, Chapple A, Dumelow C, Evans J, Prinjha S, Rozmovits L. How the internet affects patients' experience of cancer: a qualitative study. *BMJ*. 2004;328:564.
- Grant RW, Cagliero E, Chueh HC, Meigs JB. Internet use among primary care patients with type 2 diabetes: the generation and education gap. *J Gen Intern Med*. 2005;20:470-3.
- Fox S. Older Americans and the Internet. Washington, DC: Pew Internet & American Life Project; 2004.
- Diaz JA, Griffith RA, Ng JJ, Reinert SE, Friedmann PD, Moulton AW. Patients' use of the Internet for medical information. *J Gen Intern Med*. 2002;17:180-5.
- Wagner TH, Bundorf MK, Singer SJ, Baker LC. Free internet access, the digital divide, and health information. *Med Care*. 2005;43: 415-20.
- Houston TK, Allison JJ. Users of Internet health information: differences by health status. *J Med Internet Res*. 2002;4:E7.
- Meischke H, Eisenberg M, Rowe S, Cagle A. Do older adults use the Internet for information on heart attacks? Results from a survey of seniors in King County, Washington. *Heart Lung*. 2005;34:3-12.
- Adams N, Stubbs D, Woods V. Psychological barriers to Internet usage among older adults in the UK. *Med Inform Internet Med*. 2005; 30:3-17.
- Mead N, Varnam R, Rogers A, Roland M. What predicts patients' interest in the Internet as a health resource in primary care in England? *J Health Serv Res Policy*. 2003;8:33-9.
- Rogers A, Mead N. More than technology and access: primary care patients' views on the use and non-use of health information in the Internet age. *Health Soc Care Community*. 2004;12:102-110.
- Eysenbach G, Powell J, Kuss O, Sa ER. Empirical studies assessing the quality of health information for consumers on the world wide web: a systematic review. *JAMA*. 2002;287:2691-700.
- Wisconsin Longitudinal Study 1957-2004. <http://www.ssc.wisc.edu/wlsresearch>.
- Henmon VAC, Nelson MJ. Henmon-Nelson Tests of Mental Ability. High School Examination—Grades 7 to 12—Forms A, B, and C. Teacher's Manual. Boston: Houghton Mifflin Company; 1946.
- Henmon VAC, Nelson MJ. The Henmon-Nelson Tests of Mental Ability. Manual for Administration. Boston: Houghton Mifflin Company; 1954.
- Seltzer MM, Floyd F, Greenberg J, Lounds J, Lindstrom M, Hong J. Life course impacts of mild intellectual deficits. *Am J Ment Retard*. 2005;110:451-68.
- Ware J Jr, Kosinski M, Keller SD. A 12-Item short-form health survey: construction of scales and preliminary tests of reliability and validity. *Med Care*. 1996;34:220-33.
- Ware JE, Kosinski M, Keller SD. SF-12: How To Score the SF-12 Physical and Mental Health Summary Scales. Boston: The Health Institute, New England Medical Center; 1995.
- Duke University Center for the Study of Aging and Human Development. Multidimensional Functional Assessment: The OARS Methodology. Durham, NC: Duke University; 1978.
- McCrae RR, Costa PT Jr. Personality in Adulthood: A Five-Factor Perspective. 2nd edn. New York: Guilford Press; 2003.
- Srivastava S, John OP, Gosling SD, Potter J. Development of personality in early and middle adulthood: set like plaster or persistent change? *J Pers Soc Psychol*. 2003;84:1041-53.
- Charles C, Gafni A, Whelan T. Decision-making in the physician-patient encounter: revisiting the shared treatment decision-making model. *Soc Sci Med*. 1999;49:651-61.
- Ende J, Kazis L, Ash A, Moskowitz MA. Measuring patients' desire for autonomy: decision making and information-seeking preferences among medical patients. *J Gen Intern Med*. 1989;4:23-30.
- Krantz DS, Baum A, Wideman M. Assessment of preferences for self-treatment and information in health care. *J Pers Soc Psychol*. 1980; 39: 977-90.

39. **SAS Institute.** SAS Statistical Software, 9.1 edn. Cary, NC: SAS Institute; 2005.
40. **StataCorp.** Stata Statistical Software, 9.0 edn. College Station, TX: Stata Statistical Software; 2005.
41. Number of "cyberchondriacs"—U.S. adults who go online for health information—increases to estimated 117 million. Harris Poll No. 54 2005:5.
42. **Winick BJ.** Foreword: planning for the future through advance directive instruments. *Psychol Public Policy Law.* 1998;4:579–609.
43. **Gaston CM, Mitchell G.** Information giving and decision-making in patients with advanced cancer: a systematic review. *Soc Sci Med.* 2005; 61: 2252–64.
44. **Torke AM, Corbie-Smith GM, Branch WT Jr.** African American patients' perspectives on medical decision making. *Arch Intern Med.* 2004;164:525–30.
45. **U.S. Bureau of the Census.** Educational Attainment in the United States: March 2000. Series P-20, No. 536. Washington, DC: Government Printing Office; 2000.
46. **Blackhall LJ, Murphy ST, Frank G, Michel V, Azen S.** Ethnicity and attitudes toward patient autonomy. *JAMA.* 1995;274:820–5.
47. **Sudman S, Bradburn NM.** Asking Questions: A Practical Guide to Questionnaire Design. San Francisco, CA: Jossey-Bass Inc.; 1982.
48. **Bessell TL, McDonald S, Silagy CA, Anderson JN, Hiller JE, Sansom LN.** Do Internet interventions for consumers cause more harm than good? A systematic review. *Health Expect.* 2002;5: 28–37.
49. **Diaz JA, Sciamanna CN, Evangelou E, Stamp MJ, Ferguson T.** Brief report: what types of Internet guidance do patients want from their physicians? *J Gen Intern Med.* 2005;20:683–5.