

THE ASSOCIATION BETWEEN WOMEN'S HEALTH INFORMATION USE AND HEALTH CARE VISITS

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Objective: To determine the effect of the type of information sources used on health services use.

Methods: Population-based random-digit dialing survey of 498 women, between December 1999 and January 2000, on use of health information sources and health visits.

Results: After adjustment for sociodemographic and medical factors, use of print health media and computer-based resources was associated with 1.9 and 1.6 more visits, respectively compared to non-use (Regression coefficients 1.9; [95% confidence interval {CI} 0.1, 3.7] and 1.6; [95% CI 0.3, 3.0]).

Conclusions: Print health media and computer-based sources are associated with a higher number of health care visits.

Introduction

With the widespread use of the Internet and massive amounts of health information available from print and broadcast sources (Brashers, Goldsmith, & Hsieh 2002; Brodie et al., 2000; Cline & Haynes, 2001), the health information seeking behavior (Dutta-Bergman, 2004; Kenkel, 1990) of consumers and the potential effect on health care use continues to be a focus of health policy makers. It is important for both clinicians and health policy makers to understand the relationship between use of health information sources and health services utilization because of the potential effect on clinical outcomes. Previous studies have shown, for example, that people who are

well-informed are better able to cope with illness and to make well-informed decisions about their treatment options (Evans & Clark, 1983; Lerman et al., 1993). Further, although the use of health information sources is itself a behavioral factor, it can in turn, affect other health behaviors such as compliance and adherence to medical regimens. Insufficient information can lead to a lack of compliance, poor health care utilization and worse clinical outcomes (Matthews, Sellergren, Manfredi, & Williams, 2002). Therefore, it is important to examine and quantify the effect of use of health information on health services utilization.

Consumers can receive health information through intentional or less intentional sources. Individuals, for example, who choose to be exposed to health information, may use intentional media sources, such as print health media (Dutta-Bergman, 2004). Individuals who do not choose to seek information are still exposed to less intentional information sources, such as broadcast media. The relationship between the type of

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sources (e.g., print media, broadcast media) used and health care utilization can provide relevant feedback on which type of sources effect significant behavioral change. Breast cancer screening guidelines disseminated through print health media, an intentional source of information, may result in higher use of mammography compared to guidelines disseminated through less intentional sources, such as broadcast media (radio or television).

Many studies have examined patterns of health care use within the Behavioral Model of Health Care Utilization (Aday, 1974). Race, insurance, perception of health status, and clinical conditions are well-established determinants of health services use (Aday, 1975; Andersen, Aday, & Chen, 1986; Andersen, Chen, Aday, & Cornelius, 1987; Brett & Burt, 2001; Nicholson, Ellison, Grason, & Powe, 2001). Because women consume a high proportion of health care services and are the primary decision makers for their families (Nussbaum, 2001), the relationship between use of health information and health services use among women deserves further study. Our objective was to characterize the relationship between use of health information and health care visits among women. We used the Behavioral Model of Health Care Use as the framework for the analysis incorporating use of health information into the model. Our primary hypothesis was that use of print health media would be associated with a higher number of visits. Previous studies show that use of print health media as an information source correlates with more visits among patients with cancer and other chronic disease (Eraker, Kirscht, & Becker, 1984). We hypothesized that women who use print health media actively choose to obtain health information that contributes to more health services use. Our secondary hypothesis was that use of multiple sources of information would be positively associated with health care visits. We proposed that the use of multiple sources increases exposure to health information and use of health services.

Materials and Methods

Study design

We conducted a population-based, random-digit dialing survey of adult women in the Baltimore metropolitan area between December 1, 1999, and January 31, 2000, to determine the relation between use of health information sources and health care utilization. Women were eligible for the survey if they were between 18 and 64 years old, English speaking, and consented to be interviewed. Verbal consent was obtained by the interviewer and then documented on the survey form. The study was approved by the Institutional Review Board of the Johns Hopkins Bloomberg School of Public Health.

Of the 4,635 telephone numbers initially screened, 1,828 (39%) were not to households. Another 2,031 (44%) were excluded because of age ineligibility (19%), non-English speaking (1%), refused to answer screening questions (13%), and no contact after six attempts (11%). Of the 776 eligible women, 509 (66%) completed the telephone interview. We excluded 11 respondents who did not have complete data on information sources used ($n = 8$) or health care visits ($n = 3$), for a final sample of 498 women.

Development of survey instrument

The Women's Health Care Experiences Survey (WHCES) was developed following a review of published articles on women's health care utilization and of the data provided in current population-based surveys (e.g., The National Ambulatory Medical Care Survey, The Commonwealth Fund Survey). We identified gaps in the current knowledge of women's health use and developed questionnaire items to specifically address these gaps. The survey was initially reviewed by a focus group of nine, predominately African-American women in Baltimore City. Based on feedback regarding the clarity and appropriateness of the questions, the survey was modified and later presented to a group of public health providers, administrators, and researchers. Further modifications were made based on suggestions from this second focus group. Details of the development of this survey have been previously described (Grason, Weisman, & Silver 2002). The final version of the WHCES consisted of 75 closed-ended questions addressing 1) need-based health care services use, 2) health care access, 3) sources of health care information, 4) health status, and 5) sociodemographic characteristics.

Definition of variables

Health information sources. Use of health information sources was characterized as a behavioral factor. We obtained data on the use of 15 sources of health information through a series of seven questions (see Table 1). First, respondents were read a list of media sources for health information. For each source, the women were asked whether they had used that source of information at any time during the last 12 months. The list of media sources included newspapers, news magazines, radio talk shows, and television news programs. In two subsequent questions, respondents were asked whether they had used various types of health media, such as health books or health newsletters from local hospitals or universities or health magazines. Women were then asked about their use of the Internet and computer CD-ROMS (computer-based sources). Respondents were also asked whether they used health information that was distributed from any of the following groups: local, state, or

Table 1. Questions used to assess women's use of health information sources over the last 12 months

Stem: Over the past 12 months

- Q1. Have you used any of the following media sources?
 Newspaper
 News magazine (e.g. Newsweek, Time)
 Television news program
 Radio talk show
- Q2. Have you read any health magazines?
- Q3. Have you read any health books, like *Our Bodies, Ourselves* or other books on women's health?
- Q4. Did you receive or subscribe to any women's health newsletters, such as those from local hospitals, universities, or women's organizations?
- Q5. Have you used any computer-based health information, like sites on the Internet or CD-ROM computer programs about health topics?
- Q6. Have you used any of the following organizations for information?
 Local women's health groups
 State women's health groups
 National women's health groups
 National public policy groups
 Support groups
- Q7. Have you participated in any of the following activities?
 Women's health fairs
 Women's health resource centers
-

national women's health groups and national public policy groups. In addition, women were asked whether they had received any health information from participation in women's health support groups or health fairs, or attendance at women's health resource centers. Based on the responses (yes or no), we summed the total number of different types of health care sources used for each participant.

We also developed categories for modes of health information sources used. These categories included printed health media (health magazines, health books, health newsletters); printed news media (newspapers, news magazines); broadcast media (radio talk shows, television news programs); computer-based resources (CD-ROM, Internet); organizations (local, state, national health groups, national public policy groups); and organized health events (health fairs, support groups, women's health resource centers).

Health care utilization. Health care utilization was defined as ambulatory visits for health care services. Women were asked about the number of visits they had for 11 different types of services over the past 12 months, including 1) chronic disease, 2) clinical tests (e.g., mammography), 3) minor illnesses (e.g., cold, flu), 4) check-ups, 5) depression, 6) injury, 7) menstrual-related problems, 8) family planning, 9) pregnancy-related visits, 10) visits for medications, and 11) surgery-related visits. For example, respondents were asked, "How many outpatient visits in all did you make in the past 12 months for a chronic medical

problem?" The total number of visits reported for each type of health service during the last 12 months was summed and modeled as a continuous outcome variable, defined as total visits.

Sociodemographic, health status, and source of care variables. We operationalized women's characteristics into predisposing factors: race (white, black, other); education (12 years or less, some college or 2-year college graduate, college graduate/postgraduate). Because women undergo different screening tests (e.g., mammography) and health visits based largely on age range, we modeled age as a categorical variable (age 35–50 years, 51–64 years compared to 18–34 years). We also included enabling factors: insurance (private, commercial insurance, Medicaid, Medicare, self-pay, and other); total household income (\leq \$25,000; \$25,001–50,000; \$50,001–100,000; $>$ \$100,000; unknown income), need factors: chronic conditions (e.g., hypertension, diabetes), health status (excellent, good, fair, poor); and health system factors: access to a regular health care provider.

Analysis of survey responses

We first classified the use of information sources into four categories: 0–1 sources; 2–3 sources; 4–5 sources, and 6 or more sources. To examine the relation of participant characteristics with the number of different types of health information sources used, we used the χ^2 statistic and analysis of variance. In bivariate analysis, we examined the presence and strength of an association between participant characteristics and both health information use and ambulatory visits. We used quantile (median) regression rather than linear regression because of the skewed distribution of health care visits (Cameron & Trivedi, 1998). For the bivariate analysis, *p*-values less than .1 were considered significant. Potential collinearity between the sociodemographic, health status, and clinical variables was evaluated using a correlation matrix and the variance inflation factor (Glanz & Slinker, 1990).

In multivariate analysis, we used quantile (median) regression (Glanz & Slinker, 1990) to assess the presence and strength of an association between the number of health information sources used and health care visits. We first developed a dummy variable for each category of number of health information sources used: 2–3 sources; 4–5 sources; and 6 or more sources. The reference variable was 0–1 sources. In this fashion, we were able to determine the effect of the use of 2–3 sources, 4–5 sources, and 6 or more information sources, relative to 0–1 sources, on health care visits. Second, we adjusted the quantile regression model for categories of variables from the bivariate analysis in which any of the coefficients were significantly associated with both information sources used and health-care visits. These factors were age, race, income,

number of chronic conditions (none versus one or more); regular provider (no regular source versus a regular source of care), and perception of health status. Because of the small proportion of women reporting fair or poor health states, we combined the fair and poor ratings into one category to model health status (fair/poor and good versus excellent). We adjusted for pregnancy because those women would have several ambulatory visits. For the multivariate analysis using quantile regression, the association between number of sources used and health visits was considered significant if the 95% confidence interval did not include zero. We conducted a test of trend to examine whether a linear graded relationship existed between varying levels of an independent variable (number of health information sources) and the outcome variable (total visits).

Finally, we assessed the association between use of each category of health information sources (print news media, print health media, broadcast media, computer-based resources, organizational information, and organized health events) on health care visits. The number of visits was regressed separately on each information source in adjusted and unadjusted models. Quantile regression models were adjusted for age, race, income, perception of health status, regular source of care, and chronic conditions. Data analysis was conducted with the STATA statistical program (StataCorp, 2001; Stata Statistical Software: Release 7.0. College Station, TX).

Results

Participant characteristics

Figure 1 shows the distribution of the number of health information sources used and the number of annual health care visits. Eighty-one percent of the participants reported the use of two or more different sources of health information, with 47% reporting the use of 3–5 different sources of information (see Figure 1). The distribution of health care visits was skewed to the right with a median of six visits. Two fifths of participants reported up to four visits for health care services with the past year.

Table 2 summarizes the characteristics of the study sample over the 2-month period of December 1999 to January 2000 and shows the distribution of participant characteristics among the four categories of number of health information sources used. The majority of respondents were 35 years of age and older. Most women were white, had an annual household income of more than \$50,000, and had attended some college or received a college degree. Most respondents were covered by private insurance. Sixty-eight percent of participants had one or more medical conditions and 78% of participants reported that they had a regular

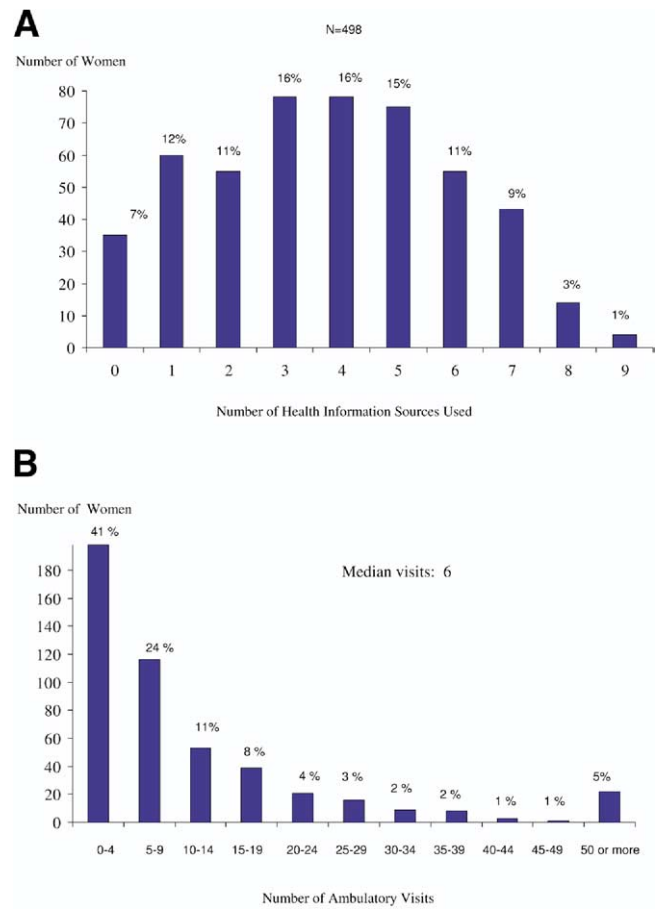


Figure 1A. The distribution of health information sources used and health care visits. Columns represent the number of women who reported using the designated number of health information sources ($N = 498$). **B.** The distribution of health information sources used and health care visits. Columns represent the number of women who attended the designated number of visits.

source of care. Women aged 18–34 and 30–35 years were more likely to use 2–3 or 4–5 different sources of information compared to women aged 51–64 years. A similar percentage of women aged 35–64 years reported the use of 6 or more sources of information. Thirty percent of Black women reported using 0–1 sources of information, compared to 16% of White women. Thirty-six percent of women with a high school education or less used 0–1 sources, whereas approximately 60% of women with some college education or a college degree used 2–5 sources of health information. In general, women on Medicaid used fewer sources compared to women with private health care coverage. Eighty-three percent of women with one or more chronic conditions used two or more sources of health information. Eighty-three percent of women with a regular provider used two or more different sources of information. Thirty percent of women with excellent health and 28% of women with fair/poor health status reported the use of 6 or more sources of information.

Table 2. Characteristics of study population by number of health information sources used ($N = 498$)

Characteristic	N	Number of Health Information Sources				p-value*
		0–1 ($n = 96$) (%)	2–3 ($n = 133$) (%)	4–5 ($n = 153$) (%)	≥ 6 ($n = 116$) (%)	
Age (18–34 y)	134	23	30	32	15	.09
35–50	213	17	27	32	25	
51–64	151	19	24	28	28	
Race (white)	335	16	27	33	25	<.005
Black	132	30	26	29	29	
Other	31	13	26	29	32	
Income (\$7,500–\$25,000)	110	37	27	23	13	<.001
\$25,001–\$50,000	149	19	23	30	28	
\$50,001–\$100,000	144	9	31	36	24	
>\$100,000	38	26	21	20	22	
Unknown income	57	18	27	30	25	
Education (≤ 12 y)	177	36	21	32	11	<.001
College (up to 2 y)	153	16	30	29	25	
College/postgraduate	168	5	30	31	34	
Payer (private, commercial)	392	16	29	31	24	<.001
Medicaid	16	25	38	25	13	
Medicare	14	29	30	43	29	
Self-pay	47	46	17	28	6	
Other	29	10	24	24	24	
Married status (single)	161	17	27	32	24	.6
Chronic conditions (none)	161	24	31	29	16	.02
≥ 1	337	17	25	31	27	
Usual source of care (none)	108	27	31	25	17	.04
Usual source of care	390	17	26	32	25	
Perception of health (excellent)	94	21	18	30	31	.04
Good	329	18	32	30	20	
Fair/poor	75	21	17	33	28	
Median visits	—	4	4	6	9	<.001

Note: Percentages may not equal zero due to rounding.

*p-values derived from χ^2 statistics for categorical variables and nonparametric tests for median visits.

Demographic and clinical factors and health care visits

Table 3 shows the unadjusted and adjusted regression coefficients for the association between demographic factors, health status, and regular source of care and health care visits. In bivariate analysis, Black race was associated with fewer visits compared to White women. After adjustment for other demographic and clinical factors, race remained associated with fewer health visits (regression coefficient -2.5 ; 95% confidence interval [CI] $-4.4, -0.6$). Women aged 35–50 years and 51–64 years had 1.0 to 3.0 more visits, respectively, compared to women aged 18–34 years. The magnitude of this relationship remained in multivariate analysis, but was no longer significant. One or more chronic conditions were associated with 5.0 more visits compared to no chronic conditions. Women with fair/poor health status reported 7 more visits compared to women who reported excellent health status. This relationship was slightly attenuated, but remained significant in multivariate analysis. Women with a regular source of care had significantly more visits compared to women with no regular source of care in both unadjusted and adjusted analyses.

Health information sources and health care visits

In the unadjusted analysis, women who reported the use of 2–3 sources of information had 3 less visits compared to women who used 0–1 sources of information (Table 4). Women who reported the use of 4–5 health information sources had 3 more health care visits compared to women who reported the use of 0–1 sources. Women in the highest group of health information sources had 5 more visits compared to those in the lowest health information group (regression coefficient 5.0; 95% CI 1.8, 8.2).

To explore potential behavioral, access, and clinical confounders of the relationship between number of health information sources used and health care visits, a multivariate quantile regression model was developed. After adjustment for age, race, income, regular source of care, perception of health, and chronic conditions, there was a significant graded, positive association between increasing numbers of health information sources and health care visits (p for trend $< .02$). Women in the highest information use group (≥ 6 sources) had more visits compared to women in the lower information use groups (regression coefficient 3.0; 95% CI 0.9, 6.9). The association between 4–5

Table 3. Association between demographics, health status, regular source of care and health care visits

Participant Characteristics	Median Number of Visits	Unadjusted Regression Coefficient (95% CI)	Adjusted Regression Coefficients* (95% CI) [†]
Age (y)			
35–50	6	1 [†] (0.6–1.2)	1 (–1.8, 3.8)
51–64	8	3 [†] (0.8, 5.1)	3 (–2.1, 3.1)
18–34	4	Reference	Reference
Black	5	–1.0 [†] (–3, 1.2)	–2.5 [†] (–4.4, –0.6)
White	7	Reference	Reference
Income			
\$>100,000	10	4 [†] (0.2, 7.8)	2 (–1.1, 5.0)
\$50–100,000	5	–2 (–4.1, 0.1)	0.3 (–1.8, 2.4)
\$25,001–\$50,000	7	2 (–0.2, 4.2)	0.6 (–1.3, 2.6)
\$7,500–\$25,000	5	Reference	Reference
Education			
College/postgraduate	6	–0.1 (–0.5, 0.3)	—
College (≤2 y)	6	0.04 (–0.1, 0.43)	—
≤12 y	6	Reference	Reference
Payment method			
Medicaid	7	0.8 (–0.1, 1.5)	—
Medicare	12	0.5 (–0.8, 1.2)	—
Other source	9	0.2 (–0.3, 0.7)	—
Self-pay	4	–0.13 (–0.5, 0.3)	—
Commercial	6	Reference	Reference
Marital status			
Single	6	0.09 (–0.2, 0.3)	—
Married	6	Reference	Reference
One or more comorbid conditions	8	5.0 [†] (2.9, 7.1)	3.0 [†] (1.1, 4.9)
No comorbid conditions	3	Reference	Reference
Good health	7	2.0 (–0.3, 4.3)	3.0 (–1.0, 5.0)
Fair/poor health	12	7.0 [†] (4.1, 9.9)	5.5 [†] (3.0, 8.0)
Excellent health	5	Reference	Reference
Regular source of care	7	4.0 [†] (1.5, 6.5)	3.5 [†] (1.5, 5.5)
No regular source of care	3	Reference	Reference
Pregnancy	7	1.02 (–6.2, 8.2)	3.5 (–3.4, 10.4)
No pregnancy	9	Reference	Reference

95% CI, = 95% confidence interval.

*Adjusted regression coefficients were adjusted for Black race, age, income, one or more chronic conditions, good health, fair/poor health, regular provider, pregnancy, and number of health information sources used. A positive regression coefficient indicates more visits among women with a particular characteristic, compared to women without the characteristic. A negative regression coefficient indicates fewer visits among women with a particular characteristic, compared to women without the characteristic.

[†]Denotes a significant regression coefficient. In median regression analysis, the regression coefficient is considered significant if the 95% confidence interval does not include zero.

sources used and health care visits was no longer significant (regression coefficient 3.0; 95% CI –0.7, 6.9). Similarly, the association between 2–3 sources of information used and health visits was no longer significant.

Type of information source used and health care visits

Specific modes of health information were associated with more health care visits (see Table 4). In bivariate analysis, use of print news media, print health media, computer-based resources, and health policy groups were associated with 2–3 more visits compared to no reported use of these modes of information. After adjusting for confounders, information sources identified as intentional were associated with more visits. The association between print health media and visits was attenuated, but remained significant (regression

coefficient 1.9; 95% CI 0.1, 3.7). Women who reported the use of computer-based resources had 1.6 more visits compared to women who did not report the use of computer-based resources. Less intentional sources, including print news media and health policy groups, were no longer significant after adjustment in multivariate analysis.

Conclusions

The focus on consumer use of health care services (Sainfort & Booske, 1996) combined with unprecedented access to health information through the Internet (Booske, Sainfort, & Hundt, 1999) highlights the need to better understand the effect of the use of health information on health services use. We exam-

Table 4. Association between health information sources and health care visits from the median (quantile) regression model

Number of Information Sources	Total Number Reporting Use (<i>n</i>)	Median Visits (<i>n</i>)	Unadjusted Regression Coefficient (95% CI)	Adjusted* Regression Coefficient (95% CI)	<i>p</i> for Linear Trend
0–1	96	4	Reference	Reference	
2–3	133	4	–3.0 [‡] (–5.3, –0.7)	–1.0 (–4.7, 2.7)	
4–5	153	8	3.0 [‡] (0.8, 5.1)	3.0 (–0.7, 6.7)	
≥6	116	9	5.0 [‡] (1.8, 8.2)	3.0 [‡] (0.9, 6.9)	.02
Intentional sources [†]					
Printed health (health magazines, books, newsletters)	365	7	3.0 [‡] (0.5, 5.2)	1.9 [†] (0.1, 3.7)	
Computer-based resources (CD-Rom, Web)	191	8	3.0 [‡] (1.0, 5.1)	1.6 [†] (0.3, 3.0)	
Organized women's health events (women's health fairs, support groups, resource centers)	97	7	1.0 (–1.5, 3.5)	1.0 (–1.2, 3.0)	
Less intentional [†] (incidental sources)					
Printed news media (newspapers, news magazines)	290	7	2.0 [‡] (–0.01, 4.0)	2.0 (–0.2, 4.4)	
Broadcast (radio talk shows, television news programs)	387	6	1.0 (–1.4, 3.4)	1.2 (–1.3, 2.0)	
Organizations (local, state, national health groups, national public policy groups)	79	9	3.0 [‡] (0.2, 5.7)	2.0 (–1.4, 5.4)	

Denotes statistically significant regression coefficient because the *p*-value for the 95% confidence interval from the quantile regression analysis is <.05.

*Adjusted for black race, age, income, regular source of care, perception of health status, and one or more chronic conditions.

[†]Intentional sources represent those sources of health information in which an individual actively seeks exposure to the information source; less intentional or incidental sources represent sources in which the individuals are generally exposed to, but do not actively seek exposure.

[‡]Denotes statistically significant regression coefficient because the *p*-value for the 95% confidence interval from the bivariate analysis is <.1.

ined the effect of exposure to multiple sources and types of health information on health care utilization in a general population of adult women. We found a higher median number of visits compared to other population-based studies. Broadcast and print health media were the two most commonly reported sources of information used. Print health media and computer-based resources were associated with a higher number of health care visits. The use of multiple sources of information was also associated with higher health care visits.

The median number of visits (median = 6) in our population is higher than that reported in national samples of general (Brett & Burt, 2001) or disease-specific visits (Nicholson, Ellison, Grason, & Powe, 2001). The higher number of median visits is most likely an effect of the higher socioeconomic level of our study sample. Because the majority of women surveyed were privately insured, they may have encountered fewer barriers to receiving health services.

Our findings support our hypothesis that use of print health media as an information source contributes to more health services use. Information about cervical cancer screening in brochures from the American Cancer Society or other organizations, for example, might contribute to more health services use related to the Papanicolaou (pap) test. Alternatively, it may be that the women in our study generally use more health care services.

The percentage of women who reported the use of computer-based resources is consistent with the findings of an earlier study (Pandey, Hart, & Tiwary, 2003) and suggest that the Internet may be emerging as a viable, alternative source of health information for women. The explanation for the association between computer-based resources and higher visits may be similar to that of print health media. Because the Internet comprises a vast amount of print health media, it may also contribute to the use of more health services.

Print health media and computer-based resources are considered active sources of health information. Individuals who use these sources are generally described as adults who actively seek health education and knowledge (Dutta-Bergman, 2004). However, these sources of information are not used equally among all populations of health information-seeking adults. There are differences in the use of computer-based sources, for example, within income (Brodie et al., 2000), education, and racial groups (Nicholson, Grason, & Powe, 2003). Older adults and lower income adults report less use of computer-based resources (Brodie et al., 2000). A higher percentage of Black women report the use of passive information sources, such as broadcast media and organized health events, compared to White women (Nicholson et al., 2003). Increased access to computer-based resources and print health media among these popu-

lations might increase health care knowledge and improve long-term health. The effect of use of computer-based sources and print health media on health services use has important policy implications for health care promotion among women who have not traditionally used these sources of information. First, for women who are less active information seekers, broadcast media may be a more effective method of health communication and promotion, particularly for health prevention campaigns that are aimed at educating women who do not actively seek health information. Second, the unintentional exposure of less active information seekers to health information, through broadcast media for example, could then prompt a higher intentional use of sources, such as computer-based sources or print media.

Several factors might explain the relationship between the use of multiple information sources and higher utilization. First, enhanced consumer knowledge through various information sources may translate into more health care service use (Lerman et al., 1993). It is also possible that women's use of multiple sources of information and higher visits may reflect uncertainty or misinterpretation of health information. Women may seek information from alternative sources because the information received from health care providers is incomplete or insufficient. Also, misinterpretation of health information could exacerbate patient uncertainty (Hoskins et al., 1995) and predispose women to make more visits. Because of the cross-sectional nature of the study, we are unable to assert that women's use of health information leads to more utilization. We are unable to conclude that higher utilization leads to higher use of health information sources. Although it is possible that women require multiple health care visits owing to chronic conditions, it is also possible that women's perception of their health status affects health services use.

Although the availability of information is important to both consumers and health care providers, the quality of available information could also affect women's health care use. Our study was limited by the inability to measure the quality of the health information sources used by study participants. There is potential selection bias because we were only able to include women with telephone service. Because the primary variables (visits, health information use) in the analysis were based on self-report, there is potential for recall bias. Finally, our results may not be generalizable because the study was conducted in one geographical area. The findings might have differed with a more diverse population.

Notwithstanding these limitations, our analysis characterizes the association between the number and type of health information sources used and health services utilization. Although it remains unclear whether women who seek information use more

health services or alternatively, women who use more health services create the need for more health information, a better understanding of consumer use of health information is needed. Finally, arguably, the most important goal of consumer use of health care information is to improve health outcomes. Further examination of the relation between health information use and women's long-term health status would be helpful.

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