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Cancer Survivors' Use of Numerous Information Sources for Cancer-Related Information: Does More Matter?

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Abstract A large proportion of the 14 million cancer survivors in the USA are actively seeking health information. This study builds on the informed- and shared-decision making literature, examining cancer survivors' health information seeking behaviors to (1) quantify the number of health information sources used; (2) create a demographic profile of patients who report seeking cancer information from numerous sources versus fewer sources in five areas: cancer information overall, disease/treatment, self-care/management, health services, and work/finances; and (3) examine whether seeking cancer information from numerous sources is associated with self-efficacy, fear of recurrence, perceptions of information seeking difficulty, and resultant patient–provider communication. Data came from a survey of post-treatment cancer survivors ($N=501$) who responded to a mailed questionnaire about health information seeking. Participants were divided into two groups using a median split: those who sought health information from more than five sources (numerous source seekers) and those that sought information from less than five sources (fewer source seekers). Multivariable logistic regression was used to model differential information seeking behaviors and outcomes for numerous versus fewer source seekers. On average, survivors sought cancer-related information from five different sources. Numerous source seekers were more likely to be women, have higher levels of education, and report fewer problems with cancer information-seeking. Overall, numerous source seekers were no more or less likely to discuss information with their providers or bring conflicting information to their providers. Understanding the characteristics, behaviors, and experiences of survivors who seek cancer-related information from numerous sources can contribute to informed decision making and patient-centered care.

Keywords Health information-seeking behavior · Cancer survivors · Cancer · Numerous source seekers · Patient-provider communication

Introduction

There is a lot of attention to health information seeking as it is an indicator of active participation by the patients and family members in informed- and shared-decision making. Patients' health information seeking may improve patient satisfaction and quality of care [1–3]. Previous research has demonstrated that in general those who are active health information seekers are characteristically different from those that do not seek health information (nonseekers); for example, nonseekers have lower income and education levels than patients who actively seek health information [4]. In cancer survivors specifically, nonseekers are more likely to be older, male, and have lower income than information seekers [5].

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With the population of cancer survivors numbering over 14 million and continuing to grow [6], we must understand the unique health information-seeking behaviors of survivors [7–9]. Although a majority of research has focused on the health information-seeking behavior of cancer patients at diagnosis and during treatment, seeking information about cancer does not end after cancer treatment; a majority of cancer survivors continue to seek cancer-related information years after a diagnosis [10]. The needs of cancer survivors include managing late and long-term physical and psychosocial effects of treatment and survivors often report their needs are unmet as they transition from active treatment to survivorship [11].

The opportunity to seek cancer-related health information from more and more sources is high. Health is currently the eight most commonly covered news topic overall, and cancer ranks first among disease-specific news coverage [12–15]. In addition, there has been an increase in the use of the Internet for health-related information [16]. With an increase in information sources, cancer information-seeking can be a confusing and complicated endeavor due to competing recommendations and the presence of conflicting information in the public information environment [17]. The belief that there are too many health and prevention recommendations to know which ones to follow is associated with increased difficulty in seeking cancer-related information [17] and can lead to less engagement in prevention behaviors [18, 19]. Moreover, confusion and uncertainty is more prevalent in at-risk populations [20].

Despite the availability of many information sources and the possibility of encountering conflicting information, little is known about what types of patients seek multiple sources and what patients do with conflicting or confusing information about cancer. In particular, we do not know whether patients who seek health information from numerous sources are more or less confident in their information seeking abilities, or whether seeking more sources is associated with outcomes related to patient–provider communication, including sharing that information with health care providers.

Patients who report difficulty understanding health information may not discuss that information with health care providers [21]. For individuals who seek cancer information from multiple sources, and may encounter conflicting information, it is important to understand whether or not they communicate with providers about this information.

The present study builds on previous health information seeking research by (1) quantifying the number of health information sources used by post-treatment cancer survivors in our population; (2) creating a demographic profile of patients who report seeking cancer information from numerous sources versus fewer sources in five areas: cancer information overall, disease/treatment, self-care/management, health services, and work/finances; and (3) examining whether seeking cancer information from numerous sources is associated with self-efficacy, fear of recurrence, perceptions of information seeking difficulty, and resultant patient–provider communication.

Methods

Participants

Participants were post-treatment cancer patients who completed the Well-Informed, Thriving and Surviving (WITS) questionnaire in 2008, designed to assess cancer-related health information-seeking behavior in cancer survivorship. Eligibility criteria included the following: English or Spanish speaking; diagnosed with stage I, II, or III cancer within the last 5 years; no treatment (chemotherapy or radiation therapy) within the last year; and no evidence of tumor recurrence or metastatic disease. A randomly selected sample of eligible current and former patients identified from a hospital database was mailed the survey and could respond with the self-addressed postage-paid reply envelope, over the Internet, or by phone at a conveniently scheduled time. A Spanish-language version of the questionnaire was available for those indicating Spanish as their primary language. A $5 gift card was included with the questionnaire. Survey items were developed based on previous literature and qualitative analysis of six focus groups of 44 cancer survivors and caregivers, then finalized through cognitive testing [22]. The final survey had 519 respondents for a 52 % response rate; other details about the WITS study have been published elsewhere [22]. Participants were, on average, 54 years old (SD=11.45, range=21–75), 73 % female, and 81 % White. Approximately 58 % of respondents were college graduates or held a post-graduate degree (Table 1).

Measures

Cancer-Related Information Sources Pursuant to our first aim, we were interested in quantifying the number of cancer information sources used by post-treatment cancer survivors in their health information seeking endeavors. WITS participants were asked "What sources have you used to get information about cancer?" and were instructed to select all that applied among 15 information sources presented: one or more doctors, another type of health care provider, Internet, family or friends who are in the medical field, family or friends who are *not* in the medical field, other cancer patients or survivors, co-workers, support groups, pamphlets or books, television, radio, public library, resource center at a hospital or clinic, cancer information or support organization, and other sources. To classify participants as more or less active seekers of cancer information, and to construct the independent variables for our analyses, participants were median split into those who sought cancer information from five or more sources (numerous

Table 1 Participant characteristics and information-seeking behaviors (unadjusted). Well-Informed, Thriving and Surviving (WITS) study. *N*=501

	All cancer information seekers	Numerous source seekers (5 or more cancer information sources used)	Fewer source seekers (less than 5 cancer information sources used)
Sample size	501	243	258
Sociodemographic factors			
Age [mean (SD)], *n*=495	54.06 (11.45)	52.96 (10.69)	55.11 (12.05)
Gender [*N* (%)]			
Male	133 (26.5)	43 (17.7)	90 (34.9)
Female	366 (73.1)	200 (82.3)	166 (64.3)
Unreported	2 (.4)	0 (0)	2 (.8)
Race [*N* (%)]			
Non-Hispanic White	406 (81.0)	204 (84.0)	202 (78.3)
Non-Hispanic Black/African American	36 (7.2)	19 (7.8)	17 (6.6)
Asian	15 (3.0)	4 (1.6)	11 (4.3)
Hispanic	24 (4.8)	9 (3.7)	15 (5.8)
Other/mixed race	16 (3.2)	6 (2.5)	10 (3.9)
Unreported	4 (.8)	1 (.4)	3 (1.2)
Socioeconomic factors			
Wealth index[a] [mean (SD)], *n*=434	0.00 (1.00)	0.04 (0.96)	−0.02 (1.02)
Debt index[b] [mean (SD)], *n*=434	0.00 (1.00)	0.02 (0.96)	−0.01 (1.05)
Highest level of education [*N* (%)]			
Less than high school	15 (3.0)	4 (1.6)	11 (4.3)
Grade 12 or GED (high school graduate)	53 (10.6)	11 (4.5)	42 (16.3)
Some post-high school education	141 (28.1)	69 (28.4)	72 (27.9)
College, 4 years or more (college graduate)	143 (28.5)	73 (30.0)	70 (27.1)
Post-graduate degree from college or university	146 (29.1)	86 (35.4)	60 (23.3)
Unreported	3 (0.6)	0 (0)	3 (1.2)
Information-seeking behaviors			
Information-seeking difficulty [mean (SD)]			
Information access barriers	0.00 (1.00)	0.18 (1.28)	−0.17 (0.59)
Information utilization barriers	0.00 (1.00)	0.02 (1.03)	−0.01 (0.97)
Information-seeking self-efficacy [mean (SD)]	4.40 (0.81)	4.48 (0.74)	4.33 (0.87)
Fear of recurrence [*N* (%)]			
Not at all	253 (50.5)	127 (52.3)	126 (48.8)
Somewhat	183 (36.5)	93 (38.3)	90 (34.9)
Quite a bit	20 (4.0)	9 (3.7)	11 (4.3)
Does not apply	29 (5.8)	9 (3.7)	20 (7.8)
Unreported	16 (3.2)	5 (2.1)	11 (4.3)
Discussing information with provider [*N* (%)]			
Yes	477 (95.2)	230 (94.7)	247 (95.7)
No	7 (1.4)	4 (1.6)	3 (1.2)
Unreported	17 (3.4)	9 (3.7)	8 (3.1)
Discussing conflicting information with provider [*N* (%)]			
Bring conflicting information to provider	405 (80.8)	194 (79.8)	211 (81.8)
Other strategy for conflicting information	71 (14.2)	35 (14.4)	36 (14.0)
Unreported	25 (5.0)	14 (5.8)	11 (4.3)

[a] Wealth index includes the following: (1) present value of total savings, assets, and property (including home) with response options from less than $500 to $500,000 or more; (2) total household income before taxes with response options from under $10,000 to $75,000 or above; (3) financial stability as measured by length of time the respondent could maintain current residence and standard of living without present income with response options less than 1 month to more than a year; and (4) home ownership status with response options rent home, own home, not paying rent or mortgage, and don't know

[b] The debt index includes "Not counting your mortgage or car loans, what is the total amount of debt held by you and other family members living here, including student loans, credit card charges, medical or legal bills, or loans from relatives?" with response options: less than $2,000, $2,000–$4,999, $5,000–$9,999, $10,000–$19,999, $20,000–$49,999, $50,000–$99,999, $100,000 or more, don't know, and refused

source seekers) and those who sought cancer information from fewer than five sources (fewer source seekers). Participants that did not report seeking cancer-related information from any source ($N=18$) were excluded from all analyses. These participants responded "no" to a previous question asking "Have you ever looked for cancer-related information from any source, including your doctor?" and therefore were not asked to identify information sources. Given that information "nonseekers" are different from those that actively seek health information [4, 5], we chose to focus on differences in the number of information sources sought in the population of participants that reported seeking cancer-related information ($N=501$).

Information Sources Within Cancer Topic Taxonomy WITS participants were asked to select which of the 14 previously defined cancer information sources they would use to find information on each of 11 specific topics that make up a cancer topic taxonomy, previously defined by Galarce et al. [22]. The taxonomy included the following: (1) disease/treatment (treatment side effects, treatment options, likelihood of surviving, cancer type, etc.), (2) self-care management (diet/nutrition, general health and staying healthy, alternative or complementary medicine, stress, depression, anxiety, etc.), (3) health services (physicians and treatment facilities, etc.), and (4) work/finances (financial assistance, employment issues, etc.). The number of information sources sought for each topic was counted, then the number of sources used for each topic area was averaged.

Health Information Seeking Self-Efficacy Participants were asked, "Overall, how confident are you that you could get advice or information about cancer if you needed it?" Response options used a five-point Likert scale representing not at all confident to completely confident.

Fear of Recurrence To assess worry about recurrence, participants responded how much during the past 7 days they felt the following: "I worry that my condition will come back." Participants who responded "not at all" were scored 0. Participants who responded "somewhat" or "quite a bit" were given a score of 1.

Health Information-Seeking Difficulty Participants were asked to report whether nine potential barriers to health information seeking were 0=no problem at all, 1=small problem, or 2=large problem. Principal component analysis with varimax rotation yielded two factors (eigenvalues >1, factor loadings >0.40) [23]. The first factor, information access barriers, accounted for 43 % of the total variance (Cronbach's alpha=0.93) and included "access to a computer, access to the Internet, difficulties in using a computer, and difficulties using an online search tool or software." The second factor, information utilization barriers, accounted for 26 % of the total variance (Cronbach's alpha=0.82) and included "there was too much information; there was no way to tell if information was accurate; there was no way to tell if information was up-to-date; there was no way to tell if information was relevant to my situation; and the available information used too many technical terms."

Discussing Information with Providers Participants were asked: "If you were to get information from a trustworthy source that is important to your situation, would you discuss the information with a doctor or health care provider?" Participants responded either yes or no.

Discussing Conflicting Information with Providers Participants were asked: "If you found conflicting information from different sources, which of the following would you most likely do? Please choose *one* answer." Participants chose one of the following options: Take the information to a physician or health care provider to figure out what is right; Ignore the information if it is different from what my doctor or health care provider told me; Use the information from the source I trust most for this topic; or Something else (please describe). Participants were categorized into two groups: those who reported bringing conflicting information to their providers and those who reported another strategy for dealing with conflicting information.

Demographic characteristics for age, race, gender, and education were measured using standard, validated measures. Wealth and debt indices were included using methods outlined in a previous publication [22].

Statistical Analysis

Unadjusted bivariate analyses (point biserial Pearson correlation coefficients, *t* tests, and chi-square) tested for differences between participants who sought information from greater than five sources (numerous source seekers) compared to those who sought information from less than five sources (fewer source seekers). Binomial logistic regression was used to model the predicted probability that participant sociodemographic and socioeconomic were associated with seeking cancer-related information within the cancer topic taxonomy for numerous source seekers compared to fewer source seekers. Controlling for sociodemographic and socioeconomic factors, multivariable logistic regression models compared numerous source seekers and fewer source seekers on information seeking attitudes and behaviors (self-efficacy, fear of recurrence, perceptions of information seeking difficulty, and patient–provider communication). Listwise deletion was used to exclude people with missing or inapplicable responses on variables of interest. All analyses used SPSS V.19.

Results

Number of Information Sources for Cancer-Related Information Overall

The mean number of sources sought per respondent was 4.88 (SD=2.60, median=4, Table 2) and ranged from 1 source (N=36) to 14 sources (N=2) with the modal number of sources identified as 3 (N=91). The most commonly used health information sources were doctors and the Internet (Table 2).

Number of Information Sources Within Cancer Topic Taxonomy

The mean number of information sources used for each specific cancer-related topic within the taxonomy ranged from 1.81 (SD=2.12) for work/finances information to 4.02 (SD=2.37) for health services information (Table 2). The number of sources used for each topic were highly intercorrelated (Cronbach's alpha=0.87; all bivariate Pearson correlation coefficients significant at $p>0.001$, data not shown). Across all topics represented by the taxonomy, doctors, Internet, other cancer patients, and pamphlets/books were among the most popular information sources sought by this population of cancer survivors (Table 2).

Predictors of Numerous Source Seekers

Socioeconomic and sociodemographic factors differentially predicted the use of numerous information sources (versus fewer information sources) for cancer-related information overall and across the cancer topic taxonomy. Significant results are provided below and presented in Table 3.

Table 2 Unadjusted percentage of cancer survivors who report using a specific information source for cancer-related information overall and for information within the cancer topic taxonomy. Well-Informed, Thriving and Surviving (WITS) study. N=501

	Cancer-related information overall	Cancer topic taxonomy[a]			
		Disease/ treatment[b]	Self-care management[c]	Health services[d]	Work/ finances[e]
Number of sources					
Mean (SD)	4.88 (2.60)	4.01 (2.22)	3.94 (2.30)	4.02 (2.37)	1.85 (2.12)
Median	4.00	3.75	3.50	4.00	1.00
Range	1–14	0–13	0–13	0–13	0–13
Source	Use [N (%)]				
One or more doctors	411 (82.0)	491 (98.0)	470 (93.8)	439 (87.6)	143 (28.5)
Internet	409 (79.0)	404 (80.6)	397 (79.2)	278 (55.5)	177 (35.3)
Other cancer patients or survivors	288 (57.5)	322 (64.3)	341 (68.1)	284 (56.7)	159 (31.7)
Pamphlets/books	285 (56.9)	326 (65.1)	343 (68.5)	130 (25.9)	120 (24.0)
Family or friends in the medical field	247 (49.3)	266 (53.1)	280 (55.9)	270 (53.9)	100 (20.0)
Family or friends not in the medical field	162 (32.3)	145 (28.9)	253 (50.5)	147 (29.3)	129 (25.7)
Resource center at a hospital/clinic	133 (26.5)	231 (46.1)	248 (49.5)	122 (24.4)	154 (30.7)
Television	96 (19.2)	92 (18.4)	130 (25.9)	52 (10.4)	38 (7.6)
Cancer information or support organization	94 (18.8)	127 (25.3)	123 (24.6)	72 (14.4)	71 (14.2)
Support groups	73 (14.6)	162 (32.3)	217 (43.3)	92 (18.4)	110 (22.0)
Co-workers[f]	70 (14.0)	–	–	–	–
Another type of health care provider	69 (13.8)	146 (29.1)	234 (46.7)	69 (13.8)	53 (10.6)
Public library	50 (10.0)	97 (19.4)	107 (21.4)	33 (6.6)	39 (7.8)
Radio	31 (6.2)	35 (7.0)	55 (11.0)	17 (3.4)	20 (4.0)
Other sources	27 (5.4)	11 (2.2)	20 (4.0)	7 (1.4)	44 (8.8)

[a] For each topic category, individuals were considered a user of that information source if they reported using the source for any of the subtopics within that category. They were considered not using the source if they did not use the source for any of the topics within that category

[b] Disease/treatment (side effects of treatment for your cancer, treatment or treatment options for your cancer, likelihood of surviving your cancer, the kind of cancer you have, what to expect when dealing with your cancer)

[c] Self-care management (diet/nutrition, staying healthy or health in general, non-traditional medicine or alternative or complementary medicine, how to cope with stress fear depression or anxiety)

[d] Health services (doctors or facilities where you could get treatment)

[e] Work/finances (financial assistance or help with money, work or employment issues)

[f] This source was omitted from the list of options for sources used for specific topics

Table 3 Sociodemographic and socioeconomic characteristics of numerous source seekers compared to fewer source seekers for cancer-related information overall and within cancer topic taxonomy

	Cancer-related information overall (OR; 95 % CI)	Cancer topic taxonomy[a]			
		Disease/treatment (OR; 95 % CI)	Self-care management (OR; 95 % CI)	Health services information (OR; 95 % CI)	Work/finances information (OR; 95 % CI)
Age (years)	0.99 (0.97–1.01)	1.00 (0.98–1.02)	1.00 (0.98–1.02)	1.01 (0.99–1.03)	0.99 (0.97–1.01)
Gender	Wald $F=18.38^{***}$	Wald $F=4.49^{*}$	Wald $F=10.48^{**}$	Wald $F=3.20^{+}$	Wald $F=0.06$
Male	Ref	Ref	Ref	Ref	Ref
Female	2.83 (1.76–4.54)***	1.63 (1.04–2.57)*	2.13 (1.35–3.36) *	1.54 (0.96–2.48) $^{+}$	1.06 (0.67–1.66)
Race	Wald $F=3.91$	Wald $F=1.80$	Wald $F=3.12$	Wald $F=2.84$	Wald $F=5.19$
Non-Hispanic White	Ref	Ref	Ref	Ref	Ref
Non-Hispanic Black	1.19 (0.52–2.70)	0.96 (0.43–2.14)	1.12 (0.51–2.49)	1.45 (0.66–3.23)	1.58 (0.69–3.61)
Asian	0.36 (0.10–1.26)	1.46 (0.44–4.85)	2.79 (0.72–10.80)	1.90 (0.59–6.16)	1.82 (0.55–6.05)
Hispanic	1.07 (0.37–3.09)	1.78 (0.63–5.03)	0.82 (0.29–2.34)	1.06 (0.37–3.06)	0.59 (0.21–1.68)
Other/mixed race	0.45 (0.10–1.94)	1.40 (0.39–5.03)	1.77 (0.47–6.66)	1.96 (0.55–7.05)	2.70 (0.66–11.05)
Wealth index	1.03 (0.82–1.30)	1.19 (0.95–1.49)	1.02 (0.82–1.27)	1.05 (0.84–1.33)	0.75 (0.60–0.94)*
Debt index	1.01 (0.82–1.24)	0.96 (0.82–1.24)	0.98 (0.80–1.21)	1.08 (0.88–1.33)	1.34 (1.10–1.65)**
Highest level of education	Wald $F=17.49^{**}$	Wald $F=6.29$	Wald $F=8.02^{+}$	Wald $F=4.24$	Wald $F=5.32$
Post-graduate degree from college or university	Ref	Ref	Ref	Ref	Ref
College, 4 years or more (college graduate)	0.73 (0.44–1.22)	0.48 (0.11–2.17)	0.36 (0.08–1.65)	1.30 (0.32–5.38)	1.15 (0.27–4.96)
Some post-high school education	0.60 (0.36–1.01)$^{+}$	0.61 (0.29–1.27)	0.52 (0.25–1.10)	1.05 (0.50–2.18)	0.58 (0.27–1.24)
Grade 12 or GED (high school graduate)	0.16 (0.07–.039) ***	0.53 (0.32–0.89)*	0.51 (0.30–0.86)*	0.63 (0.37–1.065)	1.06 (0.63–1.78)
Less than high school	0.36 (0.08–1.65)	0.70 (0.42–1.15)	0.79 (0.48–1.31)	0.76 (0.46–1.28)	1.39 (0.83–2.30)

[a] Outcome modeled is the median split for each topic taxonomy (0=fewer source seekers, 1=numerous source seekers)

$^{+}p<0.10$

$^{*}p<0.05$

$^{**}p<0.01$

$^{***}p<0.001$

Overall Cancer-Related Information Gender ($p<0.001$) and education ($p=0.002$) were the strongest predictors of being a numerous source seeker compared to fewer source seekers. Women were almost three times more likely to seek cancer-related information from a greater number of information sources than males (OR=2.83, 95 % CI=1.76–4.54). Participants with a high school degree or GED were 84 % less likely ($p<0.001$) than those with post-graduate education to seek cancer information from numerous sources.

Disease/Treatment Information For information specific to cancer-related disease and treatment, those with a high school degree were less likely to use numerous information sources than those with post-graduate education (OR=0.53, CI=0.32–0.89). Females were more likely than males to seek disease/treatment information from numerous sources (OR=1.63, 95 % CI=1.04–2.57).

Self-Care Management Information Females (OR=2.13, 95 % CI=1.35–3.36) were more likely than males to seek self-care management information from numerous sources, and those with a high school degree were less likely than those with post-graduate degrees to seek self-care management information from numerous health information sources (OR=0.53, 95 % CI=0.32–0.86).

Health Services Information Sociodemographic and socioeconomic factors did not differentially predict seeking numerous information sources for cancer-related health services information.

Work/Finances Information Those with a lower wealth index were 25 % less likely than those with a higher wealth index to seek work and finances information from numerous sources (OR=0.75, 95 % CI=0.60–0.94) and those with a higher debt index were 34 %

more likely than those with a lower debt index to do so (OR=1.34, 95 % CI=1.10–1.65).

Numerous Source Seekers' Attitudes and Behavior

Information Seeking Self-Efficacy Numerous source seekers of overall cancer-related information reported greater information-seeking self-efficacy than participants who sought fewer information sources in unadjusted analyses (r_{pb}=0.09, $p<0.05$), but this association did not remain significant controlling for socioeconomic and sociodemographic characteristics (Table 4).

Fear of Recurrence Numerous source seekers reported greater fear of recurrence in unadjusted analyses (r_{pb}=0.13, p=0.004) but not in the fully adjusted model.

Information Seeking Difficulty Participants who used numerous information sources reported fewer information access barriers in both the unadjusted (r_{pb}=−0.18, $p<0.001$) and fully adjusted models (OR=0.61, 95 % CI=0.44–0.85). There was no relationship between information utilization barriers and use of numerous information sources in unadjusted or adjusted analyses.

Patient–Provider Communication In both unadjusted and adjusted analyses, numerous source seekers were not more or less likely than fewer source seekers to either discuss the information with their health care providers or bring conflicting information to their provider to ascertain information accuracy.

Discussion

This is the first study to our knowledge to ask post-treatment cancer survivors to indicate all information sources used for both cancer-related information overall and each of four specific cancer-related topics (disease/treatment, self-care management, health services, work/finances). On average, respondents sought cancer-related information from approximately five distinct information sources. Consistent with previous qualitative analyses of patterns in navigating numerous information sources [24], in our study participants who used numerous sources for one cancer-related topic also used numerous sources for other topics.

Sociodemographics differentially predicted the number of health information sources used for cancer-related information. Female gender and higher education level were the strongest predictors of using numerous cancer-related information sources overall and for specific cancer-related topics, with the exception of work and finances information. This is consistent with previous literature demonstrating increased information seeking behaviors for these populations [5, 25]. Results potentially indicate that providing access to multiple information sources may improve the survivorship experience for female patients and those with higher education, whereas males and those with lower education may prefer to have information from one key source.

Interestingly, fewer sources of information were sought for work and finances information and seeking numerous sources for work and finances information was associated only with lower wealth and increased debt. Many cancer survivors face employment and financial burdens as a result of their disease and treatment [26], but there has not been enough focus on the health and finances information available to this population [22] and survivorship care often does not include resources for cancer survivors facing these burdens [27]. Cancer survivors, especially those of low socioeconomic status, may need assistance procuring information about employment, insurance, and finances.

Our data suggest that numerous source seekers report fewer barriers to accessing information than those who use fewer information sources. Interventions to increase use of multiple health information sources in target populations should address specific identified barriers, such as Internet and

Table 4 Multivariable logistic regression models comparing information seeking attitudes and behaviors of numerous source seekers and fewer source seekers

	Model 1: information seeking self-efficacy	Model 2: fear of recurrence	Model 3: information access barriers	Model 4: information utilization barriers	Model 5: discussing information with providers	Model 6: bringing conflicting information to provider
Numerous source seekers						
OR	1.25	1.67	0.61	1.02	1.02	0.95
(95 % CI)	(0.97–1.61)$^{+}$	(0.93–2.77)$^{+}$	(0.44–0.85)**	(0.82–1.26)	(0.21–4.87)	(0.64–1.41)

All models control for age, gender, race, education, wealth, and debt indices

$^{+}p<0.10$

$^{*}p<0.05$

$^{**}p<0.01$

$^{***}p<0.001$

computer access. Difficulties assessing accuracy and relevance of information were not associated with seeking multiple information sources, suggesting these individuals are not necessarily seeking additional sources as a way to validate previous information.

In terms of patient–provider communication that may result from seeking cancer information from numerous sources, results from our study suggest that patients who use more sources for cancer-related information are not necessarily more likely to share information with their physician. Importantly, although those seeking information from more than five sources have the potential to encounter more conflicting information, they are not more likely to bring that information to their health care provider. Although for some survivors this may indicate their questions have been fully addressed through health information seeking, it is potentially concerning combined with previous work showing that patients who report difficulty understanding or trusting online health information are not necessarily more likely to discuss that information with providers [21]. Providers may want to convey openness towards addressing patients' health information-seeking behaviors to encourage numerous source seekers to discuss conflicting information during the visit.

There are some important limitations to the present analysis. Given the cross-sectional design, we are unable to assess temporality in the relationship between information-seeking attitudes and behaviors and the number of information sources sought. Although we adjust for multiple participant characteristics, it is also possible that there are characteristics moderating this relationship which could not be explored in this sample. In addition, this study of numerous source seekers compared to fewer source seekers was conducted in a population of post-treatment cancer patients from a single Northeast cancer center and may not generalize to a broader population of cancer patients. Nationally representative surveys could allow respondents to report use of multiple information sources to provide better estimates of the number of distinct cancer-related information sources sought. In addition, cancer survivors may have different information needs or information-seeking patterns than those in the diagnosis or treatment phase. However, cancer survivors are an important group to study, given there has traditionally been less focus on understanding the information needs of cancer patients post-treatment than during the diagnosis and treatment phase [7], the population of survivors is growing rapidly, and they face unique concerns and transitions in care [8, 9].

Making a distinction between numerous sources seekers and fewer source seekers is only a first step. This survey did not examine frequency or quality of information sources used and did not test knowledge or retention of cancer-related information. Survivors who used more information sources may have gained only cursory information from each source or one information source may have provided a larger percentage of information than another. These analyses can be supplemented with an understanding of how cancer survivors move through multiple information sources [24]. It would also be beneficial to explore consequences of consulting multiple sources within a source type (e.g., visiting multiple websites or consulting with multiple doctors).

Many patients are seeking cancer-related information from over five distinct information sources and these individuals seek multiple sources across a variety of cancer-related topics. These results, although preliminary, suggest that numerous source seekers are educated, do not lack confidence in their information-seeking abilities, and are not seeking multiple sources due to uncertainty or confusion. Providers should be aware that despite the potential for encountering conflicting information when using multiple sources, these individuals are not more likely to share conflicting information in the health care interaction. This distinction between numerous sources seekers and fewer source seekers may prove meaningful for researchers and practitioners attempting to appropriately address cancer survivors' health information needs.

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