

Screening practices in cancer survivors

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Abstract

Introduction Ten percent of all new cancers are diagnosed in cancer survivors and second cancers are the sixth leading cause of cancer deaths. Little is known, however, about survivors' screening practices for other cancers. The purpose of this study was to examine the impact of a cancer diagnosis on survivors' screening beliefs and practices compared to those without a cancer history.

Materials and methods This study examined cancer survivors' ($n=619$) screening beliefs and practices compared to those without cancer ($n=2,141$) using the National Cancer Institute's 2003 Health Information National Trends Survey (HINTS).

Results The typical participant was Caucasian, employed, married, and female with at least a high school education,

having a regular health care provider and health insurance. Being a cancer survivor was significantly associated with screening for colorectal cancer but not for breast or prostate cancer screening. Screening adherence exceeded American Cancer Society recommendations, national prevalence data, and Healthy People 2010 goals for individual tests for both groups. Physician recommendations were associated with a higher level of screening but recommendations varied (highest for breast cancer and lowest for colorectal cancer screening).

Conclusions Cancer survivors had different health beliefs and risk perceptions for screening compared to the NoCancer group. While there were no differences between survivors' screening for breast and prostate cancer, survivors were more likely to screen for colorectal cancer than the comparison group. Screening adherence met or exceeded recommendations for individual tests for both cancer survivors and the comparison group.

Implications for cancer survivors Cancer survivors should continue to work with their health care providers to receive age and gender appropriate screening for many types of cancers. Screening for other cancers should also be included in cancer survivorship care plans.

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Introduction

Accounting for 3.5% of the US population, there are now over ten million cancer survivors, many of whom are at

greater risk than the general population for developing additional cancers [18, 49, 57]. Ten percent of all new cancers are diagnosed in survivors and second cancers are the sixth leading cause of cancer deaths [32, 71, 72]. Reducing this risk is a concern throughout the life of the survivor [11, 54].

Screening can reduce the risk of dying from selected cancers through earlier detection when the stage of cancer is more amenable to effective treatment. For screening to be effective, health care providers and the public need to be aware of, value, and participate in screening [50]. Evidence-based screening tests, used to detect cervical, breast, and colorectal cancers (CRC), have been promoted in the general population to reduce cancer mortality (see Table 1) [3, 8, 9, 50]. Screening for prostate cancer is a common practice despite less convincing evidence about its effectiveness in reducing mortality [55, 58]. With few exceptions, there are no specific screening guidelines for the cancer survivor. Understanding screening practices of high risk populations is important to identify factors that may help or hinder these practices [3]. The cancer experience may affect survivors' beliefs and screening practices, yet we are only beginning to explore their actual practices [4, 5, 7, 19, 20, 47, 52, 53, 67].

The purpose of this study was to examine the impact of a cancer diagnosis on survivors' screening beliefs and practices compared to those without a cancer history. The specific research questions were: What are the health beliefs and screening practices of cancer survivors (CaSurvivors) when compared to a group without a personal or family history of cancer (NoCancer)?

The Health Belief Model (HBM) provided the conceptual framework to explore the cancer screening beliefs and practices of survivors and factors that may enhance or inhibit those practices. According to the Health Belief Model (HBM), people will take action to prevent, screen for, or control their health conditions if they: (1) believe they are susceptible to the condition (susceptibility); (2) believe the condition would have serious consequences (seriousness); (3) believe there is benefit to taking a course of action (benefits); and (4) believe the benefits are greater than the barriers for taking action (barriers) and (5) believe in the ability to perform the action to control the illness (self-efficacy) [31]. HBM factors associated with increased screening practices include knowledge, perceived susceptibility, increased benefits, decreased barriers, having a regular source of health care, and health insurance [14, 15, 23, 25, 27, 39, 40, 45, 61, 62, 64]. The HBM has been used in studies of cancer screening in the general population while only one study was identified in cancer survivor [30, 42, 74, 75]. The HBM was selected for this study as the best fit between the study aims and available data.

Materials and methods

This was a cross sectional, correlational study utilizing the National Cancer Institute's (NCI) Health Information National Trends Survey I (HINTS I), a national survey from list-assisted random-digit-dial (RDD) telephone interviews about the public's use of cancer-related information and other cancer related beliefs and behaviors [48, 51].

Measures Under the guidance of an expert advisory committee, NCI personnel developed and tested the HINTS I survey [51]. The final survey consisted of 148 questions on cancer communication (35 items), cancer history and general cancer knowledge (16 items), cancer specific personal risk and screening (54 items), risk behaviors (29 items), health status and demographics (14 items).¹

HINTS I procedures The HINTS data collection occurred between October 2002 and May 2003 following the best practices identified by the American Association for Public Opinion Research [2] to minimize errors from coverage, sampling, non-response and measures [26, 51, 63]. Special efforts were made to oversample African-Americans and Hispanics. Telephone interviewers, averaging 30 min, reached 19,509 households; 55% completed the screening and 62.8% completed the extended interview with a final sample of 6,369. After obtaining IRB exemption and registering for access at NCI, the HINTS I SAS files and codebooks were obtained from the HINTS website (<http://hints.matthewsgroup.com/register.asp>) for this secondary data analysis [51].

Sample Of the 6,369 evaluable HINTS I participants, excluding non-melanoma skin cancer, 9.7% ($n=619$) identified themselves as cancer survivors when asked if they had ever been told they had cancer. No other cancer information regarding current disease status, stage or treatment was collected. Of the 619 CaSurvivors, 68% reported having one of seven types of cancer: breast ($n=119$); cervical ($n=94$); prostate ($n=62$); melanoma ($n=61$); colorectal ($n=49$); and endometrial cancer ($n=39$). The other 32% included the following cancer types: ovarian (23), lymphoma (21), head and neck (19), thyroid (16), lung (16), bladder (14), kidney (9), stomach (6), leukemias (5), pancreatic (2), bone (10), other (48). In addition, 9.5% ($n=59$) of CaSurvivors reported having >1 type of cancer. Participants who did not report a personal or family history of cancer (33.6%, $n=2,141$) served as the NoCancer comparison group.

¹ The English and Spanish versions of the HINTS I survey instrument can be obtained at <http://cancercontrol.cancer.gov/hints>.

Table 1 ACS cancer screening recommendations, current US population prevalence rates, and healthy people 2010 goals

ACS cancer early detection practices minimally include the following:	US population prevalence rates ^a	Healthy people 2010 goals
<i>Cervical cancer</i> : all women should begin cervical cancer screening about 3 years after they begin having vaginal intercourse, but no later than when they are 21 years old. Screening should be done every year with the regular Pap test or every 2 years using the newer liquid-based Pap test.	95.2%	92%
<i>Breast cancer</i> : yearly mammograms starting at age 40 and continuing for as long as a woman is in good health.	63.4%	70%
<i>Colorectal cancer</i> : beginning at age 50, both men and women should follow <i>one</i> of these five testing schedules: Yearly fecal occult blood test (FOBT) Flexible sigmoidoscopy every 5 years Yearly fecal occult blood test plus flexible sigmoidoscopy every 5 years Double-contrast barium enema every 5 years Colonoscopy every 10 years	48.1%	50%
<i>Prostate cancer</i> : both prostate-specific antigen (PSA) testing and digital rectal examination (DRE) should be offered annually, beginning at age 50 years, to men who have at least a 10-year life expectancy.	59%	No goal established

^a From 2002 BRFSS (Behavioral Risk Factor Surveillance Survey) data

Statistical analysis A variety of analytical approaches, appropriate to the level of measurement, were used to address each of the research question: What are the health beliefs and screening practices of CaSurvivors compared to the NoCancer comparison group [33, 34]? Replicate weights, provided by the NCI, were used to compute jack-knife variance estimations to adjust for non-response and to calibrate or weight for gender, age, race/ethnicity, and education to allow for mean population estimates [56]. All sample sizes are reported as unweighted and all percentages are reported as weighted, which allows for the sample data to be adjusted for and be representative of US population estimates. Descriptive statistics were calculated for questions related to health beliefs, screening practices, and demographic variables. Categorical data were analyzed using cross-tabulations and chi-square tests and continuous data were analyzed using means and *t* tests. Significance tests are reported if $p < 0.05$. Results from CaSurvivors were compared to a NoCancer comparison group and also reported by cancer diagnosis for those with >30 by cancer type.

The American Cancer Society's (ACS) recommendations were used in this study to define cancer screening (Table 1); self-report for *ever* having been screened for cervical, breast, colorectal or prostate cancer is reported. For men >50 years of age, that included having colorectal cancer (CRC) screening and a prostate specific antigen (PSA). For women >50 years of age, that included Papanicolaou test, mammogram, and CRC screening.

Logistic regression analyses were performed with screening (yes/no) as the dependent variable and cancer survivor (yes/no) as the independent variable for each screening test: cervical (women >18 years of age); breast

(women >40 years of age); prostate (men >50 years of age); and colorectal (men and women >50 years of age) to evaluate screening practices by cancer status. Variables associated ($p < 0.10$) with both having had cancer and having screening tests in the univariate analyses were controlled for and included age (<65/>65 years of age), race and ethnicity (Caucasian/non-Caucasian), regular health care provider (yes/no), and having health insurance (yes/no). SAS version 9.0 (Cary, NC) and SUDAAN SAS 9.1 Callable version (RTI, Research Triangle Park, NC) were used for all analyses [59, 65].

Results

Study sample The typical participant was Caucasian, employed, married, female, had > a high school education, a regular health care provider and health insurance (Table 2). The two groups were different ($p < 0.001$) in age, gender, marital status, employment, race/ethnicity, self-reported general health status, and access to health care (having a regular HCP and health insurance). Overall, the CaSurvivors group was older, more were retired, reported poorer health, and had greater health care access than the NoCancer group.

Screening practices The primary outcome for this analysis was adherence to ACS Guidelines for cervical, breast, colorectal or prostate cancer screening. Both groups met or exceeded ACS recommendations, 2002 national Behavioral Risk Factor Surveillance Survey (BRFSS) prevalence data, and Healthy People 2010 goals (Table 3). In addition, screening rates by type of cancer are also shown. Of note, physician screening recommendations were not significantly

Table 2 Demographics of NoCancer and CaSurvivors (all and by diagnosis)

	NoCancer	CaSurvivors	Breast	Cervical	Prostate	Melanoma	Colorectal	Endometrial	>1 cancer
<i>N</i>	2,141	619	119	94	62	61	49	39	59
Age (mean years)***	42	58	64	44	71	61	63	54	62
Gender (% male)***	981 (55.1%)	179 (34.5%)	N/A	N/A	62 (100%)	32 (56.9%)	14 (42.7%)	N/A	17 (32.4%)
Time since Diagnosis (mean years)	N/A	11 years	11.6	15.3	6.3	11.3	8.4	15	17
Employment***									
Employed/self	1,285 (62.2%)	228 (39.4%)	42 (37.2%)	52 (57.5%)	14 (29.8%)	25 (50%)	13 (41.5%)	11 (20.9%)	14 (26.3%)
Retired	295 (11.8%)	237 (35.3%)	53 (39.6%)	11 (9.7%)	40 (61.8%)	31 (41.7%)	23 (42.7%)	13 (28%)	28 (44.3%)
Out of work <1/>1 year	117 (6.9%)	28 (4.2%)	7 (4.8%)	9 (8.1%)	0	1 (3.2%)	2 (2%)	1 (2.1%)	2 (7.1%)
Homemaker	162 (7.2%)	47 (7.5%)	8 (8.7%)	8 (7.9%)	0	3 (4%)	3 (2.3%)	6 (20.1%)	2 (3.2%)
Unable to work	71 (3.2%)	55 (11.2%)	8 (9.8%)	11 (11.6%)	3 (8.4%)	1 (1.2%)	4 (11.6%)	6 (13%)	10 (19.2%)
Student	120 (8.8)	6 (2.3%)	8 (3.8%)	2 (5.2%)	0	0	0	1 (15.8%)	0
Marital status:***									
Married/partnered	1,148 (61.4%)	309 (65.7%)	49 (56.4%)	47 (65.6%)	38 (81.8%)	38 (74.4%)	19 (64.1%)	11 (33.7%)	27 (64.1%)
Divorced/separated	304 (9.9%)	105 (12.5%)	19 (12%)	27 (18.4%)	7 (7.4%)	5 (4.9%)	8 (17.3%)	12 (28.2%)	6 (8.5%)
Widowed	159 (4.4%)	134 (15.1%)	42 (27.7%)	6 (5.9%)	11 (9.4%)	12 (12.7%)	14 (14.3%)	10 (16.9%)	18 (22.2%)
Never married	438 (24.3%)	53 (6.7%)	8 (3.8%)	13 (10.1%)	1 (1.5%)	6 (8%)	4 (4.6%)	5 (21.2%)	4 (5.3%)
Race/ethnicity:***									
White	1,236 (61.9%)	486 (81.1%)	93 (75.6%)	67 (79.4%)	46 (82.7%)	58 (95.8%)	40 (92.4%)	31 (74.2%)	47 (85.3%)
Black	273 (11.3)	48 (8.5%)	13 (5.6%)	10 (8%)	4 (5.1%)	0	1 (0.8%)	6 (23.1%)	5 (6.7%)
Hispanic	395 (19%)	32 (4.7%)	5 (6.1%)	10 (7.9%)	1 (3.1%)	1 (0.8%)	3 (7.6%)	0	2 (1.9%)
All others	128 (7.8%)	30 (5.4%)	7 (6.8%)	6 (4.7%)	4 (9.1%)	1 (3.5%)	0	1 (2.8%)	3 (7.9%)
Education:*									
<HS	331 (20.7%)	74 (18.2%)	13 (18.7%)	11 (13%)	10 (25%)	8 (17.1%)	4 (12.1%)	5 (13.4%)	8 (21.6%)
HS	619 (32.1%)	207 (38.2%)	40 (37.6%)	38 (50.6%)	16 (28.6%)	11 (18.7%)	15 (38.8%)	16 (56.6%)	18 (34.4%)
>HS	1,100 (47.2%)	321 (43.7%)	65 (43.7%)	44 (45.3%)	31 (46.3%)	42 (64.3%)	26 (21.2%)	17 (30%)	30 (43.9%)
Income:									
<\$2.5k	604 (26.5%)	215 (32.4%)	45 (38.6%)	39 (40.1%)	16 (22.6%)	12 (19.7%)	17 (22.3%)	12 (30.8%)	24 (44.4%)
\$2.5-<\$5k	275 (12.3%)	81 (12.5%)	14 (10.4%)	15 (17.9%)	11 (22.1%)	5 (5.3%)	4 (7.5%)	7 (12.2%)	8 (11%)
\$5-\$10k	307 (13.7%)	83 (15.5%)	13 (14.2%)	16 (18.6%)	12 (20.8%)	14 (24.3%)	6 (29.1%)	5 (12.4%)	4 (6%)
\$10-\$15k	291 (14.4%)	74 (11.5%)	19 (14.3%)	9 (9.9%)	7 (10.2%)	9 (14.3%)	8 (17.2%)	4 (5.2%)	4 (6.5%)
>\$15k	373 (18.2%)	90 (15.6%)	15 (11.3%)	9 (8.7%)	8 (12.8%)	13 (26%)	6 (15.4%)	2 (5.8%)	10 (18.8%)
Ref/NA/DK/miss	291 (14.9%)	76 (12.5%)	13 (11.3%)	6 (4.7%)	8 (11.5%)	4 (8.6%)	8 (33.6%)	8 (33.6%)	9 (13.3%)
Health care access:***									
Regular HCP (% with)	1,264 (54.9%)	519 (81.6%)	15 (86.9%)	75 (78.3%)	53 (80.5%)	52 (83.2%)	38 (87.5%)	33 (71.1%)	54 (94.3%)
Health Insurance (% with)	1,696 (80.9%)	558 (92.5%)	114 (97.4%)	72 (72%)	56 (98.9%)	61 (100%)	44 (99.1%)	37 (99.3%)	53 (91.3%)
Health status:***									
Excellent	298 (13.8%)	63 (10.2%)	10 (5.3%)	7 (9.3%)	5 (11.9%)	10 (15.4%)	6 (22.3%)	5 (10%)	4 (4.7%)
Very good	648 (31%)	158 (25.2%)	30 (22.9%)	18 (18.5%)	16 (27.7%)	24 (37.1%)	13 (25.6%)	4 (10.2%)	17 (32.4%)
Good	668 (33.8%)	182 (28.4%)	39 (30.2%)	35 (34.3%)	18 (32.1%)	11 (17.8%)	13 (27.1%)	13 (27.7%)	18 (30.4%)
Fair	372 (18.2%)	150 (25.1%)	30 (33.6%)	28 (31.5%)	13 (19%)	12 (20.5%)	8 (13.5%)	10 (21.9%)	10 (16.7%)
Poor	69 (3.2%)	50 (11%)	9 (8%)	5 (6.4%)	6 (9.4%)	4 (9.2%)	5 (11.6%)	6 (30.2%)	7 (15.8%)

Represents 68% of HINTS cancer survivors (≥ 30 subjects/specific cancer types not including more than one cancer)
 * $p \leq 0.05$ ** $p \leq 0.01$ *** $p \leq 0.001$

Table 3 Cancer screening practices

Reported ever having a:	NoCancer % (n)	CaSurvivors % (n)	BRFSS % ^a	Breast N=119	Cervical n=94	Prostate n=62	Melanoma n=61	Colorectal n=49	Endometrial n=39	>1 cancer n=59
Papanicolaou test (women, ≥ 18 years)	91.6% (1,027/1,121)***	98.7% (405/412)	95.2%	99% (117/118)	—	—	98.3% (28/29)	95.9% (27/30)	100% (37/37)	100% (28/28)
Mammography (women, ≥ 40 years)	84.9% (299/352)*	91.8% (205/323)	63.4%	—	86.6% (51/59)	—	89.7% (22/24)	94.7% (27/30)	96.9% (31/32)	100% (15/15)
PSA (men, ≥ 50 years)	58.7% (177/302)**	76% (100/132)	59%	—	—	—	89.9% (23/25)	74% (10/12)	—	100% (8/8)
Colonoscopy or Sigmoidoscopy or FOBT (men and women ≥ 50)	69% (374/542)***	84.6% (362/428)	48.1%	80.4% (80/92)	85.7% (19/24)	97.4% (44/45)	93.8% (42/45)	—	92.4% (24/26)	89.1% (29/33)

Screening criteria (e.g. age) based on the ACS's recommendations for the general population. CaSurvivors respondents were excluded if they reported having the primary cancer the screening test was used for (e.g. women with breast cancer were excluded from the mammography calculations). χ^2 comparing CaSurvivors and NoCancer; * <0.05 , ** <0.01 , *** <0.001 .
^aBehavioral Risk Factor Surveillance Survey (BRFSS) 2002 prevalence rates.

different between groups, although recommendations were highest for breast cancer (>78%) and lowest for CRC screening (<19%).

Being a cancer survivor was not significantly associated with the screening practices for three of the four tests (Papanicolaou tests (Odds Ratio (OR) 1.85, 95% Confidence Interval (CI) 0.48–7.16), mammograms (OR 1.83, CI 0.82–4.05), or PSA (OR 1.13, CI 0.39–3.3). Being a survivor did significantly and positively influence adoption of CRC screening (OR 2.03, CI 1.29–3.2).

When asked about things people could do to reduce their chances of getting cancer, screening was identified by 1.6% (9/606) of CaSurvivors and 0.8% (19/2,101) of the NoCancer Group. When asked specifically about their own desired behavior changes to reduce the chance of getting cancer, only 0.5% (9/2,103) of the NoCancer group identified screening.

Cancer specific screening beliefs and practices Health beliefs (perceived risk, severity, benefits, barriers, and self-efficacy) were assessed regarding breast, prostate, and CRC of CaSurvivors compared to the NoCancer comparison group (Table 4).

Breast cancer Cancer survivors perceived themselves to be at greater risk than the NoCancer group for both absolute and comparative risk (Table 4). The strength of association between perceived absolute and comparative risk was moderate ($r=0.46$, $p<0.001$). There were no differences between the two groups in barriers for obtaining a mammogram ($n=184$, χ^2 6.7, 8 df, $p=0.58$). There was a significant positive relationship between physician recommendations and obtaining a mammogram ($n=446$, χ^2 8.9, 1 df, $p=0.005$). While more CaSurvivors reported having mammograms than the NoCancer group, there was no difference when controlling for age, race/ethnicity, and access to health care (OR 1.83 CI 0.82–4.05).

Prostate cancer Cancer survivors perceived themselves to be at greater absolute risk (χ^2 19.9, 4 df, $p=0.001$) and comparative risk (χ^2 12.6, 2 df, $p=0.01$) (Table 4). The strength of association between perceived absolute and comparative risk was moderate ($r=0.45$, $p<0.001$). Physician recommendations about getting a PSA were associated with having the test ($n=195$, χ^2 43.9, 1 df, $p<0.001$). Although more CaSurvivors reported having PSAs than the NoCancer group, there was no difference between the two groups when controlling for age, race/ethnicity, and access to health care (OR 1.13 CI 0.39–3.3).

Colorectal cancer Cancer survivors perceived themselves to be at greater risk than the NoCancer group for both absolute (χ^2 50.3, 4 df, $p<0.001$) and comparative (χ^2 26.1, 2 df,

Table 4 Cancer screening beliefs

	CaSurvivors <i>N</i> =205	NoCancer <i>N</i> =399
Breast cancer screening		
MD recommended mammography	83.8%	78.1%
<i>Risk</i> ^a :		
Mean absolute risk in women who obtained a mammogram (1 low → 5 very high)	2.7	2.1***
Perceived absolute risk for developing breast cancer (somewhat/very high)	23.1%	8.2%***
Perceived relative risk compared to 'average' woman (more likely)	18.6%	7.6%***
<i>Barriers to getting screened</i>		
MD did not advise	8.8%	21%
Did not know I needed test	21%	11%
<i>Prostate cancer screening</i>	CaSurvivors <i>N</i> =100	NoCancer <i>N</i> =177
MD recommended PSA	64.5%	66.8%
<i>Risk</i> ^a :		
Mean absolute risk (1 low → 5 very high)	2.6	2.4
Perceived absolute risk for developing prostate cancer (somewhat/very high)	16.5%	9.5%**
Perceived relative risk compared to average man (more likely)	16.6%	7%*
<i>Colorectal cancer screening</i>	CaSurvivors <i>N</i> =362	NoCancer <i>N</i> =374
MD recommended:		
FOBT	35.7%	36.1%
Sigmoidoscopy	8.5%	8.3%
Colonoscopy	22.4%	15.3%
<i>Risk</i> ^a :		
Mean absolute risk (1 low → 5 very high)	2.4	2.0**
Perceived absolute risk for developing CRC (somewhat/very high)	13.1%	5.1%***
Perceived relative risk compared to average person (more likely)	17%	6.9%***
<i>Barriers to getting screened:</i>		
MD did not advise	27.1%	19%
Did not know needed it	13.2%	22.9%
Afraid of finding cancer if tested (strongly agree)	15.9%	14.1%*
Too expensive (strongly disagreed)	28.9%	20.7%***
<i>Benefits to getting screened:</i>		
Arranging to get tested would be easy (strongly agree)	48%	37.8%***
Regular screening increases chance of cure (strongly agree)	92%	84.8%***

Screening criteria (e.g. age and gender) based on the ACS' recommendations for the general population. CaSurvivors with the relevant primary cancer were not asked about that screening test (e.g. women with breast cancer were not asked about having mammograms). Parallel questions about health beliefs were not ascertained across the three cancers in 2003 HINTS.

* $p \leq 0.05$, ** $p \leq 0.01$ *** < 0.0001

^a Two different risk questions were asked. One question asked about perceived *absolute* risk 'how likely you are to get X cancer' (1 = very low → 5 = very high). The other asked about perceived *comparative* risk 'compared to the average man/woman, 'how likely are you to get X cancer' (1 = less likely → 3 = more likely on a 3 point likert scale).

$p < 0.001$) risk for CRC. The strength of association between perceived absolute and comparative risk was moderate ($r = 0.41$, $p < 0.001$). Since only 25% ($n = 27$) of CaSurvivors and 18.7% ($n = 41$) of the NoCancer group reported that a physician recommended either a sigmoidoscopy or colonoscopy ($p = 0.42$), the relationship between physician recommendation and screening was not conducted (Table 4). Barriers for not obtaining a colonoscopy or sigmoidoscopy were not significantly different between the two groups ($n = 431$, χ^2 8, 8 df, $p = 0.45$). There were, however, significant differences between groups in perceived benefits and self-efficacy (Table 4). Cancer survivors had significantly higher CRC screening rates compared the NoCancer group when controlling for age,

race/ethnicity, and access to health care. Being a survivor positively influenced CRC screening (OR 1.84, CI 1.06–3.19) and being younger age (<65 years) negatively and independently influenced this behavior (OR 0.41, CI 0.20–0.84).

Discussion

The NCI's HINTS I provided a large nationally representative random sample to explore select constructs from the Health Belief Model about cancer survivors screening beliefs and practices. Screening rates exceeded ACS recommendations, national BRFSS prevalence data, and

Healthy People 2010 goals in both groups. Cancer survivors had higher perceived risk scores for breast, cervical, prostate, and CRC screening. Survivors also perceived greater benefits, fewer barriers and greater seriousness of CRC significantly more often than the group without cancer, which may have contributed to their higher screening rates. Furthermore, being a survivor influenced CRC screening practices when controlling for age, race and ethnicity, and health care access. Being a survivor, however, was not found to influence screening practices for cervical, breast, prostate cancers when controlling for these variables. Lack of difference between groups may be related to the high adherence rates. These results contrast with those found by Bellizzi et al in a secondary data analysis of four years of National Health Interview Survey (NHIS) data [7]. They found that cancer survivors were more likely to receive mammograms, Papanicolaou tests and PSA when compared to the comparison group (CRC screening was not evaluated). In another study using 2000 NHIS data, Trask et al. also found survivors having higher screening rates for mammograms, clinical breast exam, Papanicolaou test, PSA, skin exam, and CRC screening [67]. In this study, the percentage of survivors having the screening tests were higher, however, these differences were not apparent when statistically controlling for other socioeconomic differences between the two groups. Each of these studies controlled for differences with different variables which may contribute to these disparities (e.g. our study included health care access as one of these variables while neither of the other studies did). While it was not possible to ascertain whether survivors were being followed by oncologists, primary care providers, or both, physician recommendations were associated with a higher level of screening in breast and prostate cancer.

Perceived vulnerability about cancer may be a motivator or deterrent in obtaining screening tests [6, 37, 39, 40, 43, 44, 47, 58, 68, 70]. Associations between perceived risk and screening practices has varied [37, 43, 44, 69, 70]; some have found that increased perceived vulnerability resulting in increased screening. In this study, there were moderate associations between perceived absolute and comparative risk for breast, prostate, and CRC but those risk perceptions were not significantly associated with having the relevant screening test. While increased benefits, decreased barriers and self-efficacy were associated with obtaining CRC screening, these variables could not be explored as thoroughly in cervical, breast or prostate because there were fewer relevant HINTS questions.

In a national telephone survey, Schwartz et al. found that most US adults (87%) believed in screening and in the benefits of finding a cancer [60]. However, very few respondents in either group identified screening as a way

to reduce cancer risk in general or for themselves. Historically, screening rates have varied by the type of test and have been attributed to individual factors such as age, gender, socioeconomic status and to access to health care [9]. In a recent analysis of the 2002 Behavioral Risk Factor Surveillance Survey (BRFSS) data, men were more likely to have a PSA than CRC screening [10]. Men who had a PSA test and health care access (both provider and insurance) were more likely to have CRC screening than men who didn't. In another cross sectional random telephone survey of Massachusetts' residents, predictors of CRC screening included: having a regular checkup; having other screening tests; having a family history of CRC; and vitamin supplement use [36].

Access to health care includes having a regular provider and having some type of health insurance; lack of access remains a major barrier to cancer screening [9, 66]. In the current study, CaSurvivors were more likely to have access to health care than the NoCancer group. Similar to other studies, screening rates were significantly higher when physician's made recommendations. Although physician recommendations did not differ between groups, they did differ across cancers to be screened. Many other screening studies cite having a physician as a significant contributor to screening behavior and found a positive relationships between having a provider recommend screening and having the test [10, 16, 28, 36, 41, 45, 46]. Physician recommendations were highest for breast cancer screening and lowest for CRC screening and mirrored screening adherence patterns in both groups. Clinical practices regarding survivors' screening may also vary based on type of health care provider (e.g. whether an oncologist or primary care provider or both) [21, 22]. Colorectal and cervical cancer screening rates of breast cancer survivors varied by access to and type of health care provider; these rates are substantially below the most recent US population prevalence rates identified in the BRFSS [12]. Educating health care providers, whether in primary care or in oncology, about their impact when recommending screening and creating organizational systems to support these efforts (e.g. reminder systems) may be useful in increasing adherence, especially for CRC screening. These patterns may also reflect public and professional exposure to screening messages and celebrity endorsements which began in the 1970s for mammography (e.g. Betty Ford and Happy Rockefeller's breast cancer in the news) and colonoscopy in 2000 (Katie Couric's TV colonoscopy) [17, 35]. Compared to other cancers, there are more CRC screening test options which may also make it more confusing for the public.

Having insurance to pay for the screening test is another important factor. Mammography rates dramatically increased once insurance coverage was initiated [9]. While

still suboptimal, colonoscopies rose in average risk individuals from 4.6 to 14.2% after Medicare coverage in 2001 [27, 38]. Although the “CDC Screen for Life: National Colorectal Cancer Action Campaign” is raising awareness about the need for screening, it is not providing the same health access that the National Breast and Cervical Cancer Early Detection Program (NBCCEDP) does. The NBCCEDP, initiated in 1991, has been successful in helping low-income, uninsured, and underserved women gain access to Papanicolaou tests and mammograms by providing both access and coverage.

The limitations of this study are mainly related to conducting a secondary data analysis [34]. As such, the HINTS was not designed to evaluate survivorship issues nor was the sampling designed to be representative of the population of US cancer survivors. The HBM was not evaluated for its predictive ability but was used to guide the identification and inclusion of relevant variables in understanding screening behavior [73]. Self-report of cancer history and screening practices is subject to recall bias and no verification of the self-report was conducted. Nevertheless, the robust sample of survivors and controls, as well as rich item content, provided a unique opportunity to explore these issues within the theoretical framework of the HBM. The high screening rates and lack of variability among groups may also have influenced the cervical, breast and prostate logistic regressions results. Doubeni et al. found that mammography rates declined over time in breast cancer survivors [19]. HINTS survivors were not asked about screening for their type of cancer (e.g. mammograms for women with breast cancer) so similar comparisons could not be made.

Cancer survivors had different health beliefs and risk perceptions for screening compared to the NoCancer group. While there were no differences between survivors’ screening for breast and prostate cancer, survivors were more likely to screen for colorectal cancer than the comparison group. Screening adherence met or exceeded recommendations for individual tests for both cancer survivors and the comparison group. More attention is being paid to the follow-up care of survivors [1, 13, 24, 29]. Much of that emphasis is on the prevention and management of late and long term effects of the disease and treatment. Screening for other cancers should also be included in cancer survivorship care plans [24, 29].

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