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Provider discussion about lifestyle by cancer history: A nationally representative survey

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Abstract

Background: Providers are uniquely positioned to encourage health promoting behaviors, particularly among cancer survivors where patients develop trust in providers.

Methods: We utilized the National Health Interview Survey to identify adults who reported a visit to a provider in the prior year (44,385 individuals with no cancer history and 4,792 cancer survivors), and reported prevalence of provider discussions on weight loss, physical activity, diet, and smoking. We used generalized linear mixed models to examine predicted prevalence of a provider lifestyle discussions by cancer history overall, and among those who do not meet body mass index (BMI), activity, or smoking guidelines.

Results: Among those with a BMI 25-<60 kg/m^2, 9.2% of those with a cancer history and 11.6% of those without a cancer history reported being told to participate in a weight loss program ($p<0.001$). Overall, 31.7% of cancer survivors and 35.3% of those with no cancer history were told to increase their physical activity ($p<0.001$). Only 27.6% of cancer survivors and 32.2% of those with no cancer history reported having a general discussion of diet ($p<0.001$). Among smokers 67.3% of cancer survivors and 69.9% of those with no cancer history reported counseling on smoking ($p=0.309$).

Conclusions: Fewer cancer survivors, who are at increased risk for health complications, are reporting provider discussions about critical lifestyle issues than those with no cancer history.

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Conflict of interest: None.

Impact: Our nationally representative results suggest that providers are missing an opportunity for influencing patient lifestyle factors, which could lead to mitigation of late and long-term effects of treatment.

Keywords

cancer survivorship; providers; health behaviors; physical activity; diet; body mass index; smoking

Health care providers have a role to play not only in treatment of disease, but also in promotion of a healthy lifestyle, particularly among those with a history of cancer who are at higher risk for recurrence and comorbidities. Cancer survivors, defined as such from the moment of diagnosis, numbered an estimated 16.9 million in the US in 2019.[1] The American Institute for Cancer Research recommends that survivors maintain a healthy body weight, perform physical activity, consume a healthy diet (including fruits and vegetables, while limiting high fat foods, sugar sweetened beverages, and red and processed meat), and refrain from smoking.[2] These recommendations have been further described by prominent professional societies including the National Comprehensive Cancer Network,[3] and the American Cancer Society.[4] Furthermore, among all adults, including cancer survivors, the U.S. Preventive Services Task Force (USPSTF) suggests behavioral counseling for overweight or obesity, which can be based on the framework of assess, advise, agree, assist and arrange for addressing other risk behaviors like tobacco usage.[5,6] The American Society of Clinical Oncology (ASCO) has described risks associated with overweight status among survivors and has advocated for increased research and delivery of services in this area.[7] However, despite recommendations from the federal government and professional societies, providers receive limited training in behavioral counseling, especially on topics of nutrition or physical activity, and may not feel sufficiently prepared to advise or refer patients for lifestyle behavior adoption.[8,9] A study using the National Health Interview Survey (NHIS) data from the year 2000 found that only 30% of cancer survivors reported that their provider discussed diet or offered recommendations on diet; 26% were offered exercise recommendations; and 42% were asked about smoking during provider visits in the prior year.[10] Prior research suggests that meeting lifestyle recommendations could prevent 48% of cancer deaths among women and 44% in men.[11] Cancer diagnosis is sometimes seen as a teachable moment, after which individuals may be more motivated to change behaviors.[12] In addition to standard primary care visits, cancer survivors may have more frequent healthcare utilization as they continue to see their oncology team for monitoring hormonal therapies or regular cancer screening. These physician visits represent a critical opportunity to screen for health behaviors and refer patients to appropriate programs. Given the significant percentage of the population who do not meet recommendations for lifestyle behaviors, we aimed to update previous findings of the 2000 NHIS study.[10] Specifically, we examined recent nationally representative data on provider discussions and recommendations for behavior change related to weight, physical activity, diet, and smoking in individuals with a history of cancer versus those with no cancer history.

Methods

We used the NHIS, a continuous cross-sectional interview survey that uses a probability design to create a representative sampling of U.S. households and non-institutionalized adults. The U.S. Census Bureau trains and employs staff according to procedures set by the National Center for Health Statistics. For the present study, we used the Sample Adult File, with information on demographic characteristics, health history, and lifestyle behaviors. We compiled data from 2016-2017, as these years had the relevant questions we were interested in on provider lifestyle discussions. The final response rate for the Sample Adult File was 54.3% for 2016 and 53.0% for 2017.

Participants

We identified 59,770 individuals, 6,755 of whom reported a diagnosis of cancer (classified as such by the question “Have you ever been told by a doctor or health professional that you had cancer or a malignancy of any kind?”). We excluded individuals who reported non-melanoma skin cancer only (n=1,674) and those who did not identify what type of cancer they were diagnosed with (n=28). After these exclusions, there were 52,966 with no cancer history, and 5,053 who reported a diagnosis of cancer. As our questions of interest focused on questions that asked about provider discussions in the year prior, we further limited our dataset to the 44,385 individuals with no cancer history and the 4,792 cancer survivors who reported seeing a doctor or other health care professional within the prior 12 months.

Measures

We categorized demographic and health information as follows: age at questionnaire (18-<40, 40-<65, 65+ years), sex (male, female), race/ethnicity (non-Hispanic white, non-Hispanic black, Hispanic, other), education (< high school, high school graduate, some college, Bachelor’s degree or greater), family income (≥ $45,000, $20,000-$45,000, < $20,000), health insurance coverage over prior 12 months (yes, no), functional limitations (limited in any way, not limited), body mass index (BMI in kg/m^2, 15-<18.5, 18.5 -<25, 25-<30, 30-<35, and 35+), and self-reported health status (excellent, very good, good, fair, poor). We also categorized people as reporting ever/never for diagnosis of the following chronic conditions: heart disease, stroke, hypertension, emphysema, and diabetes. We chose these five common conditions that were uniformly queried in NHIS as diagnosis ever/never.

Time since cancer diagnosis in years was calculated by subtracting reported age at diagnosis from age at interview. However, some individuals reported years since diagnosis rather than age at diagnosis (e.g. reported breast cancer diagnosis at age 1). Therefore, for cancer sites where <5% of diagnoses are among individuals under age 20 (using 2012-2016 Surveillance Epidemiology and End Results data) we assumed that the age at diagnosis was incorrectly reported as time since cancer diagnosis (n=150).

Provider discussions

For the following questions, participants were asked. “During the past 12 months, have you been told by a doctor or health professional to do any of the following…” “…participate in a weight loss program?”, “…increase your physical activity or exercise?”. Individuals were

also asked, “During the past 12 months, has a doctor or health professional talked to you about…” “…your diet?”, and “…your smoking?” (among those who reported current smoking).

Data analysis

The complex sample design in NHIS involves stratification, clustering, and multi-stage sampling. U.S. Census Bureau population estimates are used to assign person-level weights, which are adjusted quarterly by age/sex/race/ethnicity classes to provide national estimates. In tables and text our reported Ns are unweighted and percentages are weighted. The R package “survey” was used to account for complex survey procedures. Weights were divided by two to account for combining two years of data. We used descriptive statistics and weighted chi-squared tests to compare lifestyle discussions by cancer history. We used generalized linear mixed models to examine predicted percentages of provider discussion, adjusting for age (continuous), sex, race/ethnicity (white, non-white), education (<high school, completed high school, 2 or 4-year college, graduate education), comorbidities (continuous, 0-5), functional limitations (limited, not limited), number of visits to an outpatient provider (continuous). We used mean values of covariates to calculate predicted percentages. We first examined predicted percentages of provider discussion and recommendations overall, and then stratified by those meeting the guidelines compared to those who did not meet guidelines for BMI (25-60 kg/m^2) and physical activity (aerobic recommendations of 150 minutes per week). In sensitivity analyses we examined differences in outcomes when we stratified BMI by only those reporting 30-60 kg/m^2, and examining those who met both aerobic and strength physical activity recommendations. In additional analyses, we examined counseling by specific cancer site compared to the population with no cancer history, limited by age. For each cancer site, we identified the youngest age at diagnosis and used only individuals that age or older in our comparison group; we also limited the comparison group by sex for breast, prostate, cervical and uterine cancers. Thus, breast cancer survivors were compared to women age 26+ with no cancer history, prostate cancer survivors were compared to males age 25+ with no cancer history, melanoma survivors were compared to those age 20+ with no cancer history, cervical cancer survivors were compared to females age 21+ with no cancer history, colon cancer survivors were compared to adults age 30+ with no cancer history, and uterine cancer survivors were compared to females 27+ with no cancer history. We also examined prevalence of provider discussions by time since diagnosis, patient age, and race/ethnicity. R (Version 3.6.0) was used to conduct descriptive statistics, chi-squared tests and regression models. Python (Pandas, Python 3) was used for data management.

Results

In our final dataset, we included 44,385 individuals with no cancer history and 4,792 cancer survivors who reported seeing a doctor or health care professional within 12 months of the questionnaire (Table 1). Those with a cancer history tended to be older (59.3% vs 22.7% over age 65), were more likely to be female (60.7% vs 56.6%), more likely to be non-Hispanic white (81.6% vs. 67.3%), less likely to report an income over $45,000 (13.6% vs 24.9%), and more likely to report functional limitations (68.6% vs 40.1%) than those with

no cancer history (all p-values <0.001). Cancer survivors were less likely to be never smokers than those with no cancer history (47.9% vs 62.6% respectively, p<0.001) and were slightly less likely to be normal weight (BMI 18.5-25 kg/m^2 29.9% vs 32.3%, p=0.002). Additionally, those with a cancer history reported worse self-reported health status (26.8% vs 13.8% fair or poor), and higher prevalence of (25.7% vs 12.5% reporting 2+ comorbidities) than the population with no cancer history (all p-values <0.001).

In Table 2 we present the distribution of cancer sites and average years since diagnosis. Numbers ranged from n=111 (kidney) to n=989 (breast) cancer survivors. Lung cancer survivors reported the fewest mean years since diagnosis (5.6, SE=0.3) and cervical cancer survivors reported the longest mean years since diagnosis (20, SE=0.4).

We examined lifestyle discussions with a doctor or health professional during the prior 12 months using weighted, predicted percentages (Table 3). In multivariable adjusted models, overall, 6.0% of cancer survivors were told to participate in a weight loss program compared to 7.7% of those with no cancer history (p<0.001). Among those classified as overweight or obese (BMI 25-<60 kg/m^2), 9.2% of those with a cancer history and 11.6% of those without a cancer history reported being told to participate in a weight loss program (p<0.001), and among those with a BMI 30-<60 kg/m^2 the percentages were 15.2% (95% CI 13.3-17.3) and 19.3% (95% CI 18.5-20.2), respectively (p<0.001; data shown in text only). Overall, 31.7% of cancer survivors and 35.3% of those with no cancer history were told to increase their physical activity (p<0.001). Among those who did not report meeting aerobic physical activity recommendations those percentages were 38.0% and 41.6%, respectively (p=0.003). Results were similar when looking at those who did not meet the combined aerobic and strength recommendations. Only 27.6% of cancer survivors and 32.2% of those with no cancer history reported having a general discussion of diet (p<0.001); these percentages increased to 34.6% and 40.5%, respectively, among those with a BMI of 25-60 kg/m^2 (p<0.001). When we combined a recommendation to increase physical activity with a general discussion of diet, we found a significant difference by cancer history such that 17.5% of those with a cancer history (95% CI 16.2-18.8) and 21.1% of those with no cancer history (95% CI 20.7-21.8) reported both topics were discussed (data shown in text only). Among smokers 67.3% of cancer survivors and 69.9% of those with no cancer history reported receiving counseling on smoking (p=0.309).

We also examined lifestyle discussions separately by cancer site, comparing those with a specific cancer type to adults in the same age range with no cancer history (Table 4). There were no statistically significant differences in recommendations to participate in a weight loss program, increase physical activity, or discussions of diet by cancer history for those with the following histories: breast, prostate, cervical, colon cancer, or melanoma. Among those with uterine cancer we observed differences in recommendations: 18.1% were told to participate in a weight loss program compared to 11.8% females of the same age with no cancer history (p=0.02); 64.0% were told to increase physical activity compared to 51.8% with no cancer history (p<0.001). Women with a history of uterine cancer were also more likely to report a general discussion of diet (51.9% vs 41.1%, p=0.001). When we added BMI to the endometrial models, statistically significant differences between groups only remained for increasing physical activity, where 47.4% of survivors reported the

recommendation compared to 39.3% of those with no cancer history (p=0.036; data shown in text only). There were no differences in discussion of smoking among those reporting smoking by cancer site compared to adults with no cancer history.

We also separately stratified lifestyle counseling by time since diagnosis, age, and race/ethnicity (Table 5). There was no statistically significant difference by time since diagnosis and predicted lifestyle counseling (all p-values >0.05), although recommendations for participating in a weight loss program and increasing physical activity were slightly more common in those 3-10 years from diagnosis compared to those within 2 years or 11 or more years from diagnosis. In analyses stratified by age we found that those aged 40-64 years were more likely to receive recommendations to participate in a weight loss program, to increase physical activity, and to have a general discussion on diet than those aged 18-39 or 65+ years (global p-values all <0.001). In analyses stratified by race, it appeared that a greater percentage of non-whites reported being told to participate in a weight loss program, increase physical activity or discussed diet with their provider (all global p-values <0.001). Younger individuals and those reporting a race other than non-Hispanic White or non-Hispanic Black were less likely to receive counseling on smoking (p<0.001 and p=0.010, respectively).

Discussion

In this study we found differences in lifestyle recommendations by cancer history, such that a higher percentage of those with no cancer history reported these lifestyle discussions than those with a cancer history. We thus identified a need to increase provider discussions among cancer survivors about weight loss, physical activity and diet, particularly among those not meeting public health recommendations. Cancer survivors are at higher risk than the general population for health complications including recurrence, cardiovascular disease, and mortality; [13,14] this risk could be mitigated by maintaining a healthy body weight, being physically active, and refraining from smoking.

Our findings are consistent with previously published literature on provider counseling prevalence. While we followed a similar approach to that conducted by Sabatino et al. using the 2000 NHIS data, both the questions asked in the survey and the model adjustment technique differed, precluding direct comparison between the predicted percentages.[10] Still, it appeared that the percentage of individuals reporting provider counseling on diet improved slightly from the prior study (24.6% vs. 27.6% in our study), and the percentage who were offered exercise recommendations improved from 21.5% in the prior study to 31.7% in our study.[10] While this is promising, there is still a significant missed opportunity to provide these lifestyle recommendations to cancer survivors. In our study the percentage who were told to participate in a weight loss program or increase physical activity increased only slightly among those who did not meet the U.S. recommendations, suggesting that perhaps some providers counsel on weight loss, physical activity, and diet regardless of reported habits, and other do not mention these factors among patients at all. In our previously published study of NHIS data from 2013-2017 a greater percentage of cancer survivors reported obesity than those with no cancer history (31.3% vs. 29.3%), underscoring the issue of obesity in this population.[15] Another study conducted using the Medicare Expenditure

Panel Survey found that 25% of cancer survivors reported that their provider did not discuss lifestyle recommendations at all, 24.6% reported a brief discussion, and 38.6% reported discussing it in great detail.[16]

For their part, cancer survivors are already asking for help adopting healthy lifestyle behaviors and looking to their oncology team for advice. A recent survey conducted by the National Coalition for Cancer Survivorship among a nationally sample of 840 cancer survivors found that among the top five listed survivorship needs were maintaining a healthy weight and getting enough exercise.[17]

Studies in primary care suggest models for provider-led lifestyle counseling. One study of National Health and Nutrition Examination Survey (NHANES) data reported that lifestyle counseling among pre-diabetic individuals led to improved lifestyle, [18] underscoring the potential impact of physician discussions on lifestyle. Recent studies have summarized primary care provider intervention impacts on physical activity levels, showing some success in achieved physical activity or dietary behaviors with physician counseling.[19-21] USPSTF has also published recommendations for screening and management of obesity in adults, including tips for primary care providers and others to counsel on weight loss.[22] These models may be considered in adapting interventions for cancer survivors.

Counseling on the preventive behaviors recommended for cancer survivors is not yet part of standardized clinical survivorship care, although it is a recognized component of comprehensive survivorship care planning.[23] While the American Society of Clinical Oncology has generated a position statement on obesity and cancer and provided tools and resources to help providers address obesity with their patients,[7] published studies still identify a gap in practice. A recent survey of 971 oncologists found that most recognized that overweight and obesity is detrimental to cancer treatment outcomes, but approximately 35% reported that they rarely or never refer overweight or obese patients for weight management after therapy.[24] Still, 78.5% reported advising patients to eat a healthier, balanced diet and reported referring patients to dieticians. Other studies show mixed results on whether oncologists regularly counsel patients on physical activity, with estimates of <50% to 82% [24,25]. A qualitative study of clinicians at four cancer hospitals found that clinicians felt that they lacked training and knowledge, and were unsure of when to introduce physical activity to survivors.[26] Additionally, they reported little knowledge of community-based programs for referrals.[26] There is a paucity of literature on the impact of oncologist-delivered referral on patient behavior change. While one study found that breast cancer survivors who received an oncologist recommendation were more adherent to physical activity compared to usual care, this study also found that oncologist recommendation plus referral was no different than usual care in reported physical activity levels.[27] More research is needed to better understand how to support both patients and providers in completing lifestyle assessment and referrals.

While studies in primary care suggest that provider counseling on lifestyle improves behaviors, there is limited literature on the impact of oncologist recommendations to improve diet and physical activity or primary care-delivered counseling specific to cancer survivors.[13] There is additional debate around the role of the oncologist in behavioral

counseling for physical activity, and the extent to which various providers should be involved.[28,29] A recently funded study aiming to integrate physical activity data into the electronic health record for breast and endometrial cancer survivors (NCT04262180), may shed some light on strategies for improving provider feedback and monitoring of physical activity, building on published formative work.[30] Meanwhile more active strategies are needed to give oncologists and primary care providers tools to assess, advise, and refer on strategies for health promotion specific to cancer survivors. Furthermore, studies are needed to understand patient perspectives including knowledge, attitude and behaviors about cancer survivorship care.

There are some existing tools intended to help guide oncologists in assessing and managing obesity, physical activity, and smoking. The American College of Sports Medicine (ACSM) *Exercise is Medicine* initiative provides an action guide to providers to consider physical activity as a vital sign and to screen, provide a brief intervention, and refer to treatment as needed.[31,32] Furthermore, the ACSM is building a *Moving Through Cancer* registry to geographically document all physical activity programs developed for cancer survivors and to serve as a resource for both patients and providers.[33] ASCO has long promoted tobacco cessation programs and provided resources to clinicians [34] and patients.[35] Non-oncology providers may rely on CDC's clinical tools the USPSTF Cessation Recommendations, or tools from professional societies.[6,36,37]

Strengths of our study include the nationally representative sample of the non-institutionalized U.S. population. We were able to examine counseling by providers on multiple health behaviors overall and by cancer site, which has implications for targeting provider counseling on lifestyle. However, there are also limitations to our analysis. All NHIS data are self-reported, which may be subject to inaccuracies in recall, particularly over the time period of 12 months. We only included those who reported visiting a healthcare professional in the prior year; thus these results may not generalize to populations who do not have regular healthcare access. We were limited to the wording and questions collected through NHIS, and thus were not able to distinguish by provider type, or further patient characteristics (e.g. former vs never smokers). We were also unable to look at treatment among the cancer survivors, although we were able to examine differences by time since diagnosis. The cross-sectional design also precludes examination of change over time. NHIS includes only the non-institutionalized population; therefore, we cannot generalize to those who are in nursing homes or other care facilities.

In this study, only 7.3% of cancer survivors who were overweight or obese were told to participate in a weight loss program, only 35.9% were told to increase physical activity levels, and only 29.2% had a general discussion of diet, which underscores a critical gap in delivery of lifestyle counseling from health professionals. While physicians cannot be expected to deliver ongoing counseling due to both time constraints and lack of training, lifestyle factors are critical to improving both late and long term effects of cancer treatment, metabolic and cardiovascular health, and overall survival outcomes.[38,39] Importantly, as the cancer survivor population continues to grow, oncology teams need to make helping individuals live well with and beyond their cancer—not simply survive treatment--- a priority. Furthermore, more research is needed to understand observed differences in

provider discussions by age and race/ethnicity, and whether these differences may be due to implicit bias.[40,41] Health researchers, oncologists, and other health care providers may utilize the presented data to prioritize health behavior change in the cancer survivor and general population, with the goal of improving quality of life and multiple health outcomes. Providers still need additional tools, incentives, and training in lifestyle counseling and referral both for cancer survivors and for the general public, who also report high levels of obesity and physical inactivity, and a need for smoking cessation.

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Abbreviations list:

ASCO	American Society of Clinical Oncology
ACSM	American College of Sports Medicine
BMI	Body mass index
CDC	Centers for Disease Control and Prevention
NHANES	National Health and Nutrition Examination Survey
NHIS	National Health Interview Survey
USPSTF	U.S. Preventive Services Task Force

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Table 1.

Characteristics of those who reported seeing a healthcare professional in the prior year, by cancer history

	Cancer History			No Cancer History			p
Characteristic	**Total n**	**Total %**	**SE**	**Total n**	**Total %**	**SE**	
Age, years							<0.001
18-39	256	5.9	0.4	14657	35.7	0.4	
40-64	1612	34.8	0.8	18563	41.5	0.3	
65+	2924	59.3	0.8	11165	22.7	0.3	
Sex, female	2884	60.7	0.8	25463	56.6	0.3	<0.001
Race/ethnicity							
White, non-Hispanic	3992	81.6	0.9	30991	67.3	0.7	<0.001
Black, non-Hispanic	361	8.5	0.6	5255	13.3	0.5	
Hispanic	270	6.4	0.6	5143	12.9	0.6	
Non-Hispanic, other	169	3.5	0.4	2996	6.5	0.3	
Education							0.048
< High school	579	12.1	0.6	4914	10.9	0.3	
High school graduate	2121	43.4	0.9	19374	42.8	0.4	
2- or 4- year college graduate	1455	30.9	0.8	14452	33.1	0.3	
Graduate education	625	13.3	0.6	5510	12.9	0.3	
Family income							<0.001
≥ $45,000	613	13.6	0.6	10592	24.9	0.4	
$20,000-<$45,000	440	9.3	0.5	7686	17.5	0.2	
< $20,000	450	9.2	0.5	6270	14.1	0.3	
Missing	3289	68.0	0.8	19837	43.5	0.4	
Functional limitations reported	3315	68.6	0.9	18665	40.1	0.4	<0.001
Health insurance coverage	4588	95.6	0.4	40091	90.1	0.2	<0.001
Smoking status							<0.001
Current	654	13.3	0.6	6546	14.5	0.3	
Former	1865	38.7	0.9	10678	22.8	0.3	
Never	2270	47.9	0.9	27105	62.6	0.4	
Body-mass index (kg/m^2)							0.002
15-<18.5	98	2.1	0.3	680	1.5	0.1	
18.5 -<25	1423	29.9	0.8	14174	32.3	0.3	
25-<30	1641	34.2	0.8	14669	33.0	0.3	
30-<35	920	19.0	0.7	7984	17.8	0.2	
35-60	585	12.1	0.6	5566	12.4	0.2	
Reported health status							<0.001
Excellent	580	12.6	0.6	11137	25.9	0.3	
Very good	1305	27.0	0.8	15053	33.9	0.3	

	Cancer History			No Cancer History			p
Characteristic	**Total n**	**Total %**	**SE**	**Total n**	**Total %**	**SE**	
Good	1629	33.7	0.8	11897	26.4	0.3	
Fair	918	19.2	0.7	4846	10.7	0.2	
Poor	359	7.6	0.4	1442	3.07	0.1	
Comorbidities (Ever)							
Heart disease	578	12.0	0.5	2309	4.9	0.1	<0.001
Stroke	380	7.9	0.5	1619	3.5	0.1	<0.001
Hypertension	2736	56.4	0.8	16096	34.6	0.3	<0.001
Emphysema	230	4.4	0.3	804	1.6	0.1	<0.001
Diabetes	899	18.3	0.6	4913	10.7	0.2	<0.001
Comorbidities							<0.001
None	1637	34.8	0.8	26088	60.6	0.4	
1	1891	39.5	0.8	12407	26.9	0.3	
2+	1264	25.7	0.8	5890	12.5	0.2	
Number of visits to an outpatient provider over the prior year							<0.001
0	96	2.4	0.3	1892	4.7	0.2	
1-2	1494	31.6	0.8	23081	52.9	0.4	
3-6	2291	47.0	0.8	15309	33.5	0.3	
7-8	898	18.7	0.6	3951	8.6	0.2	

Table 2.

Distribution of cancer sites reported by those with a cancer history[a]

Cancer Site	Number	%	SE	Average Years since diagnosis
Bladder	113	2.3	0.2	10.4
Breast	989	21.2	0.7	11.6
Cervix	293	6.2	0.4	20.0
Colon	289	5.6	0.4	10.3
Kidney	111	2.3	0.2	7.2
Lung	136	2.9	0.3	5.6
Lymphoma	148	3.0	0.3	9.3
Melanoma	403	8.4	0.5	10.6
Prostate	653	13.5	0.6	8.8
Thyroid	144	3.0	0.3	12.1
Uterus	201	4.3	0.3	16.5
Other	758	15.7	0.6	19.6
Multiple	554	11.6	0.5	

[a]All columns other than N are weighted.

Table 3.

Reported discussion by doctor or health professional during the prior 12 months about…[a,b]

	Participate in a weight loss program		p-value	Increase your physical activity		p-value	General discussion of diet		p-value	Smoking[c]		p-value
	No.	% (95% CI)		No.	% (95% CI)		No.	% (95% CI)		No.	% (95% CI)	
Overall												
Cancer history	387	6.0 5.3- 6.8	<.001	1937	31.7 30.0- 33.4	<.001	1639	27.6 26.0- 29.1	<.001	481	67.3 62.3- 71.9	.309
No cancer history	3685	7.7 7.4- 8.0		15465	35.3 34.6- 35.9		14344	32.2 31.6- 32.9		4392	69.9 68.4- 71.3	
BMI ≥25 -<60 kg/m^2												
Cancer history	346	9.2 8.1- 10.5	<.001	1468	40.2 38.1- 42.4	<.001	1245	34.6 32.7- 36.7	<.001	292	74.3 68.1- 79.6	.313
No cancer history	3377	11.6 11.1- 12.0		12246	44.7 43.9- 45.4		11272	40.5 39.8- 41.3		2773	71.1 69.4- 72.7	
Did not meet aerobic PA recommendation												
Cancer history	244	7.2 6.2- 8.5	.013	1246	38.0 35.7- 40.3	.003	988	28.9 26.8- 31.1	<.001	343	70.7 65.4- 75.5	.551
No cancer history	2024	8.8 8.4- 9.3		8922	41.6 40.6- 42.5		7530	34.4 33.5- 35.4		2704	72.4 70.6- 74.1	

[a]P-values were calculated using generalized linear mixed models.

[b]Models were adjusted for age (continuous), sex, race/ethnicity (white, non-white), education (<High school, Completed high school, 2 or 4-year college, graduate degree), comorbidities (continuous), functional limitations (limited, not limited), number of visits to a provider (continuous).

[c]This question was only asked of those who reported current smoking.

Table 4.

Reported provider discussions by cancer site[a,b]

	Participate in a weight loss program			Increase your physical activity			General discussion of diet			Smoking[c]		
	n	% (95% CI)	p	n	% (95% CI)	p	n	% (95% CI)	p	n	% (95% CI)	p
Breast cancer	88	8.1 (6.3- 10.2)	.88	456	39.3 (36.1- 42.6)	.30	342	30.1 (26.9- 33.5)	.12	86	78.3 (69.2- 85.3)	.28
No cancer history (females)	204	7.9 (6.5- 9.5)		1014	41.6 (38.6- 44.7)		852	33.5 (30.7- 36.4)		261	72.5 (66.2- 78.0)	
Prostate cancer	65	7.9 (5.7- 10.8)	.69	295	39.3 (36.1- 42.6)	.67	264	34.1 (30.1- 38.3)	.48	56	78.9 (64.6- 88.5)	.79
No cancer history (males)	149	7.3 (5.7- 9.2)		782	41.6 (38.6- 44.7)		723	36.1 (32.8- 39.6)		182	80.9 (71.1- 87.9)	
Melanoma	43	8.9 (6.5- 12.0)	.40	193	40.1 (35.9- 44.5)	.43	157	29.4 (24.8- 34.5)	.11	34	75.0 (60.2- 85.6)	.88
No cancer history	463	7.7 (6.7- 8.8)		2363	41.4 (37.9- 45.0)		2030	33.7 (32.0- 35.5)		554	75.9 (71.6- 79.8)	
Cervical	29	6.2 (4.0- 9.4)	.22	139	38.9 (34.3- 43.7)	.92	136	37.9 (31.7- 44.5)	.05	75	72.0 (60.5- 81.1)	.62
No cancer history (females)	263	8.2 (7.0- 9.5)		1337	40.9 (39.1- 42.6)		1062	31.3 (29.0- 33.6)		274	75.0 (68.9- 80.2)	
Colon	26	6.3 (3.9- 9.9)	.33	161	40.3 (33.4- 47.5)	.70	136	35.1 (29.6- 41.2)	.55	31	75.2 (58.0- 86.9)	.92
Adults with no cancer history	479	8.0 (7.0-9.1)		2365	40.6 (38.3- 43.1)		2027	33.3 (31.6- 35.0)		545	75.9 (71.5- 79.8)	
Uterine	32	11.8 (8.3- 16.6)	.02	136	51.8 (50.4- 75.6)	<.001	118	41.1 (34.9- 47.6)	.001	34/40	80.3 (59.3- 92.2)	.45
Female adults with no cancer history	260	7.5 (6.4- 8.8)		1331	39.5 (44.9- 58.6)		1073	31.1 (28.9- 33.4)		310/422	73.5 (68.4- 78.0)	

[a]Adults with no cancer history were limited to the youngest age of those with a cancer history by site. Thus, we compared breast cancer survivors to females over age 26 with no cancer history, prostate cancer survivors were compared to males age 25 or older, cervical cancer survivors were compared females age 21 and older with no cancer history, colon cancer survivors were compared to adults age 21 and older with no cancer history, and uterine cancer survivors were compared to females age 27 and older with no cancer history.

[b]Models were adjusted for age (continuous), sex (for melanoma and colon only), race/ethnicity (white, non-white), education (< High school, Completed high school, 2 or 4-year college, graduate degree), comorbidities (continuous), number of visits to a provider (continuous), and functional limitations (limited, not limited).

[c]Data collected only among those who reported current smoking.

Table 5.

Reported provider discussions by time since diagnosis, age, and race/ethnicity [a]

	Participate in a weight loss program				Increase your physical activity				General discussion of diet				Smoking[b]			
	n	%	95% CI	p	n	%	95% CI	p	n	%	95% CI	p	n	%	95% CI	p
Time since diagnosis, years				.200				.820				.150				.420
0-2	73	5.3	4.1- 7.0		398	39.5	35.9- 43.3		350	30.9	27.5- 34.4		123	80.2	71.5- 86.7	
3-5	76	7.1	5.4- 9.2		316	40.1	35.8- 44.5		265	31.7	28.1- 35.6		73	72.2	61.6- 80.8	
6-10	84	7.0	5.2- 9.3		420	41.6	38.0- 45.4		360	36.1	32.5- 39.9		83	71.7	59.7- 81.3	
11+	154	5.4	4.4- 6.7		783	39.6	37.1- 42.2		654	31.7	29.3- 34.3		194	77.6	70.9- 83.1	
Age in years				<.001				<.001				<.001				<.001
18-39	757	4.0	3.6- 4.4		3606	27.7	26.7- 28.7		3799	28.7	27.6- 29.7		1326	63.9	61.4- 66.2	
40-64	2266	7.0	6.6- 7.4		8409	38.4	37.4- 39.3		7923	35.2	34.3- 36.1		2718	73.3	71.4- 75.0	
65+	1172	5.2	4.8- 5.6		6022	34.2	33.1- 35.5		4826	26.6	25.6- 27.7		944	70.0	66.7- 73.2	
Race/ethnicity				<.001				<.001				<.001				.010
White, non-Hispanic	2784	5.0	4.7- 5.3		12560	32.1	31.4- 32.8		11384	28.8	28.1- 29.5		3781	70.7	69.2- 72.2	
Black, non-Hispanic	656	6.2	5.6- 6.9		2234	33.0	31.4- 34.7		2205	33.6	31.9- 35.3		658	69.5	65.7- 73.0	
Other	765	7.6	6.9- 8.4		3243	42.2	40.7- 43.7		2959	37.3	36.0- 38.6		549	64.4	60.3- 68.4	

[a] Prediction models were adjusted for age (continuous), sex, race/ethnicity (white, non-white, except in race-stratified models), education (<High school, Completed high school, 2 or 4-year college, graduate degree), body mass index (continuous), comorbidities (continuous), number of visits to a provider (continuous), and functional limitation (not limited, limited).

[b] Data collected only among those who reported current smoking.