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National estimates of racial disparities in health status and behavioral risk factors among long-term cancer survivors and non-cancer controls

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Abstract

Objective—We examined racial disparities (White, African American, and other race) in health status (self-rated health, lower-body functional limitations, psychological distress, and body mass index [BMI]) and behaviors (smoking, alcohol use, and physical activity) of long-term cancer survivors (≥ 5 years) when compared to non-cancer controls.

Methods—Using 2005–2007 National Health Interview Survey data, we computed adjusted prevalence estimates of health status and behaviors for all six groups, controlling for sociodemographic factors, medical-care access, or presence of other chronic conditions.

Results—The sample included 2,762 (3.6%) survivors and 73,059 controls. Adjusted prevalence estimates for each race were higher for long-term survivors than controls in terms of having fair-poor self-rated health, 1 limitation, psychological distress, and higher BMI but were similar between survivors and controls in terms of physical activity, smoking, and alcohol use. Adjusted prevalence estimates for having fair-poor self-rated health were higher for African American survivors than white survivors, lower for psychological distress, physical activity and alcohol use, and similar for smoking and BMI.

Conclusion—With the exception of smoking and limitations, racial differences existed among survivors for all health-status and behavioral measures. Clinicians may play a key role in helping to reduce disparities.

Keywords

Disparity; Race; Cancer survivor; Behavior; Quality of life

Introduction

An estimated 11.4 million Americans were alive with a cancer history in 2006 [1]. Long-term cancer survivors (i.e., 5 years postdiagnosis) account for half of all survivors [1]. The number of long-term survivors is increasing rapidly due to improvements in early detection and treatment and population aging overall. Long-term cancer survivors are at increased risk for recurrence, second primary cancers, late effects of treatment, and a variety of symptoms that can adversely affect their health status, physical functioning, quality of life, and survival. Health behaviors, including smoking, alcohol intake, and physical activity, may play a key role in these adverse sequelae.

While a growing literature focuses on the medical follow-up of cancer survivors [2, 3], relatively little attention has focused on the systematic assessment of behavioral risk factors which are independent predictors of recurrence, second primary cancers, reduced survival, and lower quality of life among cancer survivors [4–6]. These behaviors may also place cancer survivors at risk for chronic diseases such as heart disease, stroke, diabetes, and arthritis.

While some population-based studies focus on the health and behaviors among cancer survivors in the United States [7–9], few focus on long-term survivors and even fewer have examined racial disparities in health and behaviors [10]. Reducing disparities is an overarching goal of the Healthy People 2010 initiative and of the National Cancer Institute's strategic plan. Differences in health status and behaviors may help explain racial disparities in recurrence, second primary cancers, reduced survival, and quality of life following a cancer diagnosis. The research reported here extends the focus of previous studies by examining racial disparities in health status (self-reported health, lower-body functional limitations, psychological distress, and body mass index [BMI]) and behaviors (smoking, alcohol use, and physical activity) of long-term cancer survivors (hereafter “survivors”) when compared to persons without a cancer history (controls) using nationwide, population-based data.

Materials and methods

Data source

We used 2005–2007 National Health Interview Survey (NHIS) data [11]. The NHIS is a continuous face-to-face household interview covering a wide variety of health-related topics, providing estimates for the civilian non-institutionalized US population. Data are collected

about all family members in about 40,000 households annually. Participants in this study were limited to the randomly selected respondents who were asked about their cancer history. Data were self-reported, except when respondents were incapable of responding themselves. Proxies were used if physical or mental conditions precluded respondents from answering the questions themselves. Due to small sample sizes, it was not possible to examine survivors by cancer type. Response rates for the sample adult component of the NHIS in 2005, 2006, and 2007 were 69.0, 70.8, and 67.8%, respectively.

Cancer history

Cancer history was based on the question “Have you ever been told by a doctor or other health professional that you had cancer or a malignancy of any kind?” If respondents reported a history of cancer, they indicated the cancer type from a list of 30 possible types. Participants could report up to three cancer types. Accuracy of self-reported cancer history varies by cancer type, with breast cancer being reported most accurately and cervical cancer most likely to be underreported [12]. Based on the age at the interview and age at the first cancer diagnosis, we calculated the number of years since diagnosis. We excluded more recent cancer survivors (<5 years since their diagnosis) and nonmelanoma and unknown-type skin cancers from the analysis [8, 13]. Persons who were long-term survivors were compared with persons who had no cancer history (controls).

Race

We categorized self-reported race as White, African American, or other race (American Indian, Alaska Native, Native Hawaiian, Guamanian, Samoan, other Pacific Islander, Asian Indian, Chinese, Filipino, Japanese, Korean, Vietnamese, other Asian, some other race). Due to small sample sizes, it was not possible to examine the other race category in more detail.

Health status outcomes

Self-rated health was measured using the question, “How would you rate your health—would you say it is excellent, very good, good, fair, or poor?” We compared persons who answered “fair” or “poor” to persons who answered “excellent,” “very good,” or “good.”

Five items from the Nagi physical performance scale assessed *lower-body functional limitations*, one of the outcome measures. This measure asks about difficulties with walking a quarter of a mile; walking up and down 10 steps without rest; standing for 2 h; stooping, crouching, or kneeling; and lifting 10 lb [14]. We defined limitation as reporting difficulty with or inability to perform at least one of the five physical activities (1 = any difficulty or inability to perform activity vs. 0 = no difficulty) [15]. Having lower-body functional limitations predicts mortality [16], hospitalization [17], and nursing home placement [18]. This scale, assessing lower-extremity strength and basic motor functions, has been used in studies of cancer survivors, showing increased prevalence in cancer survivors relative to persons without a cancer history [8]. Survivors of lung, thyroid, and uterine cancers are particularly affected by lower-body functional limitations [19].

Non-specific psychological distress was measured using the K6 questionnaire, which asks about the frequency of six symptoms of mental illness or non-specific psychological distress during the past 30 days, including feeling so sad that nothing could cheer them up, nervous, restless/fidgety, hopeless, worthless, and that everything was an effort [20]. The K6 is designed to capture mental health problems that are severe enough to cause moderate-to-serious impairment in social, occupational, or school functioning and to require treatment. Serious psychological distress was indicated by a score ≥ 13 .

Body mass index (BMI) was calculated based on self-reported height and weight. Individuals with a BMI of ≥ 25 kg/m² were categorized as overweight/obese and compared with individuals with BMI < 25 kg/m², categorized as underweight/normal weight.

Health behavior outcomes

Physical activity was measured with the frequency and duration (in min) of light, moderate, and vigorous physical activity (per week). We compared two groups: participants who engaged in either ≥ 30 min of light/moderate activity at least 5 days a week or ≥ 20 min of vigorous physical activity at least 3 days a week and participants who engaged in lower levels of physical activity [9].

Respondents indicated their current *smoking status* as being a current, former, or never smoker. We compared current smokers with former/never smokers [9].

Although no universal recommendations exist for *alcohol use* in cancer survivors, general recommendations are to limit alcohol use to one drink/day for women and two drinks/day for men [21]. To measure overuse of alcohol, we categorized alcohol intake as follows: 0–1 drink/day versus >1 drink/day for women and 0–2 drinks/day versus >2 drinks/day for men based on these recommendations.

Factors potentially associated with health status/behavior

Based on previous research, we selected the following factors to include as covariates in our analysis: (1) sociodemographic factors, (2) access to medical care, and (3) chronic conditions [8, 9, 13]. Sociodemographic factors included age group, Hispanic origin, gender, income categories, family size, receipt of government assistance because of low income, educational attainment, marital status, and home ownership. Access-to-medical-care indicators included currently having health care insurance, being unable to afford prescription medicines, mental health care, dental care, or eye glasses during the past 12 months, being unable to see a doctor during the past 12 months because of cost, and reporting delay in receipt of medical care during the past 12 months due to inability to (a) get through on the telephone, (b) get an appointment soon enough, (c) get into see a doctor soon enough, (d) get to the clinic/doctor's office when it was open, and (e) find transportation to get there. The sum of 11 chronic conditions also was used as a covariate based on participants' self-reported diagnosis by a physician. These conditions included current diabetes, asthma, or trouble with vision even when wearing glasses or contact lenses; having general joint symptoms (pain, aching, or stiffness in or around a joint) during the past 30 days; having lower-back pain during the past 3 months; or ever having had coronary heart disease, myocardial infarction, other heart disease, stroke, arthritis (osteoarthritis, rheumatoid arthritis, gout, lupus, or fibromyalgia), or hypertension on more than one occasion.

Statistical analysis

The NHIS collects data through a complex sampling design, involving stratification, clustering, and multi-stage sampling. To obtain nationally representative estimates, all data were weighted by adjusting for the probability of inclusion in the sample, taking into consideration survey non-response as well as the sex, age, and race/ethnicity of survey respondents. First, we calculated the prevalence of the health status and behavioral risk factor measures by cancer history (long-term cancer survivors vs. non-cancer controls) and race (white, African American, or other). Second, we used multivariable logistic regression to compute adjusted proportions of the dependent variables, called predicted marginals, for each of the six groups [22]. Predicted marginals can be interpreted as conditional prevalence estimates. The predicted marginals are equivalent to least squares means when analyzing

multiple linear regression model data from a simple random-sample survey. An advantage of using predicted marginals over traditional odds ratios is that the former approach does not require the use of a reference group against which all other groups are compared. Variance estimates for proportions and logistic regression models were calculated using the Taylor series approximation [23]. All *p* values were two sided. The sociodemographic factors, chronic conditions, and access to medical care factors were included as groups of variables in the logistic regression models to examine their effects on the predicted marginals. We examined in separate models the effect of each of the two other factors (access to medical care and chronic conditions) after adjustment for sociodemographic factors. We used SAS 9.1 and SUDAAN 9.0 for data analysis.

Results

The 2005–2007 NHIS dataset included 79,096 adults who completed the “sample adult” interview. A total of 3,275 (4.1%) respondents were excluded because they met one or more of the exclusion criteria: (a) only cancer was nonmelanoma ($n = 1,004$) or unknown-type ($n = 494$) skin cancer, (b) diagnosed with cancer more recently than 5 years before the interview ($n = 2,191$), or (c) cancer history was unknown ($n = 229$). Data for 74,761 adults were included in the analysis. Of these respondents, 2,762 (3.6%) were long-term cancer survivors and 73,059 were controls. Average time since diagnosis was 15.8 years (95% CI: 15.2–16.3); 6.3% of the survivors were diagnosed prior to age 18.

In this study, proxy-reported data accounted for 1.3% of all data (2.9% among survivors and 1.3% among controls). We also analyzed the data by excluding proxy respondents. Since excluding proxy respondents did not alter the results, we included proxy-respondent data in all subsequent analyses reported.

Table 1 shows that among each of the three racial groups of survivors, most were survivors of breast or prostate cancer. As can be seen in Table 2, the age distribution among survivors was relatively similar across racial groups but, as expected, survivors were much older on average than controls. A higher percentage of survivors was women and reported having a usual place for their medical care. The average number of chronic conditions was higher among survivors than controls.

Health status outcomes

Overall 12.1% (95% CI: 11.7–12.4) of study participants reported fair-poor health, which differed by cancer history and race (Table 3). Fair-poor self-rated health was least common among white controls (10.7%) and most common among African American survivors (39.3%) in Model 1. For each race, prevalence of fair-poor self-rated health was higher among survivors than controls. Substantial differences in prevalence of fair-poor self-rated health existed between African American (39.3%) and white survivors (27.1%). Adjusted prevalence estimates for fair-poor self-rated health became more similar between survivors and controls of all races after adjusting for sociodemographic differences (Model 2 vs. Model 1). Access to medical care did not further change adjusted prevalence estimates in self-rated health (Model 3 vs. Model 2). After adjusting for presence of chronic conditions, differences between survivors and controls in adjusted prevalence estimates became smaller for each race (Model 4 vs. Model 2). After adjusting for chronic conditions (Model 4), adjusted prevalence estimates were similar for African American survivors (17.2%), African American controls (15.2%), and white survivors (14.1%).

Overall 27.7% (95% CI: 27.1–28.1) of study participants reported having 1 LBFL (Table 3). Unadjusted prevalence estimates of lower-body functional limitations varied little by race among controls or among survivors (Model 1). However, even after adjusting for

sociodemographic characteristics, substantial differences existed in adjusted prevalence estimates between survivors and controls within each racial group (Model 2). Race-specific differences in adjusted prevalence estimates of lower-body functional limitations between survivors and controls were further reduced by adjusting for the presence of chronic conditions (Model 4 vs. Model 2).

Overall 7.9% (95% CI: 7.6–8.1) of the sample had serious, non-specific psychological distress (Table 3). As shown in Model 1, prevalence of serious psychological distress was lowest among white controls (7.6%) and highest among survivors of other races (16.7%). Survivors reported higher prevalence of serious psychological distress than controls of the same race (Model 1). Differences in prevalence estimates between survivors and controls were reduced after controlling for sociodemographic characteristics (Model 2). The adjusted prevalence estimate was lower for African American survivors (6.2%) than for white survivors (8.9%), but similar to that of African American controls (6.6%) after adjusting for chronic conditions. Adjusted prevalence estimates were mostly unchanged after adjusting for access to medical care.

Overall 62.7% (95% CI: 62.2–63.1) of study participants was overweight or obese. Model 1 shows no differences in the prevalence of being overweight or obese between white survivors (63.6%) and white controls (62.5%), but African American survivors (76.5%) had higher prevalence compared with African American controls (70.4%). Survivors of other races (50.7%) and controls of other races (49.1%) had lower prevalence of being overweight or obese compared with white or African American survivors and controls. Adjusting for sociodemographic, access to medical care, or chronic conditions covariates (Models 2–4) did not change prevalence estimates of being overweight or obese.

Health behavior outcomes

Overall 34.4% (95% CI: 33.8–35.0) of the sample were physically active, which varied substantially by race among the survivor and control groups (Table 4, Model 1). Prevalence of recommended levels of physical activity was 19.5% among African American survivors compared with 29.5% among white survivors and 35.9% among white controls. After controlling for sociodemographic characteristics (Model 2), prevalence of recommended levels of physical activity was similar for African American survivors (26.5%) and African American controls (28.6%) but was lower compared with white survivors (33.8%) and white controls (35.5%). Prevalence of physical activity was similar for survivors and controls of other races. Adding access to medical care (Models 3) or number of chronic conditions (Model 4) to the model with sociodemographic characteristics (Model 2) did not affect the prevalence of recommended levels of physical activity.

Overall, smoking prevalence was 20.4% (95% CI: 20.0–20.9). Although smoking prevalence varied by race among the survivor and control groups (Table 4, Model 1), differences in prevalence were relatively small among the groups except for persons of other races; smoking prevalence was lowest among controls of other races (15.9%) and highest among survivors of other races (27.3%). After controlling for sociodemographic characteristics (Model 2), smoking prevalence was highest among survivors of other races (33.1%). African American survivors (21.0%) had slightly higher prevalence than African American controls (16.1%). Adding access to medical care (Model 3) or presence of chronic conditions (Model 4) to sociodemographic characteristics did not have an effect on smoking prevalence.

Overall 14.4% (95% CI: 14.0–14.8) of the sample overused alcohol. As shown in Model 1, prevalence of alcohol overuse was similar between white survivors (17.9%) and controls (15.7%) and was higher than the prevalence of alcohol overuse in; African American

survivors (6.1%) and African American controls (8.7%). The prevalence of alcohol overuse among persons of other races was more than two times higher for survivors (17.2%) than for controls (7.8%). Adjusting for covariates (Models 2–4) did little to affect these prevalence estimates.

Discussion

Although the number of survivors is increasing rapidly, racial disparities in health status and behaviors among survivors have been particularly understudied [24]. To date, much of the research on behavioral risk factors among cancer survivors has focused on tobacco use, particularly among lung cancer survivors, with less focus on physical activity, obesity, and alcohol use among the general population of survivors. Importantly, very little research about survivorship issues in long-term cancer survivors has been conducted.

Relative to controls, survivors were more likely to have lower health status and higher BMI after adjusting for various sociodemographic characteristics. Moreover, African American survivors were more likely to have fair-poor self-rated health, higher BMI, and at least one limitation than white survivors. Our results extend prior findings among short-term cancer survivors suggesting that the health status of African American long-term survivors remains poorer than that of white survivors at least 5 years after diagnosis [25]. We showed that the prevalence of poor-fair self-rated health and lower-body functional limitations among African American long-term survivors was largely explained by higher prevalence of other chronic conditions. Of all measures of health status included here, only the prevalence of serious psychological distress was lower among African American cancer survivors compared with white survivors.

Within each racial group, the prevalence of participation in recommended levels of physical activity, smoking, and alcohol use was similar for long-term survivors and controls after taking into account sociodemographic differences. But the prevalence of participation in recommended levels of physical activity and alcohol use was lower for African American survivors than white survivors, and these differences were not explained by adjusting for access to medical care or chronic conditions. As previously reported, African American survivors are at increased risk of recurrence and death due to lower physical activity and higher BMI [26]. Interventions aimed at helping survivors increase physical activity may improve many aspects of their life after cancer diagnosis, including health and functional status, quality of life, and depression [7, 27]. Of concern is the similar prevalence of smoking among survivors and controls, which places survivors at increased risk of various adverse health outcomes, including lower survival [28].

Based on our findings and those of other studies, it is imperative that clinicians recognize the opportunity to help improve long-term cancer survivors' health and functioning, in general, and reduce racial disparities among long-term survivors, in particular [29]. It is likely that clinicians will be treating a larger number of long-term survivors in the future, given their growing number and poor health status. Oncologists may be in the best position to provide initial guidance to their patients about behavior change during and after cancer treatment. Although physician recommendation can play an important role in changing survivors' behaviors, few clinicians currently provide health promotion counseling to their patients [30]. The frequency with which physicians recommend behavioral changes to their patients varies by behavior, with smoking cessation recommended most frequently and physical activity recommended least often [30]. Not recommending physical activity is particularly worrisome given our findings of higher prevalence of being overweight or obese and lower prevalence of recommended levels of physical activity among African American survivors. Although survivors are in frequent contact with the health care system during

treatment and follow-up care, most primary care physicians reported feeling unprepared to care for survivors [31]. In our study, nearly all survivors had a usual place to receive medical care, suggesting that clinicians have opportunities to provide evidence-based health promotion recommendations to their cancer survivors. Therefore, education of clinicians to encourage survivors to adopt healthier lifestyles seems to be in order.

Limitations of the study include the NHIS restriction to non-institutionalized adults, which excludes cancer survivors who are institutionalized. Second, because some cancers associated with significantly worse health status also are more rapidly fatal, the associations observed may be underestimated. Third, due to the cross-sectional design, it is not possible to evaluate the temporal direction of observed associations. Fourth, social determinants (poverty, culture, and social injustice) were not available in the NHIS but likely play a role in racial disparities among survivors.

In conclusion, with the number of long-term survivors expected to increase dramatically in the next few decades, addressing observed racial disparities in health status and behavior becomes increasingly important.

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Table 1

Frequency of cancer types by race

Cancer type	White (%)	African American (%)	Other race (%)	Total (%)
Total	2,380 (100.0)	276 (100.0)	106 (100.0)	2,762 (100.0)
Bladder	55 (2.3)	4 (1.4)	1 (0.9)	60 (2.2)
Breast	490 (20.6)	68 (24.6)	25 (23.6)	583 (21.1)
Cervix	260 (10.9)	25 (9.1)	14 (13.2)	299 (10.8)
Colorectal	169 (7.1)	23 (8.3)	7 (6.6)	199 (7.2)
Lung	41 (1.7)	12 (4.3)	0 (0.0)	53 (1.9)
Lymphoma	71 (3.0)	5 (1.8)	1 (0.9)	77 (2.8)
Melanoma	193 (8.1)	1 (0.4)	3(2.8)	197 (7.1)
Ovarian	79 (3.3)	11 (4.0)	5 (4.7)	95 (3.4)
Prostate	264 (11.1)	61 (22.1)	12 (11.3)	337 (12.2)
Thyroid	62 (2.6)	2 (0.7)	3 (2.8)	67(2.4)
Uterus	171 (7.2)	18 (6.5)	5 (4.7)	194 (7.0)
Other	567 (22.1)	46 (16.7)	30 (28.3)	601 (21.8)

Table 2

Selected characteristics of the study population by cancer history and race, 2005–2007

	No cancer history			Long-term cancer survivor		
	White (n = 56,150)	African American (n = 11,753)	Other race (5,156)	White (n = 2,380)	African American (n = 276)	Other race (n = 106)
Weighted n	165,379,278	24,861,000	13,870,920	6,516,255	469,995	254,867
<i>Sociodemographics</i>						
Age group						
18–39	41.2	47.6	50.3	9.6	11.1	7.3
40–64	44.3	41.7	40.2	40.4	40.2	51.9
65–84	12.8	9.9	8.7	43.8	44.1	36.2
85+	1.6	0.9	0.8	6.2	4.6	4.6
Sex						
Male	49.2	45.0	49.7	36.6	39.2	26.7
Female	50.8	55.0	50.3	63.4	60.8	73.3
Family income						
\$0–\$34,999	26.4	13.4	25.2	19.2	8.7	23.3
\$35,000–\$74,999	26.7	40.6	29.4	33.4	46.3	30.6
\$75,000 and over	28.1	24.8	26.7	27.5	25.0	23.6
Unknown	18.8	21.3	18.8	19.9	19.9	22.5
<i>Health care access</i>						
Usual place for medical care						
Yes	82.2	81.8	80.7	91.4	92.3	91.9
No	15.7	15.7	16.7	6.3	5.2	7.1
More than one place	1.1	1.3	1.3	1.2	1.9	0.6
Unknown	1.0	1.2	1.3	1.1	0.6	0.4
One or more system barriers						
No	90.6	91.1	88.4	88.7	83.7	86.5
Yes	9.4	8.9	11.6	11.3	16.3	13.5
Mean number of chronic conditions	1.4	1.4	1.1	2.6	2.9	3.0

Table 3

Prevalence (standard error [se]) of fair-poor self-rated health, lower-body functional limitations, non-specific psychological distress, and body mass index among long-term cancer survivors and non-cancer controls by race, 2005–2007 National Health Interview Survey

	Model 1: Unadjusted		Model 2: Adjusted for sociodemographics		Model 3: Adjusted for sociodemographics and access to care		Model 4: Adjusted for sociodemographics and chronic conditions	
	Prevalence	se	Prevalence	se	Prevalence	se	Prevalence	se
Fair-poor self-rated health								
White, no cancer	10.7	0.2	11.2	0.2	11.2	0.2	11.3	0.2
White, cancer	27.1	1.1	16.7	0.8	15.9	0.7	14.1	0.7
African American, no cancer	17.0	0.4	15.2	0.4	15.5	0.4	15.2	0.4
African American, cancer	39.3	3.7	21.3	2.6	19.7	2.4	17.2	2.2
Other, no cancer	10.6	0.5	11.8	0.5	12.2	0.5	12.9	0.5
Other, cancer	31.0	4.9	21.0	3.9	20.4	3.9	14.8	3.5
Lower-body functional limitation								
White, no cancer	27.1	0.3	27.9	0.3	27.8	0.3	27.9	0.2
White, cancer	58.6	1.2	37.4	1.1	35.7	1.0	32.1	0.9
African American, no cancer	26.9	0.5	25.8	0.5	26.3	0.5	25.9	0.4
African American, cancer	61.3	3.7	38.0	3.2	35.8	3.0	31.1	2.6
Other, no cancer	20.3	0.7	23.0	0.7	24.0	0.7	25.4	0.7
Other, cancer	56.0	5.0	36.6	4.1	35.5	3.7	28.2	3.8
Psychological distress								
White, no cancer	7.6	0.1	8.0	0.2	7.9	0.2	8.0	0.2
White, cancer	11.4	0.7	10.6	0.7	9.7	0.7	8.9	0.6
African American, no cancer	8.3	0.3	6.5	0.3	6.7	0.3	6.6	0.3
African American, cancer	11.3	1.9	8.3	1.4	7.2	1.3	6.2	1.1
Other, no cancer	8.4	0.5	8.3	0.5	8.6	0.5	8.9	0.5
Other, cancer	16.7	4.6	15.2	4.4	14.3	4.2	10.0	3.6
Body mass index								
White, no cancer	62.6	0.3	62.2	0.3	62.2	0.3	62.2	0.3
White, cancer	63.6	1.2	60.3	1.3	59.9	1.3	57.8	1.3
African American, no cancer	70.4	0.5	72.9	0.5	72.9	0.5	73.1	0.5

	Model 1: Unadjusted		Model 2: Adjusted for sociodemographics		Model 3: Adjusted for sociodemographics and access to care		Model 4: Adjusted for sociodemographics and chronic conditions	
	Prevalence	se	Prevalence	se	Prevalence	se	Prevalence	se
African American, cancer	76.5	3.1	74.6	3.3	74.2	3.4	71.4	3.7
Other, no cancer	49.1	0.9	50.4	0.8	50.5	0.8	51.5	0.8
Other, cancer	50.7	5.8	49.8	5.8	49.9	5.8	44.7	6.0

Sociodemographic factors included age group, Hispanic origin, gender, income categories, family size, receipt of government assistance because of low income, educational attainment, marital status, and home ownership. Access to medical care consisted of having health care insurance at the time of the interview, being unable to afford prescription medicines, mental health care, dental care, or eye glasses during the past 12 months, being unable to see a doctor during the 12 months prior to the interview because of cost, and reporting delay in receipt of medical care during the past 12 months due to inability to (a) get through on the telephone, (b) get an appointment soon enough, (c) get into see a doctor soon enough, (d) get to the clinic/doctor's office when it was open, and (e) find transportation to get there. The chronic conditions covariate was the sum of 11 conditions based on participants' self-reported diagnosis by a physician

se: standard error

Table 4

Prevalence (standard error [se]) of physical activity, smoking, and alcohol overuse among long-term cancer survivors and non-cancer controls by race, 2005–2007 National Health Interview Survey

	Model 1: Unadjusted		Model 2: Adjusted for sociodemographics		Model 3: Adjusted for sociodemographics and access to care		Model 4: Adjusted for sociodemographics and chronic conditions	
	Prevalence	se	Prevalence	se	Prevalence	se	Prevalence	se
Physical activity								
White, no cancer	35.9	0.4	35.5	0.4	35.5	0.4	35.5	0.4
White, cancer	29.5	1.2	33.8	1.2	33.9	1.2	34.5	1.2
African American, no cancer	26.7	0.6	28.6	0.7	28.7	0.7	28.5	0.7
African American, cancer	19.5	2.9	26.5	3.5	26.5	3.5	27.4	3.6
Other, no cancer	33.6	0.9	32.2	0.8	32.2	0.8	31.9	0.8
Other, cancer	27.0	5.3	30.2	5.2	30.0	5.1	31.4	5.3
Smoking								
White, no cancer	20.8	0.3	21.6	0.3	21.6	0.3	21.6	0.3
White, cancer	18.6	1.0	23.3	1.1	22.6	1.1	22.4	1.1
African American, no cancer	20.9	0.5	16.1	0.4	16.3	0.4	16.2	0.4
African American, cancer	21.4	3.0	21.0	2.8	20.6	2.8	19.9	2.8
Other, no cancer	15.9	0.7	14.9	0.7	15.1	0.7	15.1	0.7
Other, cancer	27.3	4.9	33.1	4.5	32.6	4.5	31.2	4.4
Alcohol use								
White, no cancer	15.7	0.2	15.6	0.2	15.6	0.2	15.6	0.2
White, cancer	17.9	0.9	16.1	0.8	16.0	0.8	16.3	0.8
African American, no cancer	8.7	0.3	9.6	0.4	9.6	0.4	9.6	0.4
African American, cancer	6.1	1.9	6.6	2.0	6.6	2.1	6.8	2.1
Other, no cancer	7.8	0.4	7.8	0.4	7.8	0.4	7.7	0.4
Other, cancer	17.2	4.3	16.3	4.0	16.1	4.0	16.7	4.1

Sociodemographic factors included age group, Hispanic origin, gender, income categories, family size, receipt of government assistance because of low income, educational attainment, marital status, and home ownership. Access to medical care consisted of having health care insurance at the time of the interview, being unable to afford prescription medicines, mental health care, dental care, or eye glasses during the past 12 months, being unable to see a doctor during the 12 months prior to the interview because of cost, and reporting delay in receipt of medical care during the past 12 months due to inability to (a) get through on the telephone, (b) get an appointment soon enough, (c) get into see a doctor soon enough, (d) get to the clinic/doctor's office when it was open, and (e) find transportation to get there. The chronic conditions covariate was the sum of 11 conditions based on participants' self-reported diagnosis by a physician

se: standard error

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