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Work Disability Associated with Cancer Survivorship and Other Chronic Conditions

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Summary

The long-term effects of cancer and its treatment on employment and productivity are a major concern for the 40% of cancer survivors in the U.S. who are working age. This study's objectives were (1) to quantify the increase in work disability attributable to cancer in a cohort of adult survivors who were an average of 46 months post-diagnosis and (2) to compare disability rates in cancer survivors to individuals with other chronic conditions. Data from the Penn State Cancer Survivor Study (PSCSS) and the Health and Retirement Study (HRS) were compared. The PSCSS sample included 647 survivors age 55–65, diagnosed at four medical centers in Pennsylvania and Maryland. There were 5988 similarly aged subjects without cancer in the HRS. Adjusted odds ratios for work disability were estimated for cancer survivorship, heart disease, stroke, diabetes, lung disease, and arthritis/rheumatism with multivariate logistic regression. Even for cancer-free survivors, the disability rate was significantly higher in comparison to adults with no chronic conditions (female OR=1.94; male OR=1.89). There were few significant differences between disability rates for cancer and other conditions. The elevated disability rate is another argument for viewing cancer survivorship as a chronic condition potentially requiring a broad range of psychosocial services.

INTRODUCTION

With recent improvements in long-term survival and growth in the population of cancer survivors, more attention is being paid to the long-term health and well-being of people living with a history of cancer (Jemal *et al.*, 2004; Rowland, 2004). For the roughly 40% of cancer survivors in the U.S. (National Cancer Institute SEER, 2006) who are working age (25–64 years old), the long-term effects of cancer and cancer treatments on productivity and the ability to work are likely to be a major concern. Long-term disability threatens the economic well-being of survivors and their families, as it may mean a loss of earnings and job-related health insurance. Additionally, the quality of life of survivors who are limited in ability to work may be affected by the loss of identity and purpose, life satisfaction, and social relationships that work often provides (Steiner *et al.*, 2004).

The primary goal of this study was to estimate the excess prevalence of long-term work disability in a cohort of adult cancer survivors who were diagnosed 2 to 6 years earlier. A

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secondary goal was to compare the rate of disability associated with cancer survivorship to disability rates for other common chronic conditions, in order to put the cancer burden in perspective.

There have been relatively few attempts to measure the increase in disability attributable to cancer in the years following initial treatment (Hewitt *et al.*, 2003; Short *et al.*, 2005; Bradley and Bednarek, 2002; Chirikos *et al.*, 2002b; Yabroff *et al.*, 2004). From the first round of interviews with our survivor cohort, we reported that approximately 20% of those working at diagnosis reported disabilities that they perceived as cancer-related 1 to 5 years later (Short *et al.*, 2005). There were significant differences in adjusted disability rates among working survivors by cancer site, stage at diagnosis, treatment status, cancer recurrence, the presence of co-morbidities, and occupation. No study has compared long-term disability rates for cancer and other specific conditions, although Hewitt and colleagues compared cancer survivors under age 65 to adults with all other chronic conditions—and found that fewer cancer survivors were unable to work at all (Hewitt *et al.*, 2003).

METHODS

Research approach

To quantify the excess rate of disability in the cancer sample, we compared the rate of work disability among the cancer survivors in 2002 to the rate among individuals with no history of cancer, interviewed in the same year of the Health and Retirement Study (HRS), a prospective national study of Americans born from 1931 through 1947. We also compared the disability rate for cancer survivorship to the disability rate for five common chronic conditions (heart disease, diabetes, arthritis/rheumatism, chronic lung disease and stroke) identified in the cancer and HRS surveys. To facilitate comparison of the cancer survey to the HRS, many of the questions in the cancer survey were taken from the HRS. Subjects outside the age range common to both surveys (55–65 years of age at the 2002 interview) were dropped from each sample. We used multivariate logistic regression and propensity scores to account for differences in characteristics of the two samples that might otherwise have confounded comparisons of disability rates.

Penn State Cancer Survivor Study

The Penn State Cancer Survivor Study (PSCSS) identified a cohort of cancer survivors from the tumor registries of four medical centers in the Eastern United States. The cohort was diagnosed with cancer for the first time from 1997 through 1999. Because of the study's focus on employment and disability, eligibility was limited to ages 25 to 62 at diagnosis. Patients who could not be interviewed in English were excluded. Survivors of all types of cancer were included, with three exceptions: superficial skin cancers, Stage 4 cancers at diagnosis (except Stage 4 leukemias, plasma cell cancers, and lymphomas with relatively favorable survival rates), and patients at Johns Hopkins with urological, testicular, and prostate cancers that were outside the administrative control of the tumor registry.

The research protocol was approved by Institutional Review Boards at Penn State's University Park campus and at each hospital. Hospital employees obtained informed consent

before subjects were interviewed. Forty-three percent of eligible cases (2076 patients) consented to be interviewed, and 88% of those who consented and survived (1763 subjects) completed the first interview (Short *et al.*, 2005). Eighty-nine percent of surviving subjects who completed the first interview completed the second interview (1511 cases).

Considering the low participation rate, we conducted extensive analyses to identify correlates of non-participation and to test for non-participation biases. These analyses suggested that multivariate methods, such as those used in this article, were effective in minimizing any bias (Short and Mallonee, 2006). In a sample of over 5000 eligible individuals, there were significant differences in participation by gender, race, cancer site, and facility in a logistic regression that predicted participation from characteristics of eligible patients determined from the tumor registries. Given these differences, we performed additional tests for bias in multivariate models of employment, disability, and other quality-of-life outcomes within the cancer sample at the first interview, with the correlates of participation as covariates. Specifically, we added each person's propensity-to-participate score from the participation model as an additional covariate in the outcome models and examined its statistical significance. These tests did not reveal any residual biases. We also used logistic regression to identify correlates of attrition not due to mortality after the first round. Of the large number of variables considered, the few significant differences in attrition were related to age, nonwhite race, any college education, poverty, and treatment at the facility with the lowest initial participation rate.

In addition to asking about each subject at the time of interview, the first interview asked retrospectively about marital status, health insurance, and employment at diagnosis. The type of cancer and the date of diagnosis were obtained from the cancer registries. Survivors were asked, "Since you were first diagnosed in [month, year of diagnosis], has your cancer spread to other parts of your body?" and "Since you were first diagnosed, have you had any new cancers?" We used responses to these questions to distinguish between survivors "with new cancers" (encompassing metastases, recurrences, and second primaries) and disease-free survivors. Whether or not survivors were in treatment for active cancer was also self-reported.

After the 2002 sample was restricted to the age range common to both surveys, there were 660 cases available for comparison to the HRS. We further excluded 13 cases still in initial treatment for active cancer in 2002 who did not report any new cancers. The resulting sample comprised 522 cases that were disease-free, 119 cases involving new cancers, and 6 with missing data on new cancers. Time from diagnosis ranged from 26 to 70 months (mean=45.9, standard deviation=10.3), with 71% of survivors 37 to 60 months from diagnosis. Breast (50%), uterine (12%), lung (6%), and colorectal (6%) cancers were the most prevalent among female survivors. Prostate (40%), colorectal (12%), and urinary tract (9%) cancers were the most prevalent among male survivors. Seventy-nine percent of the female survivors and 68% of the male survivors were diagnosed with Stage 1 or Stage 2 cancers. Treatment included surgery for 92% of females and 81% of males, radiation therapy for 54% of females and 34% of males, and chemotherapy for 46% of females and 26% of males.

Health and Retirement Study

HRS is an ongoing panel study conducted by the University of Michigan with funding primarily from the National Institute on Aging (Institute for Social Research, 2006). The HRS began in 1992 with a nationally representative cohort of 51- to 61-year-olds, born from 1931 to 1941. A second cohort, born from 1942 to 1947, was added in 1998. HRS interviews are conducted biannually in even years. HRS subjects with any history of cancer, other than superficial skin cancers, were dropped from our analyses. Data from the HRS were drawn from RAND's longitudinal compilation wherever possible, and otherwise from wave-specific public use files (RAND, 2004). After the sample was restricted to the age range common to both surveys, there were 5988 cases available for comparison to the cancer survey.

Where possible, studies of disability and employment outcomes for cancer survivors have matched survivor and comparison samples on employment status at diagnosis (Bradley *et al.*, 2002a; Maunsell *et al.*, 2004; Bradley *et al.*, 2005a). Preliminary analyses confirmed that not working at diagnosis strongly predicted disability in 2002 in the cancer sample (adjusted odds ratio = 2.52, p<.0001). Consequently, we implemented a procedure used by Bradley and colleagues to control for employment status in the HRS sample at an earlier point in time (or "baseline") comparable to the date of diagnosis in the cancer sample (Bradley *et al.*, 2002a). We assigned baseline dates to the HRS sample by randomly assigning dates of diagnosis from the cancer sample to HRS subjects of like gender, with replacement. Then we determined baseline employment from data reported in HRS interviews before and after the baseline, and included employment at baseline/diagnosis for both samples as a covariate in our analyses.

Measures of disability and chronic conditions

Studies of the employment consequences of cancer survivorship have focused more on employment rates than disability rates (Bradley *et al.*, 2002a; Bradley *et al.*, 2002b; Chirikos *et al.*, 2002a; Chirikos *et al.*, 2002b; Spelten *et al.*, 2002; Hewitt *et al.*, 2003; Maunsell *et al.*, 2004; Yabroff *et al.*, 2004; Bradley *et al.*, 2005a; Bradley *et al.*, 2005b; Short *et al.*, 2005). However, disability rates provide a conceptually broader measure of the employment effect of cancer survivorship than employment rates. First, survivors who are working in spite of disabilities are counted in the disability rate. Second, the disability rate is a more sensitive measure of the effect of cancer on the health and quality of life of survivors who might not have worked even in the absence of a cancer history (such as women caring for children, or early retirees). The disability rate captures a narrowing of the choices that survivors are *able* to exercise, while the employment rate measures only those choices that they *actually* exercise.

Work disability was measured in both surveys by asking subjects if they had any impairments or health problems that limited the kind or amount of paid work they could do. This self-reported measure is widely used in national surveys to measure disability rates (Bound and Burkhauser, 1999). Its value in 2002 is a strong predictor of actual 2002 employment in both the HRS (unadjusted odds ratio=.121, p<.0001) and cancer samples (unadjusted odds ratio=.277, p<.0001). For our descriptive purposes, it is arguably a better

measure of disability than more objective measures of health that do not necessarily capture individuals' capacity to perform the work that is most relevant to them (Bound, 1991).

The prevalence of heart disease, diabetes, stroke, chronic lung disease, and arthritis or rheumatism was measured identically in both surveys by asking respondents, "Has a doctor ever told you that you had [condition]?" Because of recall concerns, the cancer survey did not attempt to discern if these conditions predated the diagnosis of cancer. These were the only chronic conditions identified in both surveys.

Statistical Methods

The cancer and HRS samples were compared on characteristics likely to be associated with differences in the prevalence of work disability, including the presence of other chronic conditions, age, gender, race, marital status, education and employment, job-related health insurance, and occupation at diagnosis/baseline. Age was categorized to distinguish subjects who had reached the minimum age for Social Security retirement benefits at age 62 and eligibility for Medicare and full Social Security benefits at age 65. Chi-square tests revealed significant differences between the samples related to these characteristics. In addition, the cancer sample was drawn from two Census divisions (Mid-Atlantic and South Atlantic), while the HRS was national in scope.

We used two approaches to adjust for the differences between samples. First, we included all of the characteristics listed above as covariates in multivariate logistic regressions predicting work disability. The regressions were estimated separately by gender, after a likelihood ratio test rejected pooling genders ($p<.01$). Importantly, considering the geographic differences between the samples, chi-square tests showed no significant geographic differences in adjusted disability rates. Nevertheless, we considered models with the HRS sample restricted to the census divisions where the cancer sample was located, in addition to models involving the full HRS sample.

We also added propensity scores to the disability models as a way of further accounting for differences in the observed characteristics of the samples (Rosenbaum and Rubin, 1983; D'Agostino, 1998; Pasta, 2000; Christos and Barron-Vaya, 2005; Love, 2005). Propensity scores were estimated for both samples from another logistic regression. They represented the individual probability of being in the cancer sample as a function of each person's observed characteristics (sex, age, race, educational attainment, marital status, children at home, general health, chronic disease, work status, job-related health insurance, and pension status). Prior to introducing the propensity scores into the disability models, we dropped a small number of observations with propensity scores outside the range common to both samples.

To compare disability rates for cancer and each of the other chronic conditions, we used a model specification of the form: log odds of disability = $\beta_o + \beta_1$ cancer survivor + β_2 diabetes + β_3 chronic lung disease + β_4 heart disease + β_5 stroke + β_6 arthritis/rheumatism + $X\beta_k$, where X is the vector of other covariates and β_k represents their coefficients. The indicators for cancer and the other conditions were not mutually exclusive; cancer survivors

with heart disease, for example, were coded as 1's for both variables. Similarly, HRS subjects with diabetes and heart disease were coded as 1's for both variables.

To compare the disability rate for cancer to the rate for each of the other conditions, we computed an adjusted odds-ratio for cancer relative to the other conditions by dividing the cancer coefficient by each of the other coefficients. For example, the odds-ratio for cancer relative to diabetes was β_1/β_2. If we had re-estimated the logistic model 5 times with each of the chronic conditions as the reference group, we would have obtained exactly the same ratios. We used a Wald test of the equality of each pair of coefficients (e.g. $\beta_1=\beta_2$), a linear restriction distributed as a chi-square with one degree of freedom, to identify odds ratios significantly different from 1. We considered two versions of the regression models that (1) estimated one coefficient (β_1) for all cancer survivors grouped together and (2) estimated separate coefficients for survivors with and without any new cancers.

RESULTS

The differences between the samples are shown in Table 1. The cancer sample was not only younger than the HRS sample and predominantly white, but on average was also higher in socioeconomic status (as evidenced by significant differences in education, employment, and occupation). Although arthritis/rheumatism was more prevalent in the HRS sample and heart disease was more prevalent among females in the cancer sample, there were few significant differences in the prevalence of the five chronic conditions.

For both genders, the unadjusted rate of work disability (Table 2) was significantly higher in the cancer sample than in the HRS. Comparing sub samples with each of the five chronic conditions by gender across surveys, there were no significant differences in unadjusted disability rates. However, when cancer survivors with none of these conditions were compared to HRS subjects with none of these conditions, the unadjusted disability rate in the cancer sample was about three times higher for males and four times higher for females. According to data not shown in the table, about half of all disabled survivors (16 of 30 percent) reported in the survey that their disability was related in some way to their cancer.

In keeping with the elevated disability rate for cancer survivors in the descriptive data, logistic regressions without propensity scores showed that the adjusted rate of work disability was significantly higher for cancer survivors compared to adults of the same gender with no history of cancer and no other chronic conditions (female OR =2.14, male OR=2.34; Table 3). When evaluated at the means of the independent variables in the cancer sample, the adjusted odds-ratios imply that a history of cancer raised the rate of work disability by 14 percentage points. The increase in disability for survivors with any new cancers (+25%) was significantly greater than the increase in disability for cancer-free survivors (+11%). Restricting the HRS sample to subjects in the Mid-Atlantic and South Atlantic census divisions had little effect on these estimates, so we report estimates from the unrestricted model that used the full power of the HRS to estimate the effects of the five chronic conditions and other covariates. Adding propensity scores to the logistic regressions also had little effect on the estimates.

Table 4 compares the adjusted odds of disability associated with cancer to the adjusted odds associated with each of the other chronic conditions. There were relatively few significant differences between cancer survivorship and the other conditions, as indicated by adjusted odds-ratios significantly different from one. Where there were significant differences, the rate for cancer-free survivors was less than the rate for other conditions, while the rate for survivors with new cancers was greater than the rate for other conditions. The only difference that was significant for both genders was the lower rate of disability for diabetics compared to survivors with new cancers.

DISCUSSION

The primary goal of this study was to quantify the excess prevalence of work disability specifically attributable to cancer in a cohort of adult cancer survivors, recognizing that self-reported disability rates are influenced by a variety of health, demographic, and socioeconomic factors in addition to cancer survivorship. Adjusted odds-ratios from logistic regressions comparing cancer survivors to other adults with no chronic conditions showed that about half the disability in the cancer cohort was attributable to their cancer history (14 out of 30 percentage points). This estimate was consistent with survivors' own perceptions of disability attributable to cancer, as about half of the cancer survivors who reported any work disability said that it was related to their cancer. Because we adjusted for other chronic conditions in estimating excess disability associated with cancer, our methods may be somewhat conservative in attributing disability to cancer. As we were unable to distinguish between conditions in the cancer sample that predated and emerged after diagnosis, we could not account for disability associated with conditions triggered by cancer treatment, such as heart problems caused by chemotherapy.

A second research goal was to compare the adjusted rate of work disability for cancer survivorship to disability rates for other chronic conditions. We found few consistent differences, but disability rates for disease-free survivors were less than or similar to rates for other conditions. These findings are consistent with findings from the few studies that have compared the effect of cancer on employment or disability to the effects of other chronic conditions. One such study reported that the adjusted disability rate for cancer survivors with no other chronic conditions was lower than the rate for adults with chronic conditions but no history of cancer (Hewitt *et al.*, 2003). Another study found that the long-term employment effects of breast cancer survivorship were similar to the effects of other physical conditions (Bradley *et al.*, 2002b).

Findings from this study should be interpreted cautiously for several reasons. First, the experiences of survivors from four medical centers in the Eastern U.S. may not be representative of cancer survivors nationally. In particular, given this sample's relatively advantaged racial and socioeconomic profile, the disability rate is likely to be lower in this sample of cancer survivors. Also, disability patterns in the age group studied here—adults approaching retirement—may not generalize to younger adults. The low recruitment rate in the cancer study is another potential limitation, although extensive analyses of non-response did not uncover any systematic biases in multivariate models like those used here. It is also possible that we failed to account for differences between the HRS and cancer sample that

biased comparisons of disability rates. However, refinements involving geographic location and propensity scores had little effect on the estimates. Finally, although the importance of individuals' perceptions of their ability to work is widely acknowledged in quality-of-life research (Ferrell and Dow, 1997), self-reported disability may not mirror more objective clinical assessments (Bound, 1991).

In a recent report, the Institute of Medicine characterized the care of cancer survivors as presenting the same ongoing challenges as the care of patients with other chronic conditions (IOM, 2006). This study lends further credence to a new paradigm of cancer survivorship as a chronic condition, by showing that rates of work disability associated with cancer survivorship are elevated and similar to rates associated with other chronic conditions. Like patients with other chronic conditions, cancer survivors may require additional clinical and psychosocial services to realize their full potential at work and maximize the quality of their lives more generally. However, as demonstrated by the two-thirds of cancer survivors in this study who reported no limitations in ability to work 2 to 6 years post-diagnosis, the productivity of most survivors is unaffected over the long term.

Unlike other chronic diseases such as diabetes or arthritis where disability is commonly caused by the disease process itself, short and long term disability associated with cancer is often caused more by treatment than the disease itself. For example, chronic pain in breast cancer survivors is related to more invasive surgery, multiple treatments such as surgery combined with radiation, and post-operative pain (Poleshuck EL 2006). Treatment for head and neck cancers, the sixth most prevalent cancer globally, commonly leads to disfigurement, chronic pain and poor functional outcomes (Chin 2006). The results of our study show that cancer survivors suffer from work limitations at a higher rate than individuals with other chronic diseases. Consequently, cancer patients may require psychosocial services and other therapeutic modalities such as physical and occupational therapy to assist in their return to a productive work life. However, developing new and improved treatments with fewer adverse health consequences is another potentially important strategy for reducing cancer related disability

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Table 1

Sample Characteristics

Characteristic	Sample			
	Males		Females	
	Cancer (N=253)	HRS (N=2607)	Cancer (N=394)	HRS (N=3381)
	Column percent			
Work disability[a, b]	27	22	32	26
Any new cancers	19	--	18	--
Diabetes	17	18	14	15
Chronic lung disease	9	7	12	9
Heart disease[b]	22	20	19	14
Stroke	5	5	3	5
Arthritis/rheumatism[a, b]	38	45	52	60
Diagnosis/baseline year				
1997	29	30	32	30
1998	40	40	38	40
1999	31	30	30	30
Working at baseline/diagnosis[a,b]	85	72	73	57
Managerial/professional/technical job at baseline/diagnosis[a,b]	35	25	29	17
Had own employer insurance at baseline/diagnosis	44	43	34	31
Age[a,b]				
55–59	40	32	50	38
60–61	17	23	19	22
62–64	34	35	22	30
65	9	10	8	10
Nonwhite[a, b]	6	17	6	22
Married at baseline/diagnosis	89	85	76	73
Education[a, b]				
Less than high school	7	25	7	26
High school	34	45	39	53
Some college	19	4	21	4
College	16	14	13	9
Post college	24	12	20	8
Census region/division[a, b]				
Northeast	0	3	0	3
Mid Atlantic	74	11	59	13
Midwest	0	25	0	23
South Atlantic	26	26	41	26
Rest of South	0	17	0	17
West	0	17	0	17

HRS: Health and Retirement Study. Variables are measured at follow-up in 2002, unless otherwise indicated.

[a] Male cancer and HRS samples are significantly different ($p<.05$).

[b] Female cancer and HRS samples are significantly different ($p<.05$).

Table 2

Prevalence of Work Disability

	Males		Females	
	Cancer	**HRS**	**Cancer**	**HRS**
Entire sample [a,b]	27%	22%	32%	26%
With chronic conditions				
Diabetes	35	37	46	44
Chronic lung disease	48	60	48	55
Heart disease	32	42	51	55
Stroke	58	61	73	56
Arthritis/rheumatism	40	33	39	36
No chronic conditions [a,b]	14	5	21	5

HRS: Health and Retirement Study

[a] Males in cancer and HRS samples are significantly different ($p<.05$).

[b] Females in cancer and HRS samples are significantly different ($p<.05$).

Table 3

Adjusted Odds Ratios from Logistic Regressions Predicting Work Disability

Variable	Model 1 All survivors		Model 2 Survivors with and without new cancers	
			Females (N=3701)	
	OR	**95% CI**	**OR**	**95% CI**
Cancer survivorship				
All survivors (N=383)	2.14**	1.62–2.83		
Survivors with any new cancers (N=68)			3.05**	1.76–5.30
Cancer-free survivors (N=311)			1.94**	1.43–2.63
Chronic conditions				
Diabetes (N=556)	1.54**	1.23–1.92	1.54**	1.23–1.92
Chronic lung disease (N=345)	2.63**	2.03–3.42	2.63**	2.03–3.42
Heart disease (N=550)	2.91**	2.34–3.61	2.91**	2.34–3.62
Stroke (N=167)	2.26**	1.56–3.28	2.25**	1.55–3.26
Arthritis/rheumatism (N=2193)	3.37**	2.78–4.09	3.36**	2.77–4.07
No cancer/No chronic conditions (N=1021)	1.00		1.00	
			Males (N=2810)	
Cancer survivorship				
All survivors (N=251)	2.34**	1.63–3.36		
Survivors with any new cancers (N=48)			5.14**	2.59–10.20
Cancer-free survivors (N=201)			1.89**	1.25–2.84
Chronic conditions				
Diabetes (N=501)	2.02**	1.57–2.60	2.04**	1.58–2.62
Chronic lung disease (N=210)	4.89**	3.46–6.90	4.88**	3.45–6.89
Heart disease (N=554)	2.34**	1.84–2.98	2.32**	1.83–2.96
Stroke (N= 143)	3.86**	2.55–5.85	3.78**	2.50–5.72
Arthritis/rheumatism (N=1261)	2.88**	2.31–3.60	2.92	2.34–3.65
No cancer/No chronic conditions (N=969)	1.00		1.00	

OR: odds ratio. 95% CI: 95% confidence interval.

** Statistically significant in a two-tailed test ($p<0.01$).

The reference group is adults who are not cancer survivors and have no chronic conditions. The odds ratio for the reference group is 1. Odds ratios are adjusted for age, race, education, marital status at diagnosis/baseline, employment status at diagnosis/baseline, occupation at diagnosis/baseline, and health insurance from own employer at diagnosis/baseline.

Table 4

Adjusted odds-ratios for cancer survivorship relative to other chronic conditions

Condition/Reference group	Female cancer survivors			Male cancer survivors		
	All survivors	**New cancers**	**Disease free**	**All survivors**	**New cancers**	**Disease free**
Diabetes	1.39	1.98*	1.26	1.16	2.52*	0.93
Chronic lung disease	0.81	1.16	0.74	0.48*	1.05	0.39*
Heart disease	0.74	1.05	0.67*	1.00	2.21*	0.81
Stroke	0.95	1.36	0.86	0.60	1.36	0.50*
Arthritis/rheumatism	0.64*	0.91	0.58*	0.81	1.76	0.65

*Adjusted odds-ratio is significantly different from 1 ($p<.05$).

Adjusted odds ratios for cancer survivorship relative to other chronic conditions were calculated by dividing the odds ratio for cancer survivors in Table 3 (e.g. $OR_{\text{all female survivors}} = 2.14$) by the odds ratio for each chronic condition in Table 3 (e.g. $OR_{\text{female diabetics}} = 1.54$, $OR_{\text{cancer compared to diabetes}} = 2.14/1.54 = 1.39$). Levels of statistical significance were determined from pair-wise Wald tests of the equality of coefficients in Table 3 (e.g. $OR_{\text{all female survivors}} = OR_{\text{female diabetics}}$).