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Employment and retirement status of older cancer survivors compared to non-cancer siblings

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Abstract

Background—The effect of cancer on employment and retirement status in an older work force is not well understood. This study examines whether cancer survivors were less likely to be working than a sibling comparison group.

Objectives—To compare work-related variables between older cancer survivors and a group of non-cancer sibling controls. A secondary objective was to evaluate the effect of cancer site and time since cancer diagnosis on work-related variables.

Methods—Data from the Wisconsin Longitudinal Study (WLS) were used to assess work outcomes in cancer survivors (+CA, n=539, mean age=65.81, SD=4.75 years) and non-cancer sibling controls (–CA, n=539, mean age=63.95, SD=5.31 years).

Results—Survivors (+CA group) were more likely to report not working (61.8%) and to be completely retired (55%) than the –CA group (48.3% not employed; 42% retired). Controlling for age, gender and education, this effect persisted with the +CA group more likely to be not working (OR=1.40; 95% CI=1.08 to 1.83) and completely retired (OR=1.36; 95% CI=1.05 to 1.77) than the –CA group. Neither time since diagnosis nor cancer site affected work outcomes.

Conclusions—In this study, older +CA survivors were less likely to be working and more likely to be completely retired than –CA sibling controls. Future research should evaluate factors affecting work status among older cancer survivors.

Keywords

older cancer survivors; survivorship; employment; retirement; work

1. Introduction

There are approximately 12 million cancer survivors in the United States, with numbers predicted to increase substantially in the upcoming decade [43]. Due to improved screening and treatment, over 65% of adults diagnosed with cancer now live 5 years or more past diagnosis [41]. In addition, the risk of being diagnosed with cancer increases with age. Between the ages of 50 to 70, 20.59% of men and 15.39% of women, will be diagnosed with cancer [29]. As more people are surviving a diagnosis of cancer and the population is aging,

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the number of older cancer survivors is growing. Approximately 60% of cancer survivors are age 65 years or older [41]. Furthermore, the proportion of the labor force aged 55 years or older has increased from 11.9% in 1990 to 18.8% in 2009 [54]. During times of economic recession, many workers must work longer to ensure adequate savings for retirement [26]. Thus, the number of older cancer survivors in the work force will likely increase with survivors continuing in the workplace for personal, insurance, or economic reasons.

Previous studies have shown that 30-50% of cancer survivors may experience treatment- or disease-related long-term and late effects [5, 14, 21, 28, 48, 55, 62] that can adversely impact work activities [15, 51]. Work activities with increased physical or cognitive demands can be particularly problematic for cancer survivors to perform [7-8, 12, 45, 49, 52, 58]. Treatment related sequelae (e.g., fatigue, pain, and physical and cognitive limitations), in combination with age-related physical and cognitive changes, may exacerbate work-related difficulties for older cancer survivors.

Following a cancer diagnosis, approximately 25-30% of previously employed survivors do not return to work [15, 36, 56]. In a meta-analysis of survivors with varying cancer types, approximately one-third reported being unemployed [15]. A recent systematic review found that cancer survivors had a greater risk for early retirement as well as unemployment [36]. For survivors that continue to work, 20% reported being limited in their ability to work [50] or experienced reduced work hours [4, 6, 38]. Up to 50% of cancer survivors report significantly poorer work capacity compared to matched controls, years after diagnosis and curative therapy [23]. Productivity loss can result in considerable economic burden for the survivor, employer, and society. The National Cancer Institute estimates the loss in productivity due to cancer to be approximately 135 billion dollars annually [41]. Employment is a critical component of quality of life, providing health insurance, economic stability, professional identity, and supportive social relationships. Thus, the difficulties cancer survivors experience at work are considered an important public health problem, predicted to escalate over the next decade [27].

Despite the aging cancer population, the majority of post-cancer employment literature does not reflect the increasing age of the workforce. Much of the work-related cancer research has focused on a younger workforce, with a mean age of less than 55 years [15]. For studies that included survivors with a range of ages, results have varied. Increasing age had a significant impact on employment and retirement status [4, 13, 16, 19, 34, 36, 47, 49] with older survivors more likely to leave their jobs [19], retire [4, 13], or be unemployed [16, 34, 47] than younger survivors. These results are not surprising given that older workers are less likely to be working than younger workers. However, studies that compared older cancer survivors to older non-cancer participants found that cancer did not affect socioeconomic outcomes [42], the decision to retire [4], or employment [20]. As the risk of being diagnosed with cancer increases with age, it is important to understand the effect of cancer on the work status of an aging workforce. Whether cancer detrimentally affects employment and retirement status for older cancer survivors is still unclear. Specifically, does cancer affect work-related variables in a cohort of older cancer survivors? If individuals are forced to prematurely leave the workforce, they may experience economic consequences that adversely affect quality of life.

The use of a sibling-matched cohort may help to address this question. Case-control sibling cohorts can be used to address confounding factors such as socioeconomic background and social origins that cannot be readily controlled for with non-sibling comparisons. Case-control sibling cohorts have been used in quality of life research of survivors of childhood cancer [22, 32-33, 45, 63] and the role of job characteristics in mediating socioeconomic status and health outcomes [10]. In addition, case-control sibling pairs have been used in

employment-related research of adult survivors of childhood cancer [32]. Interestingly, adult survivors of childhood cancer are more likely to report experiencing employment challenges than their sibling controls [32].

For this study, a sibling case-control cohort was used to examine whether differences existed in work-related variables for survivors of adult cancer compared to a sibling comparison group. Use of a sibling cohort addresses the potentially confounding factor of childhood socioeconomic status. The objective of this study was to compare work-related variables between older cancer survivors and a comparison group of non-cancer sibling controls. A secondary objective was to evaluate the effect of cancer site and time since cancer diagnosis on work-related variables.

2. Subjects and Methods

2.1. Study Sample

This study is a secondary analysis examining data from respondents who participated in the Wisconsin Longitudinal Study (WLS), a publically available, de-identified dataset. The WLS is a long-term study that surveyed a random sample of 10,317 men and women who graduated from Wisconsin high schools in 1957. Participants were surveyed in 1957, 1975, 1993 and 2003. Surveys were also administered in 1977, 1994 and 2004 to a randomly selected sibling (n=7,638) of the graduates. Survey questions covered dimensions of life and livelihood including family background, educational attainment, employment and retirement status, work activities, social participation, health status, quality of life, and income.

The cohort for this secondary analysis was selected from respondents to the 2003/04 round of WLS surveys (which included both phone and mail questionnaires). A total of 4271 sibling pairs responded to the 2003/2004 survey. Of these, 539 cancer:non-cancer sibling pairs were identified on the basis of either the graduate or the sibling being diagnosed with cancer (not including minor skin cancers) by 2002, with the other having no history of cancer. The final sample consisted of two groups: cancer survivors (+CA, n=539) at least a year from diagnosis and their non-cancer siblings (−CA, n=539).

2.2. Study Variables/Measures

Participant demographics and characteristics included: age, gender, education (less than high school, high school, and college or higher), marital status, and total personal income. Cancer survivors were identified with a question (yes/no) “Has a doctor ever told you that you have cancer or a malignant tumor, not including minor skin cancers?” Self-rated health status was assessed with respondents asked to rate their current health (excellent, good, fair, poor, or very poor). However, since only a small number of respondents rated their health as either poor or very poor, we combined these two response levels. As a result the response levels of the health status variable used were excellent, good, fair, or poor/very poor.

The work-related variables evaluated in this study were: (i) *employment status*: currently employed or not employed, (ii) *full-time/part-time (FT/PT) status* (for those that report being employed): working ≥35 hours per week (FT) or <35 hours (PT), (iii) retirement status: completely retired or working (i.e. working consisted of those who defined themselves as not retired at all or partially retired) and (iv) whether respondents were limited in the kind or amount of work or daily activities they were able to do over the past month due to their physical health: yes/no.

We elected to evaluate both employment and retirement status as respondents could report being unemployed but not retired. For example, someone may report being unemployed, but not self-identify as being retired. This might occur if job loss was experienced and the

individual was actively seeking work. Conversely, someone could be retired from their primary occupation but is employed in a secondary occupation. In this case, the individual might report being retired but also employed. For working respondents, we evaluated whether cancer had an effect on full-time or part-time status. In addition, we evaluated whether respondents felt that their health limited their ability to participate in work or daily activities.

Covariates included age, gender, education and cancer (yes/no). We also examined the effect of cancer site (colon, breast, prostate, other) and time since cancer diagnosis (1-5, 6-10, or 11+ years) among the +CA sample in separate models.

2.3. Statistical Analysis

Analysis of group differences, between the +CA group and – CA group, were compared using chi-square tests for categorical variables and t-tests for continuous variables. Regression analyses were used to compare work-related variables between +CA and –CA groups with adjustment for the effects of potential confounders of age, gender and education. Generalized linear mixed effects logistic regressions with random intercepts were used to take into account the correlation between siblings in a given dyad. While sibling controls can be helpful for controlling factors related to family and socioeconomic background, they do not control for age, gender and educational status. Thus, the regression analysis was adjusted for these potential confounders. In addition, we fitted models with all pairwise interactions between cancer status and these three variables. All interactions were non-significant; therefore, they were removed from the final model.

For retirement status, the original variable has three levels: “Completely retired”, “partially retired” and “not retired at all”. The frequencies of these three levels in the data were 48.5%, 21.8% and 29.7%, respectively. For ease of interpretation, we combined the level “partially retired” and “not retired at all” to make the retirement status a binary variable (completely retired or not retired). Using this combination, the two levels of the new variable have almost equally frequencies. In our analysis, we also evaluated “completely retired” versus “not retired at all”, eliminating the “partially retired” group. We found that the results were consistent regardless of whether or not the “partially retired” group was included in the analyses. Since the results were consistent, we elected to include the “partially retired” group in order to avoid excluding data.

Further analysis of the +CA group alone was also conducted. Chi-square tests were performed to identify significant differences in the work-related measures between the cancer site groups (colon, breast, prostate, other) and the time since diagnosis groups (1-5, 6-10, or 11+ years). The logistic regressions were fitted to evaluate the effects of cancer site and time since diagnosis, adjusting for potential confounders, age, gender and education. All statistical tests were two-sided with statistical significance set at $p < 0.05$. Statistical analyses were conducted using R (version 2.14.0).

3. Results

3.1 Descriptive Statistics

Participant demographics and characteristics are presented in Table 1. More than 99% of the participants are non-Hispanic White. The +CA group (average age = 65.81 (SD=4.75) years) was significantly older than the –CA (average age = 63.95, SD=5.31 years). Overall, 89% of the participants were 60 years or older. The +CA group was significantly more likely to rate their health as fair or poor/very poor. There were no significant differences between the +CA and the –CA groups for gender, education, marital status and income. More than half the survivors (53%) were 6 years from diagnosis. For the variable employment status,

cancer survivors were more likely to report not working (61.8%) than their non-cancer sibling controls (48.3%). Similarly, 55% of cancer survivors report being completely retired compared to 42% of the non-cancer sibling control group. Among respondents still working, a greater proportion of survivors were working part-time (51.3%) than the sibling controls (39.5%).

For the +CA group, there was no significant difference in the work-related measures between the cancer site groups (colon, breast, prostate, other) and the time since diagnosis groups (1-5, 6-10, or 11+ years).

3.2. Multivariate analysis: Effect of Cancer on Work-Related Variables

3.2.1. Employment Status—The odds ratios for the work-related variables are listed in Table III. Employment status remained significantly associated with cancer after controlling for age, gender and education. Cancer survivors were more likely to report being not employed than sibling controls (OR=1.40; 95% CI=1.08 to 1.83). As expected, age (OR = 1.20; 95% CI, 1.15 to 1.24) and gender (OR = 0.71; 95% CI, 0.54 to 0.92) were also significant, with older respondents and women more likely to be not employed.

3.2.2. Full-time/Part-time (FT/PT) Status—Among those who were employed, cancer was not significant in determining *FT/PT status* after accounting for the demographic factors. Gender and age were significant, with men less likely to be working part-time than women (OR = 0.58; 95% CI, 0.39 to 0.86), and older respondents more likely to be working part-time (OR = 1.17; 95% CI, 1.11 to 1.23).

3.2.3. Retirement Status—After taking into account age, gender and education, the +CA group was more likely to be completely retired (OR = 1.36; 95% CI, 1.05 to 1.77), compared to the –CA group. Age was also significantly associated with retirement status with older individuals more likely to be completely retired (OR = 1.18; 95% CI, 1.14 to 1.23).

3.2.4. Limited in work/daily activities—Cancer was not significant in determining whether individuals felt that they were limited in kind or amount of work or daily activities they were able to do, after controlling for age, gender and education. Age was significant in the model, with older individuals more likely to feel limited (OR = 1.09; 95% CI, 1.03 to 1.15). Compared to the group with the highest education, those with a high school-level education were more likely to be limited in work/daily activities (OR = 1.61; 95% CI, 1.10 to 2.37).

3.3. Multivariate Analysis: +CA group only

Odds ratios for the effect of cancer site and time since diagnosis on work-related variables are listed in Table III. When age, gender and education are controlled for, cancer site and time since diagnosis were not significantly associated with *employment status*, *FT/PT status*, *retirement status* and whether respondents were *limited in work/daily activities*.

4. Discussion

Older +CA survivors participating in the WLS were more likely to report not working compared to non-cancer siblings. Respondents with a cancer diagnosis were also more likely to report being completely retired than sibling controls unaffected by cancer. In this research, +CA survivors were approximately 40% less likely to be working than their –CA siblings. These findings are consistent with other studies that found that a cancer diagnosis was associated with a lower likelihood of employment in younger workers, the majority being less than 55 years of age [15, 17, 36, 39, 62]. In a meta-analysis of varying cancer

types, the level of risk for unemployment (pooled RR 1.37; 95% CI, 1.21 to 1.55) was similar to that found in this study [15]. Importantly, of the 26 studies reviewed, the majority matched for age and gender but less than ten studies matched for residency and only three matched for education. While the WLS does not specifically match for residency, more than 70% of respondents still live in Wisconsin [25]. In addition, through use of sibling controls, we are able to control for potential bias due to family socioeconomic background. Our results support that cancer affects employment and retirement status for older cancer survivors, independent of age, gender and education.

While we did see a difference in FT/PT status of employed survivors and siblings in this study, with more survivors working part-time than controls, cancer was not significant in the multivariate analysis. Instead, age and gender influenced FT/PT status with older +CA survivors and women more likely to be working part-time. Our findings are similar to a study on breast cancer survivors employed at 3-years post-diagnosis [16]. There was no difference in hours worked per week or part-time/full-time status between those with and without cancer. Other studies, however, have found that cancer survivors tend to work fewer hours per week than healthy controls [20, 39], although differences were larger for survivors with new or recurrent cancer diagnoses than for long-term cancer-free survivors [39].

In addition, we examined the effect of cancer on being limited in work/daily activities. While cancer did not have an effect, age had a small but significant effect. Importantly, a smaller sample size, approximately 15% of participants did not respond to this question, may have affected our ability to detect a significant effect.

In our analysis of the +CA group, we found that after controlling for age, gender, and education, cancer site and time since diagnosis were not associated with any of the work-related variables. Lindbohm et al. [35] also reported that time since diagnosis did not affect employment-related variables. In comparison, Bradley et al. [9] found that there was a marked difference in return to work rates by time since diagnosis with a greater reduction in employment and hours worked at 6 months post diagnosis than 12 and 18 months. Difference in study findings may be attributable to the difference in measures of time since diagnosis. In our study, +CA survivors were at least one year post-diagnosis; in comparison, in Bradley et al. [9], subjects were assessed at 6 months post-diagnosis. Work may be more affected during active treatment and shortly thereafter when symptom burden may be at its peak.

With regard to cancer sites, numerous studies have shown that survivors of lung, gastrointestinal, and head and neck cancer are likely to have worse employment outcomes than survivors of breast, prostate, and other primary cancers [50, 57-58, 60]. Colon and lung cancers have also been associated with more work-related sick time than breast or prostate [51], with lung cancer survivors having higher levels of unemployment [18]. However, associations like these were not evident in our results, possibly because the cancer site groupings were not the same as in other studies. The “other cancers” group in this study may include cancers with much heavier or much lighter symptom burden. In addition, 53.4% of survivors in this study were six or more years post-diagnosis, which may suggest a lower symptom burden due to length of time since diagnosis.

Finally, it is interesting to note that the +CA group reported poorer health status than the -CA group. These results are consistent with others that found +CA survivors were more likely to report their health as fair or poor [28, 62]. These results suggest the need for further investigation of the health status and symptom burden experienced by long-term older cancer survivors and to develop targeted interventions to improve post-cancer work

outcomes. In addition, further work is needed to better understand the optimal nature, timing, duration, and effectiveness of these interventions.

The results of this study found that older cancer survivors were more likely than their non-cancer sibling controls to report not working or being completely retired. While cancer and cancer-related treatment may impair a person's ability to perform work-related activities, this study was not able to elucidate the reasons for the differences in work-related variables. Future research is needed to identify the factors that contribute to this difference in work status and to identify the work-related needs of older cancer survivors. This information will guide targeted post-cancer employment interventions to address potentially modifiable factors such as survivor symptom burden, health status and work-related factors.

Despite the strength of a matched sibling comparison group, this study has several limitations. The lack of clinical details regarding cancer diagnosis and treatment made it impossible to distinguish disease stage or treatment regimens. Studies have shown that treatment modality (surgery alone, chemotherapy alone, radiotherapy alone, or combinations of these therapies) can have a substantial impact on work, health, and other quality of life outcomes [2, 3, 11, 13, 24, 31, 37, 40, 44, 53]. The same has been shown for cancer stage at diagnosis [1, 7, 9, 11, 18, 30, 38, 50, 61]. Furthermore, we were unable to take into account whether survivors had suffered a local or distant recurrence since their initial diagnosis, or developed new cancers. A cancer recurrence or new cancer diagnosis would likely affect employment [39]. In addition, other non-cancer chronic health conditions may confound the apparent association between cancer and work-related status. Another limitation is the WLS's exclusive focus on high school graduates. In addition, the majority of the sample is white. Therefore, the findings of this study may not be generalized to those without a high school degree or who are non-white. A final limitation of this study was the inability to investigate the effect of work-related variables. While we accounted for demographic characteristics of the study sample in our multivariate analysis, work-related variables were not addressed due to either (a) low response rates, or (b) inconsistencies between survey questions that were given to graduates versus siblings. In addition, this study was not able to assess whether respondents voluntarily left the workplace. Further research is needed to investigate the effect of work-related factors on employment and retirement status in older cancer survivors.

5. Conclusion

Cancer survivors may not always want to return to work; yet for those who do, work disability can have dramatic consequences on quality of life. Financial stability, access to affordable health insurance, and supportive workplace social relationships can all be negatively affected with loss of employment. Results from this study found a marked difference in employment and retirement status between cancer survivors and their non-cancer sibling controls. Further research is needed to identify factors predicting employment outcomes for older survivors of cancer.

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Table I

Participant demographics and characteristics of cancer survivors (+CA) and sibling controls (–CA) (N=1,078)

Characteristic	+CA group(N=539)	–CA group (N=539)	p ^a
Age			<.001
<i>Mean (SD)</i>	65.81 (4.75)	63.95 (5.31)	
<i>Range</i>	48 - 84	47 - 81	
Gender, N (%)			.807
<i>Male</i>	246 (45.6)	250 (46.4)	
<i>Female</i>	293 (54.4)	289 (53.6)	
Education, N (%)			.659
<i>Less than high school</i>	9 (1.7)	13 (2.5)	
<i>High school</i>	348 (65.4)	339 (64.2)	
<i>College or higher</i>	175 (32.9)	176 (33.3)	
Marital status, N (%)			.346
<i>Currently married</i>	422 (78.3)	409 (75.9)	
<i>Not currently married</i>	117 (21.7)	130 (24.1)	
Total personal income (\$)			.688
<i>Median</i>	25,500	26,000	
<i>Range</i>	0 to 50000	0 to 55000	
Self-rated health status, N (%)			<.001
<i>Excellent</i>	58 (12.2)	88 (19.1)	
<i>Good</i>	295 (62.0)	306 (66.5)	
<i>Fair</i>	94 (19.7)	57 (12.4)	
<i>Poor or Very poor</i>	29 (6.1)	9 (2.0)	
Employment status, N (%)			<.001
<i>Employed</i>	203 (38.2)	273 (51.7)	
<i>Not employed</i>	329 (61.8)	255 (48.3)	
Part or full-time work ^b , N (%)			.011
<i>Full-time</i>	97 (48.7)	164 (60.5)	
<i>Part-time</i>	102 (51.3)	107 (39.5)	
Retirement status, N (%)			<.001
<i>Not at all retired or partially retired</i>	237 (45.0)	305 (58.0)	
<i>Completely retired</i>	290 (55.0)	221 (42.0)	
Limited in work/daily activities, N (%)			.083
<i>Yes</i>	117 (25.2)	91 (20.3)	
<i>No</i>	348 (74.8)	357 (79.7)	
Cancer site, N (%)			
<i>Colon</i>	45 (8.4)	--	
<i>Breast (female)</i>	178 (33.2)	--	
<i>Prostate</i>	113 (21.1)	--	
<i>Other</i>	200 (37.3)	--	
Years since cancer diagnosis, N (%)			

Characteristic	+CA group(N=539)	-CA group (N=539)	p ^a
<i>1 to 5 years</i>	251 (46.6)	--	
<i>6 to 10years</i>	117 (21.7)	--	
<i>11 years or more</i>	171 (31.7)	--	

^a Categorical variables were compared with chi-square tests and continuous variables were compared with t-tests

^b Of those who are employed

Table IIOdds ratio and confidence intervals for the effect of cancer on work-related variables^a

Predictors	Employment Status reference group= employed [OR (95% CI)]	Full-time/part-time reference group= full time [OR (95% CI)]	Retirement status reference group= completely retired [OR (95% CI)]	Limited in work /daily activities reference group= not limited [OR (95% CI)]
Age	1.20* (1.15 1.24)	1.17* (1.11 1.23)	1.18* (1.14 1.23)	1.06* (1.02 1.09)
Gender				
<i>Male</i>	0.71* (0.54 0.92)	0.58* (0.39 0.86)	0.80 (0.62 1.04)	0.82 (0.58 1.16)
<i>Female</i>	1.00	1.00	1.00	1.00
Education				
<i>Less than HS</i>	0.77 (0.26 2.26)	1.50 (0.26 8.58)	0.66 (0.24 1.84)	1.61 (0.46 5.58)
<i>HS completed</i>	1.32 (0.99 1.76)	0.81 (0.54 1.22)	1.33* (1.01 1.76)	1.61* (1.10 2.37)
<i>College or above</i>	1.00	1.00	1.00	1.00
Cancer group				
+CA	1.40* (1.08 1.83)	1.29 (0.87 1.91)	1.36* (1.05 1.77)	1.26 (0.90 1.75)
-CA	1.00	1.00	1.00	1.00

*
p< 0.05^a
controlled for age, gender and education in multivariate model

Table III

Odds ratio and confidence intervals for the effect of time since diagnosis and cancer-site on work-related variables^a

Predictors	Employment Status reference group= employed [OR (95% CI)]	Full-time/part-time reference group= full time [OR (95% CI)]	Retirement status reference group= completely retired [OR (95% CI)]	Limited in work /daily activities reference group= not limited [OR (95% CI)]
Time since diagnosis				
1 to 5 years	1.12 (0.71 1.75)	0.90 (0.44 1.87)	0.89 (0.57 1.39)	1.37 (0.83 2.25)
6 to 10 years	1.28 (0.79 2.07)	0.92 (0.41 2.03)	0.96 (0.60 1.53)	1.08 (0.61 1.90)
11 or more years	1.00	1.00	1.00	1.00
Cancer site				
Breast	1.27 (0.57 2.87)	0.50 (0.14 1.79)	0.98 (0.43 2.20)	0.82 (0.32 2.11)
Prostate	1.56 (0.72 3.38)	0.58 (0.17 2.04)	1.47 (0.68 3.20)	1.07 (0.43 2.68)
Colon	1.31 (0.64 2.67)	0.80 (0.27 2.40)	1.06 (0.52 2.16)	0.91 (0.39 2.13)
Other	1.00	1.00	1.00	1.00

^a controlled for age, gender and education in multivariate model