



Published in final edited form as:

*J Cancer Surviv.* 2020 April ; 14(2): 179–187. doi:10.1007/s11764-019-00843-0.

## Chronic pain, health related quality of life, and employment in working-age cancer survivors

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### Abstract

**Purpose:** This study estimated the prevalence of cancer-related pain in working-age cancer survivors (age 25–64 years) and evaluated differences in demographic and clinical variables in those with and without pain. We also investigated the impact of cancer-related pain on health-related quality of life (HRQoL) and employment outcomes in this population.

**Methods:** We used cross-sectional data from the 2016 Behavioral Risk Factor Surveillance System (BRFSS). Analyses were conducted with a sample of 1,702 cancer survivors who completed treatment. All analyses were conducted using procedures to account for the complex sampling design of the BRFSS.

**Results:** Nearly 17% (95% CI [13.94–19.58]) of working-age cancer survivors reported experiencing cancer-related pain. Among those who experienced pain, the majority were female, white, non-Hispanic, married/partnered, and non-employed, with breast as the most common cancer disease site. Those with cancer-related pain experienced more physically unhealthy days (adjusted rate ratio [aRR] 1.63, 95% CI [1.16–2.28]), mentally unhealthy days (aRR 1.52, 95% CI [1.02–2.26]), and activity interference (aRR 2.15, 95% CI [1.53–3.02]). Cancer-related pain decreased the odds of being employed, but only in female survivors (aOR 0.34, 95% CI [0.22–0.54]).

**Conclusion:** Cancer-related chronic pain is a prevalent, long-term condition that is negatively associated with HRQoL and employment in working-age cancer survivors.

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**Conflict of Interest:** The authors declare that they have no conflict of interest.

**Ethical approval:** All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards. For this type of study, formal consent is not required.

This article does not contain any studies with animals performed by the authors.

**Implications for Cancer Survivors:** Clinical interventions targeting chronic pain may improve HRQoL in working-age cancer survivors and employment outcomes, particularly in women.

### Keywords

cancer-related chronic pain; health related quality of life; employment; working-age cancer survivor

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## Introduction

The continuous drop in cancer-related death rates over the past few decades has resulted in a growing number of long-term cancer survivors [1]. This increasing population of individuals has brought into focus the need to better understand the long-term effects of cancer treatments [2]. While the majority of individuals in extended survivorship who have completed active treatment are age 65 years or older, younger age is associated with higher rates of cancer-related symptom burden [3–7]. Younger, working-age cancer survivors (i.e., < 65 years old) represent a distinctive subgroup of cancer survivors who face a constellation of complex responsibilities unique to their phase of life, including family caregiving, professional pressures, and financial insecurity. For certain disease sites, younger age is associated with higher rates of cancer-related pain [8–10], lower quality of life [11–13], and higher levels of financial hardship [14, 15]. Therefore, further investigation into the impact these symptoms have on working-age cancer survivors is warranted.

Prevalence estimates for cancer-related pain vary by disease characteristics and site [4]. While general estimates exist for the prevalence of cancer-related pain in survivors who have completed treatment, the role of cancer-related pain has not been investigated in working-age survivors specifically, despite documented associations between younger age and increased pain prevalence, severity and interference [16]. The majority of studies regarding cancer-related chronic pain focused on female breast cancer survivors, as they comprise the largest percentage of long-term survivors [17]. A study of 877 recurrence-free breast cancer survivors who underwent radiotherapy found younger age to be a significant risk factor for chronic breast pain, with 23.1% of women under age 39 years reporting pain compared to 8.7% of those over age 60 years [9]. Similarly, a long-term follow-up study of breast cancer survivors with post-mastectomy pain syndrome found women with persistent pain to be younger compared to those whose pain resolved (mean age 49.5 vs 56.2 years) [8]. This association between younger age and increased risk for cancer-related chronic pain is true for other disease sites as well [18, 19], although with more limited findings. Therefore, there is a need to investigate this finding in more heterogeneous samples that include multiple disease sites.

A number of hypotheses have been suggested for the association between age and cancer-related pain in cancer survivors. At the forefront is the association between younger age and an increased likelihood of receiving cancer treatments such as chemotherapy [20] that contribute to long-term pain conditions. Younger patients, often with fewer comorbidities, may also receive more aggressive treatment regimens and may be over treated for their

disease [21]. Another hypothesis for the age and pain association is the differential ability of younger survivors to manage and cope with disease- and treatment-related side effects [22]. The combination of these factors places younger cancer survivors at an increased risk for cancer-related chronic pain syndromes and related distress.

Health-related quality of life (HRQoL), a multidimensional construct related to physical, emotional, and social functioning, is poorer in survivors who report either cancer-related [8, 23–25] or non-cancer-related chronic pain [26]. For example, among breast cancer survivors who completed active treatment, those reporting persistent pain demonstrated significantly lower levels of HRQoL compared to those without [27]. Hamood and colleagues demonstrated a dose-response relationship, such that as the number of pain symptoms reported increased, an incremental decrease in HRQoL was observed [28]. Younger survivors, in general, are at risk for lower HRQoL relative to older survivors [29], with age being a significant positive predictor of physical HRQoL in certain types of cancer [30].

For working-age survivors, employment is an essential component of well-being. In a study of middle-aged (age 45 to 65 years) individuals with colon cancer one year after diagnosis, those who maintained or increased their professional work load reported significantly better overall quality of life when compared to those who had decreased or stopped working [31]. Additionally, ongoing symptom interference related to cancer and its treatments can contribute to reduced employment [7] that can jeopardize employment-based health insurance required to offset the cost of surveillance and survivorship care.

The purpose of this study was to 1) estimate the prevalence of cancer-related pain in working-age cancer survivors, 2) evaluate differences in demographic and clinical characteristics between working-age cancer survivors with and without cancer-related pain, and 3) investigate the impact of cancer-related pain on HRQoL and employment outcomes in this population.

## Materials and Methods

### Data Source and Study Population

We analyzed data from the 2016 Behavioral Risk Factor Surveillance System (BRFSS), a population-based telephone survey conducted annually in all 50 states, the District of Columbia, and participating US territories. This survey collected information about health-related risk behaviors, chronic health conditions, and use of preventive services among non-institutionalized residents aged 18 years. The complex sampling design and weighting methodology of the BRFSS are described elsewhere [32, 33].

This study used data from the nine states (Idaho, Indiana, Kansas, Louisiana, Michigan, Missouri, Nebraska, South Dakota, and Wisconsin) that administered the optional Cancer Survivorship Module in 2016. The median survey response rate among these states was 51.4% [33]. The initial study population included 2,409 participants with a history of cancer who indicated that they completed treatment (e.g., surgery, radiation therapy, infusion chemotherapy, or oral chemotherapy), were diagnosed at age 21 years or older, and were currently between ages 25 to 64 years.

## Measures

Participants were asked if they had ever been told by a doctor, nurse, or other health professional that they had cancer. If they responded “yes” then the Cancer Survivorship Module was administered. Questions from this module asked participants about their specific cancer diagnosis and if they were still receiving treatment. Cancer-related pain was assessed among those who had completed treatment by asking “Do you currently have physical pain caused by your cancer or cancer treatment?” Participants who responded “yes” to this question were then asked, “Is your pain currently under control?” Response options included 1) yes, with medication (or treatment), 2) yes, without medication (or treatment), 3) No, with medication (or treatment) or 4) No, without medication (or treatment).

Demographic characteristics included sex (male/female), age (within a 10-year cohort), race/ethnicity (non-Hispanic white, non-Hispanic black, and other), marital status (currently married/unmarried couple or unpartnered including divorced, widowed, separated, never married). Education (did not graduate high school, graduated high school, attended college or technical school, graduated college or technical school), and employment status (employed, out of work, homemaker, student, retired or unable to work) were also included in the analysis.

HRQoL was measured using items from the Healthy Days – Health-Related Quality of Life module of the BRFSS, as recommended by the Centers for Disease Control [34]. This measure assesses the number of physically unhealthy days, mentally unhealthy days, and days of activity interference due to poor physical or mental health in the past 30 days.

## Statistical Analyses

Participants diagnosed with non-melanoma skin cancer were excluded from the study sample ( $n = 627$ ) as were participants who responded, “don’t know/not sure,” refused to answer, or had missing responses to any of the demographic, cancer-related pain, or HRQoL questions ( $n = 80$ ). To account for the complex sampling design of BRFSS, all analyses were conducted using statistical procedures that included statements for stratification, clustering, and survey weights. All analyses were conducted using SAS version 9.4 (SAS Institute Inc., Cary, NC).

Weighted prevalence estimates and 95% confidence intervals (95% CI) were estimated to summarize the characteristics of working-age cancer survivors. Chi-square test for proportions and two-tailed t-test were used to investigate differences in demographic and HRQoL characteristics between those with cancer-related pain and those without, with a  $p < 0.05$  considered statistically significant. The same univariate analyses were used to investigate differences in employment and HRQoL in those with controlled versus uncontrolled pain.

Next, three separate negative binomial regression models were used to evaluate associations between cancer-related pain and measures of HRQoL, controlling for demographic characteristics (sex, age, race/ethnicity, marital status, and education). Negative binomial regression was used as the HRQoL measures were over dispersed count variables. Finally, multivariable logistic regression was used to predict employment status for male and female

working-age cancer survivors with cancer-related pain, age, race/ethnicity, marital status, and education as covariates. Separate analyses were conducted by gender given its role in driving employment patterns. Results for negative binomial regression and multivariable logistic regression are presented as adjusted rate ratios (aRR) and odds ratios (aOR), respectively, and 95% CIs.

## Results

A total of 1,702 respondents met our inclusion criteria. Of the nearly 17% (95% CI [13.94–19.58]) of working-age cancer survivors currently experiencing cancer-related pain, three-quarters (95% CI [69.90–81.55]) controlled their pain either with or without medication/treatment. Among those who experienced pain, the majority were female (70.98%, 95% CI [61.00–80.96]), white, non-Hispanic (82.52%, 95% CI [71.82–93.23]), married/partnered (57.82%, 95% CI [47.85–67.79]), and non-employed (56.41%, 95% CI [46.92–65.89]). The most common cancer disease site in survivors with cancer-related pain was breast (32.26%, 95% CI [24.12–40.40]). Differences in demographic characteristics between those with and without cancer-related pain were further evaluated by gender. In working-age male cancer survivors, significant differences were found for age and race/ethnicity between those with cancer-related pain and those without (Table 1a). For female respondents, a significant difference in employment status was demonstrated between those with and those without cancer-related pain (Table 1b). Among cancer survivors with uncontrolled pain, approximately 20% reported being employed compared to almost 80% who reported being non-employed (Table 2). Additionally, statistically significant differences were found in all domains of HRQoL between those with controlled pain versus uncontrolled pain, such that respondents with uncontrolled pain reported a more physically and mentally unhealthy days, as well as more days of activity interference (Table 2). Differences in employment and HRQoL between those with controlled versus uncontrolled pain were not evaluated by gender given sample size limitations.

Findings from the negative binomial regression estimates of HRQoL are reported in Table 3. Those with cancer-related pain experienced 63% more physically unhealthy days (adjusted odds ratio [aRR] 1.63, 95% CI [1.16–2.28]) than those without cancer-related pain. Men had fewer physically unhealthy days (aRR 0.59; 95% CI [0.42–0.82]) compared to women, while respondents who were unpartnered had more physically unhealthy days relative to those who were partnered (aRR 1.67, 95% CI [1.19–2.33]). Survivors with cancer-related pain experienced 52% more mentally unhealthy days (aRR 1.52, 95% CI [1.02–2.26]) relative to those without pain. Men had fewer mentally unhealthy days (aRR 0.61, 95% CI [0.42–0.88]) as compared to women. Additionally, being unpartnered, younger, and having no more than a high school education were all associated with more mentally unhealthy days. Individuals with cancer-related pain also experienced more than double the number of days of activity interference related to physically or mentally unhealthy days (aRR 2.15, 95% CI [1.53–3.02]) than those without pain. In contrast, being black non-Hispanic, unpartnered, or having graduated from college were associated with fewer physically or mentally unhealthy days interfere with activity.

Findings from logistic regression models that predicted employment are reported in Table 4. For men, younger age groups were more likely to be employed compared to those in the oldest age group (age 55–64 year), as were those who were partnered. Notably, women with cancer-related pain were two-thirds less likely to be employed (aOR 0.34, 95% CI [0.22–0.54]). The odds of being employed were higher for female cancer survivors in younger age groups and those with higher levels of education.

## Discussion

This study sought to improve our understanding of the cancer-related pain experience in working-age survivors who completed treatment, and its relationship with HRQoL and employment. Nearly 17% of working-age survivors reported cancer-related pain. Of those reporting cancer-related pain, the majority were women, with the most common disease site being breast cancer. Previous research in older cancer survivors (age 57–79 years) with heterogeneous cancer disease sites also found female sex to positively predict pain following diagnosis, as well as pain severity [13]. Our results support a similar finding in this working-age sample. Notably, over 24% of working-age men reporting cancer-related chronic pain were African American compared to only 4% of men without chronic pain. In a previous study with a diverse sample of older male and female survivors, identifying as African American as a significant predictor of pain since diagnosis [13]. Our results extend this finding to younger survivors; however, only for males. For women, a significant difference in employment status was found, such that almost 60% of women without pain reported being employed compared to 34% of women with pain. Additionally, among those reporting uncontrolled pain, nearly 80% were non-employed, compared to less than 50% of those with controlled pain.

For both men and women, initial analyses indicated that HRQoL was significantly lower in individuals who experienced cancer-related pain, particularly for those with uncontrolled pain. Further regression models including the entire sample found the presence of cancer-related pain was significantly associated with greater physically unhealthy days, mentally unhealthy days, and total days of activity interference. This speaks to the ubiquitous negative impact of chronic pain across physical and psychological functioning. This finding also lends support to the negative association previously identified between cancer-related chronic pain and HRQoL, specifically in younger, working-age survivors. Being non-employed was also statistically significantly associated with all measures of HRQoL, as was being unpartnered. Finally, while the presence of cancer-related pain was associated with employment status for women, the same relationship was not found for men.

This paper highlights components of the cancer-related chronic pain experience in working-age cancer survivors. Cancer-related chronic pain has a clear association with decreased quality of life, across domains, particularly when uncontrolled. The relationship between cancer-related chronic pain and employment differed by gender, with a statistically significant relationship on employment shown only for female cancer survivors. This difference in employment may also reflect symptoms associated with breast cancer, the most common cancer reported among women, or work situations of women where conditions such as neuropathy or lymphedema may interfere with job performance. Due to sample size



limitations, disease site was not included in the model and specific pain-related conditions were not evaluated. Therefore, when considering pain as a possible clinical target for employment outcomes, gender differences, disease site and/or pain syndrome should be considered.

The primary strength of this study was the focus on working-age cancer survivors who completed treatment. It also included a variety of cancer disease sites, allowing for greater generalizability of findings, as many previous studies of cancer-related pain in extended survivorship focused on breast cancer or other more prevalent types of cancer. However, the cross-sectional nature of the data limits the causal interpretations. Additionally, while multiple states provided data for the optional Cancer Survivorship module, the median survey response rate among these states was 51.4%, which may indicate a bias in self-selection for completing the survey. While the presence of pain in nearly 17% of the sample is notable in terms of a long-term consequence of treatment, it is significantly lower than previous estimates of 40% for all adult survivors who completed treatment [4]. This is particularly surprising given the significant amount of previous research establishing younger age as a strong predictor of cancer-related chronic pain. However, nearly all states included in the survey were regionally located in the Midwest, leaving out more diverse states and those with large urban centers. Finally, while participants indicated the presence of cancer-related pain, they did not indicate levels of severity or intensity. Additionally, the presence of non-cancer related pain or the presence of other common treatment-related symptoms, such as fatigue, was not evaluated. Therefore, exploration of these important pain-related variables and other indicators of broader symptom burden was not possible.

Pain is a frequent side-effect of a cancer diagnosis and its treatment that can persist long after treatment has ended. This sequela can negatively impact HRQoL, as well as employment outcomes, which may be particularly deleterious in working-age cancer survivors facing additional aspects of financial hardship and who count on employment as a source of medical insurance. Reduction or loss of employment in younger, working-age cancer survivors compounds difficulties in survivors already at risk for financial hardship [14, 35]. Working-age cancer survivors are more likely to experience debt and bankruptcy related to their cancer diagnosis and treatment, with those who are younger and unemployed being most at risk [15]. Addressing chronic pain management needs in working-age survivors may also impact these other relevant outcomes.

Calls have been made to include social and behavioral determinants of health in order to achieve personalized health care [36], including in the management of chronic pain and cancer-related pain [37, 38]. This study identified a number of gender differences in the experience and impact of cancer-related chronic pain in working-age survivors. Given the negative relationship between chronic pain and employment outcomes in women, a pain management intervention with an additional aim for back-to-work could be effective at increasing employment. However, for male cancer survivors, there was a negative relationship between marital status and employment, such that unpartnered men were less likely to be employed; a similar association was not found for women. This may indicate that a better fit for back-to-work outcomes for men may include a focus on enhancing perceived social support.

For working-age cancer survivors, there are multiple contextual factors that should be considered for how to effectively manage chronic pain. Efficacious interdisciplinary programs for chronic pain management typically include a variety of interventions, including medications (e.g., opioids), procedures (e.g., nerve blocks), psychological treatment, as well as physical and/or occupational therapy. However, long-term opioid use for chronic pain can have side-effects, including mental clouding, fatigue, infertility, and reduced libido, [26, 39], which may be particularly impairing for younger survivors managing family, relationships, and employment. Likewise, practical barriers exist to the accessibility of behavioral interventions for cancer-related chronic pain in working-age survivors [40]. These services are often offered exclusively during working hours, over multiple time-consuming, in person sessions, which is not a feasible delivery method for working-age survivors who may have more time constraints. Novel methods of delivery (e.g., telehealth, mobile health) may offer a pathway for increased access to effective treatment for pain management in working age survivors.

## Funding:

ECM was funded by the National Cancer Institute through grant K12 CA086913.

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Table 1a.

Sample demographic and clinical characteristics, Men, BRFSS 2016 (n = 533)

Variable	Working-age survivors without chronic cancer-related pain		Working-age survivors with chronic cancer-related pain		p-value*
	Unweighted frequency (n = 485)	Weighted percentage (95% CI)	Unweighted frequency (n = 68)	Weighted percentage (95% CI)	
<b>Age, y</b>					<.001
25–34	7	2.25 (0.24–4.27)	3	24.87 (0.00–55.95)	
35–44	25	9.37 (4.48–14.25)	3	3.09 (0.00–7.40)	
45–54	97	19.99 (15.37–24.61)	18	25.18 (8.93–41.44)	
55–64	356	68.39 (62.32–74.46)	44	46.86 (25.45–68.28)	
<b>Race/Ethnicity</b>					0.002
White, non-Hispanic	449	92.29 (88.94–95.64)	58	71.78 (41.64–100.00)	
Black, non-Hispanic	17	4.39 (1.91–6.88)	3	24.83 (0.00–56.00)	
Other	19	3.32 (0.95–5.68)	7	3.38 (0.00–7.45)	
<b>Marital Status</b>					0.522
Married or unmarried couple	338	65.98 (59.79–72.16)	47	57.69 (31.87–83.52)	
Divorced/Widowed/Separated/Never Married	147	34.02 (27.84–40.21)	21	42.31 (16.48–68.14)	
<b>Education</b>					0.069
Did not graduate High School	27	11.31 (5.85–16.77)	7	28.21 (0.00–58.18)	
Graduated High School	129	23.53 (18.33–28.72)	19	24.44 (10.67–38.20)	
Attended College or Technical School	126	30.24 (24.37–36.11)	27	33.85 (15.96–51.74)	
Graduated from College or Technical School	203	34.92 (29.43–40.41)	15	13.50 (2.08–24.93)	
<b>Employment</b>					0.683
Employed	311	61.10 (55.11–67.09)	41	65.05 (47.20–82.89)	
Non-employed	174	38.90 (32.91–44.89)	27	34.95 (17.11–52.80)	
<b>Pain Under Control</b>					
Yes, with medication (or treatment)	N/A	N/A	29	58.85 (42.60–75.11)	
Yes, without medication (or treatment)	N/A	N/A	28	29.48 (16.17–42.80)	
No, with medication (or treatment)	N/A	N/A	3	1.55 (0.94–2.17)	
No, without medication (or treatment)	N/A	N/A	5	6.42 (3.10–9.74)	
Unknown	N/A	N/A	3	3.69 (1.48–5.91)	
<b>Health-related quality of life</b>		Mean (SD)		Mean (SD)	

Variable	Working-age survivors without chronic cancer-related pain		Working-age survivors with chronic cancer-related pain		p-value*
	Unweighted frequency (n = 485)	Weighted percentage (95% CI)	Unweighted frequency (n = 68)	Weighted percentage (95% CI)	
Physically unhealthy days	4.31 (8.62)		6.60 (9.71)		<.001
Mentally unhealthy days	2.97 (7.41)		7.28 (10.35)		<.001
Days interference	3.23 (7.91)		4.55 (7.98)		<.001

\* Note: Chi-square test for proportions and two-tailed t-test for means comparing those without pain to those with pain.

\* Note: Data are from 9 states that administered the optional Cancer Survivorship Module in 2016 ( (Idaho, Indiana, Kansas, Louisiana, Michigan, Missouri, Nebraska, South Dakota, and Wisconsin)

\* Note: N/A = not applicable. BRFSS = Behavioral Risk Factor Surveillance System.

**Table 1b.**

Sample demographic and clinical characteristics, Women, BRFSS 2016 (n = 1,149)

Variable	Working-age survivors without chronic cancer-related pain		Working-age survivors with chronic cancer-related pain		p-value*
	Unweighted frequency (n = 952)	Weighted percentage (95% CI)	Unweighted frequency (n = 197)	Weighted percentage (95% CI)	
<b>Age, y</b>					0.334
25–34	39	7.26 (4.61–9.90)	8	5.24 (0.91–9.57)	
35–44	84	12.55 (8.87–16.24)	22	18.86 (10.25–27.47)	
45–54	241	28.64 (24.46–32.82)	52	30.37 (21.77–38.97)	
55–64	588	51.55 (46.98–56.12)	115	45.53 (36.53–54.52)	
<b>Race/Ethnicity</b>					0.325
White, non-Hispanic	851	87.29 (83.75–90.83)	169	86.91 (81.02–92.80)	
Black, non-Hispanic	50	6.22 (3.60–8.84)	14	9.12 (3.90–14.35)	
Other	51	6.49 (3.87–9.11)	14	3.96 (1.00–6.93)	
<b>Marital Status</b>					0.400
Married or unmarried couple	581	62.23 (57.74–66.71)	111	57.87 (48.66–67.08)	
Divorced/Widowed/Separated/Never Married	371	37.77 (33.29–42.26)	86	42.13 (32.92–51.34)	
<b>Education</b>					0.101
Did not graduate High School	44	7.34 (4.43–10.25)	13	7.58 (2.80–12.36)	
Graduated High School	244	30.94 (26.49–35.39)	61	36.68 (27.37–46.00)	
Attended College or Technical School	295	33.13 (28.94–37.31)	71	38.56 (29.36–47.76)	
Graduated from College or Technical School	369	28.60 (24.94–32.25)	52	17.18 (10.98–23.37)	
<b>Employment</b>					<.001
Employed	547	59.70 (55.20–64.21)	81	34.82 (26.18–43.47)	
Non-employed	405	40.30 (35.79–44.80)	116	65.18 (56.53–73.82)	
<b>Pain Under Control</b>					
Yes, with medication (or treatment)	N/A	N/A	75	35.85 (27.64–44.07)	
Yes, without medication (or treatment)	N/A	N/A	64	34.67 (26.83–42.50)	
No, with medication (or treatment)	N/A	N/A	17	8.00 (3.19–12.81)	
No, without medication (or treatment)	N/A	N/A	38	20.08 (14.23–25.93)	
Unknown	N/A	N/A	2	1.41 (0.00–3.92)	
<b>Health-related quality of life</b>		<b>Mean (SD)</b>		<b>Mean (SD)</b>	

Variable	Working-age survivors without chronic cancer-related pain		Working-age survivors with chronic cancer-related pain		p-value*
	Unweighted frequency (n = 952)	Weighted percentage (95% CI)	Unweighted frequency (n = 197)	Weighted percentage (95% CI)	
Physically unhealthy days	5.91 (10.00)		11.36 (11.42)		<.001
Mentally unhealthy days	5.40 (9.34)		8.46 (10.13)		<.001
Days interference	4.06 (8.73)		9.21 (11.31)		<.001

\* Note: Chi-square test for proportions and two-tailed t-test for means comparing those without pain to those with pain.

\* Note: Data are from 9 states that administered the optional Cancer Survivorship Module in 2016 ( (Idaho, Indiana, Kansas, Louisiana, Michigan, Missouri, Nebraska, South Dakota, and Wisconsin)

\* Note: N/A = not applicable. BRFSS = Behavioral Risk Factor Surveillance System



**Table 2.**

Employment and HRQoL Characteristics of Working-age survivors with controlled versus uncontrolled pain, BRFSS, 2016 (n = 259)

Variable	Controlled pain			Uncontrolled pain			p-value*
	Unweighted frequency (n = 196)	Weighted percentage (95% CI)	Unweighted frequency (n = 63)	Weighted percentage (95% CI)	Weighted percentage (95% CI)		
<b>Employment</b>							
Employed	102	50.62 (41.06–60.19)	17	20.18 (10.13–30.24)			<.001
Non-employed	94	49.38 (39.81–58.94)	46	79.82 (69.76–89.87)			
<b>Health-related quality of life</b>							
Physically unhealthy days		Mean (SD) 7.88 (10.18)		Mean (SD) 15.93 (11.83)			<.001
Mentally unhealthy days		7.00 (9.40)		12.09 (12.09)			<.001
Days interference		6.23 (9.77)		12.77 (11.69)			<.001

\* Note: Chi-square test for proportions and two-tailed t-test for means comparing those with controlled versus uncontrolled pain.

\* Note: Data are from 9 states that administered the optional Cancer Survivorship Module in 2016 (Idaho, Indiana, Kansas, Louisiana, Michigan, Missouri, Nebraska, South Dakota, and Wisconsin)

\* Note: BRFSS = Behavioral Risk Factor Surveillance System.

**Table 3.**

Cancer-related pain and health related quality of life, BRFSS, 2016 (n = 1,702; negative binomial regression)

Variable	Physically Unhealthy Days		Mentally Unhealthy Days		Days of Activity Interference	
	Adjusted RR (95% CI)	Adjusted RR (95% CI)	Adjusted RR (95% CI)	Adjusted RR (95% CI)	Adjusted RR (95% CI)	Adjusted RR (95% CI)
<b>Cancer-related pain</b>						
Yes	1.63 (1.16–2.28)	1.52 (1.02–2.26)			2.15 (1.53–3.02)	
No (Reference)	1.00	1.00			1.00	
<b>Sex</b>						
Male	0.59 (0.42–0.82)	0.61 (0.42–0.88)			0.80 (0.52–1.24)	
Female (Reference)	1.00	1.00			1.00	
<b>Age, y</b>						
25–34	0.75 (0.30–1.87)	1.57 (0.73–3.37)			1.44 (0.68–3.06)	
35–44	1.04 (0.68–1.58)	1.87 (1.08–3.25)			1.30 (0.77–2.20)	
45–54	1.13 (0.80–1.59)	1.28 (0.92–1.78)			0.87 (0.51–1.48)	
55–64 (Reference)	1.00	1.00			1.00	
<b>Race/Ethnicity</b>						
White, non-Hispanic (Reference)	1.00	1.00			1.00	
Black, non-Hispanic	0.86 (0.50–1.47)	0.66 (0.33–1.33)			0.59 (0.36–0.97)	
Other	2.01 (1.01–4.03)	1.65 (0.86–3.16)			2.01 (0.55–7.29)	
<b>Marital Status</b>						
Married or unmarried couple (Reference)	1.00	1.00			1.00	
Divorced/Widowed/Separated/Never Married	1.67 (1.19–2.33)	2.49 (1.69–3.68)			2.88 (1.90–4.37)	
<b>Education</b>						
Did not graduate High School	1.41 (0.84–2.36)	1.70 (0.83–3.46)			0.86 (0.44–1.68)	
Graduated High School	0.98 (0.67–1.41)	1.77 (1.20–2.60)			1.23 (0.73–2.07)	
Attended College or Technical School (Reference)	1.00	1.00			1.00	
Graduated from College or Technical School	0.81 (0.51–1.29)	1.11 (0.75–1.64)			0.54 (0.32–0.90)	
<b>Employment</b>						
Employed (Reference)	1.00	1.00			1.00	
Non-employed	3.72 (2.76–5.01)	3.06 (2.17–4.31)			6.81 (4.35–10.68)	

\* Note: Data are from 9 states that administered the optional Cancer Survivorship Module in 2016 (Idaho, Indiana, Kansas, Louisiana, Michigan, Missouri, Nebraska, South Dakota, and Wisconsin)

\* Note: BRFSS = Behavioral Risk Factor Surveillance System.

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**Table 4.**

Likelihood of employed, stratified by sex, BRFSS, 2016 (n = 1,702)

Variable	Male (n = 553)	Female (n = 1,149)
	Adjusted OR (95% CI)	Adjusted OR (95% CI)
<b>Cancer-related pain</b>		
Yes	0.78 (0.37–1.64)	0.34 (0.22–0.54)
No ( <i>Reference</i> )	1.00	1.00
<b>Age, y</b>		
25–34	31.84 (1.42–715.79)	6.23 (2.73–14.22)
35–44	5.45 (1.29–22.96)	1.84 (1.03–3.28)
45–54	5.98 (2.92–12.25)	2.38 (1.57–3.60)
55–64 ( <i>Reference</i> )	1.00	1.00
<b>Race/Ethnicity</b>		
White, non- Hispanic ( <i>Reference</i> )	1.00	1.00
Black, non-Hispanic	0.78 (0.19–3.24)	0.54 (0.23–1.23)
Other	1.40 (0.34–5.76)	0.73 (0.31–1.75)
<b>Marital Status</b>		
Married or unmarried couple ( <i>Reference</i> )	1.00	1.00
Divorced/Widowed/Separated/Never Married	0.33 (0.19–0.58)	0.92 (0.64–1.33)
<b>Education</b>		
Did not graduate High School	0.53 (0.18–1.58)	0.28 (0.11–0.69)
Graduated High School	0.80 (0.40–1.57)	0.54 (0.35–0.83)
Attended College or Technical School ( <i>Reference</i> )	1.00	1.00
Graduated from College or Technical School	1.11 (0.57–2.17)	1.68 (1.12–2.53)

Note: BRFSS = Behavioral Risk Factor Surveillance System