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PHYSICAL THERAPY AND CHIROPRACTIC USE AMONG CHILDHOOD CANCER SURVIVORS WITH CHRONIC DISEASE: IMPACT ON HEALTH-RELATED QUALITY OF LIFE

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Abstract

Introduction—The use of rehabilitation services to address musculoskeletal, neurological and cardiovascular late effects among childhood cancer survivors could improve physical function and health-related quality-of-life (HRQL). We describe physical therapy (PT) and chiropractic utilization among childhood cancer survivors and their association with HRQL.

Methods—The sample included 5+ year survivors from the Childhood Cancer Survivor Study (N=9,289). Questions addressing use of PT or chiropractic services and HRQL (Medical Outcomes Survey Short Form (SF-36)) were evaluated. Multivariable regression models compared PT and/or chiropractic utilization between survivors and siblings, and by diagnosis, treatment and demographic characteristics; associations between chronic disease, PT/chiropractic use, and HRQL were similarly evaluated.

Results—Survivors were not more likely to use PT (OR 1.0; 95% CI 0.8-1.2) or chiropractic (OR 0.8; 95% CI 0.7-1.0) services than siblings. More survivors reported using chiropractic (12.4%) than PT (9.2%) services. Older age and having health insurance were associated with utilization of either PT or chiropractic services. Grade 3-4 chronic conditions and a CNS tumor or sarcoma history were associated with PT but not with chiropractic service utilization. Survivors with musculoskeletal (OR 1.8; 95% CI 1.1-2.9), neurological (OR 3.4; 95% CI 1.6-6.9), or cardiovascular (OR 3.3; 95% CI 1.6-6.9) chronic conditions who used PT/chiropractic services were more likely to report poor physical health than survivors who did not use services.

Conclusions—The reported prevalence of PT/chiropractic among survivors is consistent with that reported by siblings. Severity of late effects is associated with service use and with reporting poor physical health.

Implications for Cancer Survivors—Long-term childhood cancer survivors do not appear to utilize rehabilitation services to optimize physical function and support increased HRQL.

Keywords

Physical therapy; chiropractic; childhood cancer survivor; health related quality of life

INTRODUCTION

Due to improved multimodal treatment and supportive care, the 5-year survival rate for children diagnosed with cancer is almost 80% [1]. Curative treatments, however, are potentially toxic and can have detrimental effects on developing organ systems. Childhood cancer survivors are at increased risk for musculoskeletal [2-5], neurological [4,6-8], and cardiovascular late effects [4,9-11]. These late effects may evolve as chronic conditions that are exacerbated by aging [4] and can lead to decreased physical function among survivors. In turn, diminished physical function can impact activities of daily living and the cancer survivor's perceptions of their health-related quality of life (HRQL) [12-14].

Physical therapy (PT) and chiropractic medicine may ameliorate selected physical function limitations experienced by childhood cancer survivors; addressing these limitations has the potential to improve HRQL. Physical therapy provides rehabilitative services to individuals to optimize performance when structural or functional impairments interfere with movement. Services are appropriate for functional loss related to injury, disease, disuse, or the aging process. The goals of physical therapy interventions are to develop, restore or maintain normal function, teach compensatory strategies when normal function cannot be restored, or adapt the environment to accommodate sub-optimal function so that movement can be attained for full participation in tasks essential for daily life. PT services are utilized regularly to manage structural or functional loss related to chronic diseases that impact the musculoskeletal, neurological, and cardiovascular systems [15-18]. However, we were unable to identify other studies that have examined childhood cancer survivors' use of physical therapy.

Chiropractic medicine addresses disorders of the musculoskeletal system, with a particular emphasis on spinal health. Intervention is designed to correct spinal alignment and to relieve pressure on the nervous system [19]. Surveys indicate that individuals seek chiropractic care for the treatment of musculoskeletal complaints, with prevalence of use in the United States and Canada ranging from 3-18% [20]. While the Childhood Cancer Survivor Study (CCSS) recently reported that 12% of survivors reported seeing a chiropractor compared to 14% of their siblings [21], specific factors associated with chiropractic use among childhood cancer survivors have not been reported.

We report childhood cancer survivors' use of PT and chiropractic services based on the CCSS cohort at the 2003 follow-up questionnaire. The impact of diagnosis, treatment, demographic and chronic disease characteristics on service utilization is examined. Additionally, HRQL among survivors with musculoskeletal, neurological, and cardiovascular chronic conditions who reported use of PT or chiropractic services were compared to HRQL among survivors with these same conditions who did not report use of either modality.

METHODS

Sample

The Childhood Cancer Survivor Study (CCSS) is an epidemiologic study of survivors of childhood cancer [22,23]. Persons diagnosed at one of 26 institutions between 1970 and 1986, when younger than age 21, with primary brain cancer, leukemia, Hodgkin lymphoma, non-Hodgkin lymphoma, kidney tumor, neuroblastoma, soft tissue sarcoma, or malignant bone tumor, who had survived at least 5 years since their original diagnosis, were eligible to participate. Of 20,720 persons originally eligible, 17,703 (85.4%) were located, and 14,357 (81.2%) completed a 24-page baseline questionnaire in 1995-1996. A random sample of

siblings was also invited to participate. The human subjects committee at each of the collaborating institutions approved the study protocol and documents prior to participant enrollment. Participants provided informed consent to participate and a separate consent for medical record abstraction. A second follow-up study questionnaire was conducted between 2002 and 2004. These analyses include survivors and siblings who completed both the baseline questionnaire and the 2003 follow-up questionnaire (N=12,081).

Outcome Measures

Single items in the 2003 follow-up questionnaire addressed use of PT or chiropractic services in the past 2 years. The Medical Outcomes Survey 36-Item Short-Form (SF-36) was used to assess HRQL over the past month. The SF-36 is a widely used generic health profile with extensive age- and sex-specific norms for the United States. It has 36 items measuring subscale scores for 8 domains of HRQL: mental health, physical health, emotional role function, physical role function, social health, pain, vitality and energy, health perceptions. Items in each dimension are added together to form subscale scores, which are transformed to a 0–100 scale, with higher scores indicating better perceived health. The eight subscale scores can be further combined into the physical (PCS) and mental (MCS) component summary score [24]. The internal consistency, validity of the instrument among different groups reporting ill health, and the test-retest reliability of the SF-36 are excellent [25,26]. Raw scores from the SF-36 were converted to T scores (range, 0-100) and dichotomized so that a score at or below 40 (1 standard deviation [SD] below the population mean) on a particular summary or subscale was classified as a poor HRQL outcome.

Independent Measures

Diagnosis and treatment data relevant to the primary diagnoses were abstracted from medical records at baseline, and, although evaluated and reported in a previous analysis of HRQL in this cohort [27], are included here as predictors of the HRQL summary outcomes for completeness. Age at the 2003 follow-up questionnaire, sex, race, primary diagnosis, surgical procedures, chemotherapeutic agents, and radiation were considered as potential predictors of PT or chiropractic use.

Demographic data and chronic disease status were obtained from the baseline questionnaire. Educational attainment, employment status, annual household income, health insurance, a visit to a physician in the previous two years, current use of pain medication, persistent cancer related pain, and chronic disease status were also considered as potential predictors of PT or chiropractic use. Chronic disease status, as described previously [28], was based on the National Cancer Institute's Common Terminology Criteria for Adverse Events (Version 3), intended for use in scoring both acute and chronic conditions in patients with cancer and survivors. These are: mild (grade 1), moderate (grade 2), severe (grade 3), life-threatening or disabling (grade 4), or fatal (grade 5). A total of 137 health conditions were scored. Individuals with grade 5 conditions were not included in these analyses.

Statistical Analyses

Descriptive statistics, including frequencies and percentages, for the demographic and treatment characteristics, as well as PT and chiropractic use, of the eligible participants were calculated and compared between participants and siblings with chi-square statistics. The proportions of those using PT/chiropractic services or both were compared between siblings and survivors in multivariable regression models. Generalized estimating equations were employed in survivor-sibling analyses to account for potential intrafamily correlation [29,30]. The association between chronic disease status, diagnosis or treatment and PT/chiropractic use, or both was evaluated among survivors using separate multivariable logistic regression models [31,32]. The associations between PT/chiropractic use and HRQL

among those who reported a particular chronic condition relied on SF-36 summary scales' mean score comparisons in linear models between those who reported receiving services and those who did not [33]. Models were adjusted for age at diagnosis, age at follow-up, gender, and race. Additionally, the differences in proportions of those with SF-36 summary scores ≤40 were compared using logistic regression models also adjusting for age at diagnosis, age at follow-up, gender, and race. Analyses were done in SAS version 9.1 (Cary, N.C.) [34].

RESULTS

There were 11,466 persons eligible to participate in the 2003 follow-up questionnaire. Among these, 1,751 declined to participate, and 407 were lost to follow-up. The 9,289 survivor (81.2%) participants in this study were more likely than non-participants to be 18 years old or older at time of survey, female, and white. Participants did not differ from non-participants by type of malignancy, treatment received, age at diagnosis, or time since diagnosis.

Survivors were slightly younger, more likely to be male and report a grade 3 or 4 chronic condition, less likely to have graduated from college, more likely to be unemployed, and more likely to have a household income less than $20,000 per year than were their siblings. They were only slightly less likely than siblings to have health insurance and only slightly more likely to have seen a physician in the previous two years (Table I).

A slightly higher percentage of survivors reported using chiropractic (12.4%) than PT (9.2%) service, and less than 3% of survivors reported using both PT and chiropractic services. Table II demonstrates the impact of chronic disease severity on PT or chiropractic service utilization. After adjusting for age at diagnosis, age at follow-up, sex, race, health insurance status, a visit to physician in the previous two years, current use of pain medication or a muscle relaxant and persistent cancer related pain, individuals with a grade 3 or 4 chronic condition were more likely than those with a grade 2 or lower chronic condition to report PT use. Female gender and white race were associated with chiropractic service utilization. Seeing a physician in the two years prior to the questionnaire, current use of pain medication or a muscle relaxant, and persistent cancer related pain were associated with obtaining PT services, chiropractic services, or both.

After adjusting for age at follow-up, sex, race, health insurance status, current pain or muscle relaxant use and cancer related pain, CNS (OR=1.7; 95% CI, 1.3-2.2) and soft tissue sarcoma (OR=1.5; 95% CI, 1.1-2.0) survivors were more likely than leukemia survivors to report PT use. CNS tumor survivors (OR=0.8; 95% CI, 0.6-0.9) were less likely than leukemia survivors to report using chiropractic services. Female gender was associated with PT and chiropractic service utilization. Current use of pain medication or a muscle relaxant and persistent cancer related pain were associated with obtaining PT services, chiropractic services, or both.

Survivors treated with cranial radiation (OR=0.7; 95% CI, 0.6-0.9) were less likely to report use of chiropractic services than those who did not have radiation. Female gender was associated with chiropractic service utilization, and blacks were less likely than whites to use chiropractic services (OR=0.3; 95% CI, 0.2-0.7). Current use of pain medication or a muscle relaxant and persistent cancer related pain were associated with obtaining PT services, chiropractic services, or both.

Among those 7,416 survivors who completed the SF-36 questionnaire, 196 had cardiovascular impairment, 409 had musculoskeletal impairment, and 192 had neurological impairments. Lower Physical Component Summary (PCS) scores on the SF-36 were reported by survivors with musculoskeletal (OR=1.8; 95% CI, 1.1-2.9), neurological

(OR=3.4; 95% CI, 1.6-6.9), or cardiovascular (OR=3.3; 95% CI, 1.6-6.9) chronic conditions who reported PT or chiropractic service use compared to those with the same conditions who did not use these services (Table III). The mean scores on the PCS for survivors with musculoskeletal (40.1), neurological (34.7), and cardiovascular (34.1) chronic conditions who used PT/chiropractic services were lower than the expected population norm of 50 [35]. The mean scores for the Mental Component Summary (MCS) for survivors with musculoskeletal (50.5), neurological (51.9), and cardiovascular (47.5) chronic conditions who used PT/chiropractic services were higher than the PCS scores and similar to population norms.

DISCUSSION

The findings from this cross-sectional, descriptive study indicate that a slightly higher percentage of survivors reported using chiropractic services than PT services, and those survivors with musculoskeletal, neurological, or cardiovascular chronic conditions who reported PT/chiropractic use also reported poorer HRQL than those not using those services. The relatively low number of survivors (9.3%) who reported using PT in the two years prior to the 2003 follow-up questionnaire is surprising considering childhood cancer survivors' increased risk of musculoskeletal, cardiovascular, and neurological chronic conditions that can potentially limit physical function.

Grade 3 or 4 chronic conditions were associated with PT but not with chiropractic service utilization. These findings are consistent with previous studies in which survivors who report more severe late effects are more likely to utilize health services and to have greater health concerns than those without more severe late effects [36]. A lower prevalence of PT than chiropractic use may reflect the requirement by most insurance plans in the United States to reimburse only for PT services prescribed by a physician, or, the additional requirement for documented improved functioning as a condition for continued PT services, even when a condition is chronic [37]. In addition, physicians may be reluctant to refer survivors to PT and insurers may be reluctant to pay for PT, believing that only those survivors who are capable of full recovery and optimal community and vocational pursuits will benefit from those services [38]. Cheville and colleagues [38] have noted that although rehabilitation is part of standard care for patients with pulmonary and cardiac disease, PT is rarely offered to children with cancer and childhood cancer survivors.

Access to physical therapists may be associated with decreased PT use. Physical therapists practice in hospitals, clinics, and private offices that have specially equipped facilities [39], and these facilities may not be available in rural areas of the country. Participants in the Childhood Cancer Survivor Study are scattered throughout the United States and Canada, and the use of PT has been shown to vary by geographic area [40]. Presiding in an urban area or residing in the Northeast census region has been shown to be positively associated with use of PT services [41]. Area variations may be indicative of physical therapist supply [40]; this notion is consistent with another study in which physical therapist supply (physical therapists/10,000 people) was positively associated with use of PT in any setting [42]. A decreased local availability of physical therapists may lead to longer waits and less flexibility in scheduling, which could potentially decrease PT use [42].

Although chiropractic medicine is increasingly being utilized for musculoskeletal complaints, it is not part of the long-term follow-up clinical guidelines for childhood cancer survivors [43]. The finding that more survivors reported using a chiropractor than a PT is therefore surprising. This suggests that childhood cancer survivors may be exploring alternatives to more traditional therapies as a way to deal with their late effects.

More childhood cancer survivors may use chiropractic than PT services because they may have greater access to chiropractic care. Chiropractic use is not dependent upon referral from a physician or nurse practitioner, and more insurance providers are now covering chiropractic services [44]. Recent efforts by the National Health Service Corps and Veterans Administration to enhance chiropractor availability in underserved areas [45] may also account for the greater percentage of childhood cancer survivors using chiropractic than PT.

In the present study, black childhood cancer survivors were 70% less likely to use chiropractic services than were white survivors. This finding is consistent with other studies which reported that chiropractic use is more common among whites than blacks [45,46]. These results are also consistent with those of research in other areas of health care use by people with musculoskeletal conditions [47-49]. Possible explanations for the differences in chiropractic use among whites and blacks may include economic disparities, the lack of diversity among chiropractors [50], location of chiropractors' offices, or cultural beliefs about chiropractors [46].

Survivors of childhood onset CNS tumors and soft tissue sarcoma were more likely to use PT services compared to leukemia survivors. No specific diagnoses were associated with increased use of chiropractic services. This may reflect the fact that survivors of CNS tumors are most likely to report performance limitations, making referral for continued or additional PT services more obvious [51]. Soft tissue sarcoma patients may have musculoskeletal problems or persistent pain related to local control therapy (surgery and radiation) [52-54]. These survivors may have multiple additional surgeries and interventions related to ongoing spine or joint deformity, necessitating intermittent but continued need for rehabilitative services [55].

In this study, those survivors who had musculoskeletal, neurological, or cardiovascular late effects and used either PT or chiropractic services scored lower on the HRQL Physical Component Summary score than those with the same conditions who did not use either service. Health-related factors, such as severity of condition, number of symptoms, and functional limitations, are associated with receiving physical therapy services [40]. Therefore, these findings may reflect the fact that those survivors with more severe late effects are the most likely to use either PT or chiropractic services and, in turn, be more likely to report poorer HRQL compared to survivors with less severe late effects. Studies have shown that significant predictors of PT use include the presence of more than one musculoskeletal condition (OR=2.10, 95% CI=1.84-2.39), at least some difficulty with physical function (OR=1.52, 95% CI=1.31-1.76), and having more than 7 ICD-9 codes for musculoskeletal conditions and other chronic health conditions (OR=1.33, 95% CI=1.11-1.49) [40]. In addition, individuals who reported their health as fair or poor were more likely to report use of chiropractic services compared to those who report their health as good, very good, or excellent [45]. Coulter and colleagues [56] reported that chiropractic patients scored significantly lower on all scales of the SF-36 compared to population norms. The largest differences were seen on the physical health, role limitations due to physical problems, and pain scales, indicating that persons who seek chiropractic care are substantially physically impaired. These findings may indicate that those patients who perceive their health to be poor and have not found improvement from conventional treatments seek chiropractic therapy (viewed as less conventional therapy) in an effort to improve their health.

The results of this study cannot be interpreted without taking into account potential study limitations. The study sample reflects a subset of the overall CCSS population – those who responded to the baseline and 2003 follow-up questionnaires; therefore, survivors included in the current analysis may not be fully representative of the population from which they

were derived. The survivor participants in our study were more likely than non-participants to be female, white, and older than age 18 at the time of the questionnaire. It is possible that these survivors were motivated by positive, or more concerned with negative, chronic conditions than those who did not participate, and thus they may be either more or less likely to express dissatisfaction with their HRQL outcomes. Consequently, those survivors who report poorer HRQL may be more motivated to use physical therapy or chiropractic services in an effort to improve their health. The information utilized to classify physical therapy use, chiropractic use, and health-related quality of life, as well as the independent measures, was based upon self-reported data. Self-report data is a limitation in that the accuracy of those reports cannot be validated. This can lead to decreased reliability of the data by both overestimating and underestimating the incidence and severity of various chronic health conditions [28], as well as PT use, chiropractic use, and HRQL. Lastly, while the CCSS population represents a large and heterogeneous cohort of five year survivors, results may not be generalizable to all childhood cancer survivors. As a group, CCSS participants may be more informed regarding risks and health promotion because of newsletters received as part of participation in the study. Finally, although our results are important as they relate to adult survivors of childhood cancer, differences in modern treatment modalities limit our ability to apply these findings to children treated more recently than our study population.

This study offers novel information about the use of physical therapy and chiropractic services and HRQL among childhood cancer survivors. These findings indicate that those survivors with the most severe chronic conditions (grade 3 or 4) were more likely to use a PT compared to those with less severe late effects (grade 2 or less); severity of chronic health conditions was not associated with use of chiropractic services. In addition, those survivors with grade 3 or 4 musculoskeletal, neurological, or cardiovascular chronic conditions who use PT and/or chiropractic services report poorer HRQL compared to those survivors with the same conditions who do not use these services, which may indicate that survivors' perception of their health status influences their use of PT and/or chiropractic services.

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Table 1

Characteristics of Study Population

Characteristic	*Survivors:*	*Siblings:*	p-value
	Years (SD)	**Years (SD)**	
Age at Follow-up	31.3 (7.5)	33.4 (8.6)	<.0001
Age at Diagnosis	7.7 (5.8)	NA	
Years of Survival	23.6 (4.5)	NA	
	N (%)	**N (%)**	
Gender			<.0001
Male	4708 (50.7)	1291 (46.2)	
Female	4581 (49.3)	1501 (53.8)	
Race			<.0001
White	8267 (89.0)	2483 (88.9)	
Black	332 (3.6)	58 (2.1)	
Hispanic	394 (4.2)	81 (2.9)	
Other	261 (2.8)	75 (2.7)	
Primary Diagnosis			
Leukemia	3163 (34.1)	NA	
CNS tumors	1175 (12.7)	NA	
Hodgkin’s disease	1187 (12.8)	NA	
Non-Hodgkin’s lymphoma	701 (7.6)	NA	
Soft tissue sarcoma	817 (8.8)	NA	
Wilm’s tumor	868 (9.3)	NA	
Neuroblastoma	618 (6.7)	NA	
Bone Cancer	760 (8.2)	NA	
Chronic Disease Status			<.0001
≤ Grade 2	8333 (89.7)	2764 (99.0)	
Grade 3 or 4	956 (10.3)	28 (1.0)	
Surgery			
Amputation, lower extremity	360 (3.9)	NA	
Amputation, upper extremity	45 (0.5)	NA	
Limb Sparing	85 (0.9)	NA	
Joint Replacement	49 (0.5)	NA	
Spine Surgery	205 (2.2)	NA	
Other Surgery	6076 (65.4)	NA	
No Surgery	1664 (17.9)	NA	
Not reported	805 (8.7)	NA	
Chemotherapy			
Alkylating and/or Anthracycline Agent	5062 (54.5)	NA	
Other Chemotherapy Agent	1633 (17.6)	NA	
No Chemotherapy	1801 (19.4)	NA	
Not reported	793 (8.5)	NA	

Characteristic	*Survivors:*	*Siblings:*	p-value
Radiation			
Cranial Radiation	2630 (28.3)		
Other Radiation	3000 (32.3)	NA	
No Radiation	2857 (30.8)	NA	
Not reported	802 (8.6)	NA	
Education			<.0001
1-12 years	430 (4.6)	71 (2.5)	
High school graduate	4866 (52.4)	1304 (46.7)	
College Graduate	3873 (41.7)	1408 (50.4)	
Unknown	120 (1.3)	9 (0.3)	
Employment Status			<.0001
Working/caring for home or family	7443 (80.1)	2552 (91.4)	
Student	499 (5.4)	110 (3.9)	
Unemployed/looking for work	429 (4.6)	66 (2.4)	
Unable to work	717 (7.7)	36 (1.3)	
Not reported	201 (2.2)	28 (1.0)	
Household Annual Income ($U.S.)			<.0001
Less than 19,999	1057 (11.4)	185 (6.6)	
≥ 100,000	6888 (74.2)	2325 (83.3)	
Not reported	1344 (14.5)	282 (10.1)	
Health Insurance			<.0001
Yes/Canadian	8095 (87.2)	2522 (90.3)	
No	1116 (12.0)	260 (9.3)	
Not reported	78 (0.8)	10 (0.4)	
Physician Visit Within Past 2 Years			<.0001
Yes	8085 (87.0)	2407 (86.2)	
No	1203 (13.0)	385 (13.8)	
Not reported	1 (0.0)	0 (0.0)	

Table II

Association of Chronic Disease and Use of PT , Chiropractic, or Both in Survivors[a]

	Survivors					
	PT		*Chiropractic*		*Both*	
Variables		**OR 95% CI**		**OR 95% CI**		**OR 95% CI**
Chronic Disease Status						
≤ Grade 2	582 (8.7)	1.0	857 (12.8)	1.0	155 (2.3)	1.0
Grade 3 or 4	107 (14.2)	1.3 (1.1-1.6)	104 (14.2)	1.0 (0.8-1.2)	26 (3.6)	1.4 (0.9-2.1)
Age at Diagnosis						
0-4 years	220 (7.9)	1.0	299 (10.7)	1.0	55 (2.0)	1.0
5-9 years	146 (8.8)	1.0 (0.8-1.2)	232 (13.9)	1.2 (1.0-1.5)	41 (2.5)	1.0 (0.7-1.7)
10-14 years	159 (10.2)	1.0 (0.8-1.3)	228 (14.6)	1.3 (1.1-1.6)	43 (2.8)	1.2 (0.7-1.8)
15-21 years	161 (11.7)	1.1 (0.9-1.4)	202 (14.7)	1.2 (1.0-1.5)	42 (3.1)	1.2 (0.8-1.9)
Age at Follow-up						
< 25 years	101 (6.6)	1.0	150 (9.8)	1.0	27 (1.8)	1.0
≥ 25 years	585 (10.0)	1.3 (1.0-1.7)	811 (13.8)	1.2 (1.0-1.5)	154 (2.6)	1.2 (0.8-2.0)
Gender						
Male	295 (8.1)	1.0	430 (11.8)	1.0	81 (2.2)	1.0
Female	391 (10.4)	1.1 (1.0-1.3)	531 (14.1)	1.2 (1.1-1.3)	100 (2.7)	1.0 (0.8-1.4)
Race						
White	622 (9.3)	1.0	896 (13.3)	1.0	163 (2.4)	1.0
Black	13 (6.3)	0.7 (0.4-1.3)	9 (4.4)	0.3 (0.2-0.6)	3 (1.5)	0.6 (0.2-2.0)
Hispanic	33 (11.5)	1.3 (0.9-1.8)	33 (11.5)	0.9 (0.6-1.3)	8 (2.8)	1.1 (0.5-2.2)
Other	18 (9.2)	1.1 (0.7-1.8)	23 (11.8)	0.9 (0.6-1.4)	7 (3.6)	1.6 (0.7-3.5)
Health Insurance						
Yes /Canadian	637 (9.6)	1.3 (1.0-1.8)	879 (13.3)	1.1 (0.9-1.4)	163 (2.5)	0.8 (0.5-1.4)
No	49 (6.1)	1.0	82 (10.2)	1.0	18 (2.2)	1.0
Saw Physician Within Past 2 Years						
Yes	653 (10.1)	2.4 (1.7-3.4)	900 (13.9)	2.0 (1.6-2.7)	176 (2.7)	4.7 (1.9-11.6)
No	33 (3.5)	1.0	61 (6.6)	1.0	5 (0.5)	1.0

	Survivors					
	PT		*Chiropractic*		*Both*	
Variables		**OR 95% CI**		**OR 95% CI**		**OR 95% CI**
Pain medication/muscle relaxant						
Yes	144 (24.0)	2.8 (2.-3.5)	115 (19.1)	1.4 (1.1-1.7)	38 (6.3)	2.5 (1.7-3.7)
No	542 (8.0)	1.0	846 (12.4)	1.0	143 (2.1)	1.0
Cancer related pain						
Yes	254 (15.0)	1.7 (1.-2.1)	259 (15.3)	1.2 (1.0-0.4)	64 (3.8)	1.5 (1.1-2.0)
No	432 (7.6)	1.0	702 (12.3)	1.0	117 (2.1)	

[a] Each column represents a separate model fit and includes all factors together in a multivariable model

Table III

Frequency and Percentage of Those Scoring 40 or Less on the Summary Scales of the SF-36 by Chronic Disease Status and Physical Therapy and/or Chiropractic Utilization with OR and 95% CI Comparing Those Who Did and Did Not Use Services[a]

Chronic Disease	*Physical Component Summary*					*Mental Component Summary*				
With Musculoskeletal Impairment Health Service	n	%	Mean	OR	95% CI	n	%	Mean	OR	95% CI
PT and/or Chiropractic	43	44.3	40.1	1.8	1.1-2.9	20	20.6	50.5	1.1	0.6-1.9
Neither	97	31.1	43.4	1.0		61	19.6	52.7	1.0	
Neurological Impairment Health Service										
PT and/or Chiropractic	23	52.3	34.7	3.4	1.6-6.9	10	22.7	51.9	1.4	0.6-3.2
Neither	37	25.0	42.9	1.0		28	18.9	55.0	1.0	
Cardiovascular Impairment Health Service										
PT and/or Chiropractic	27	57.5	34.1	3.3	1.6-6.9	12	25.5	47.5	1.2	0.6-2.7
Neither	46	30.9	41.9	1.0		33	22.2	49.0	1.0	

[a] Adjusted for Age at Diagnosis, Age at Follow-up, Gender, and Race