Exploring Gender Differences in Self-Reported Physical Activity and Health Among Older Caregivers

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Purpose/Objectives: To document self-reported physical health and activity levels of older caregivers. Gender differences in physical health, physical activity levels, and predictors of physical activity were also examined.

Design: A cross-sectional study.

Setting: Tom Baker Cancer Centre in Calgary, Alberta, Canada.

Sample: 130 caregivers aged 60 years or older caring for individuals with breast, prostate, or colorectal cancer.

Methods: Self-report survey including validated questionnaires on physical and mental health and physical activity levels. Convenience sampling was used. Data were analyzed using descriptive statistics, correlations, and multiple regression.

Main Research Variables: The physical component score of the SF-36v2® was the main research variable. Other variables included the mental component score of the SF-36v2, sleep quality, depression, social support, physical activity levels, and anxiety.

Findings: The mean age of caregivers was 70 years. Physical health and physical activity levels were higher than population norms. A significant difference in physical health ($p = 0.015$) existed between men and women but not in physical activity levels ($p = 0.079$). Predictors of physical activity levels were age ($\beta = -0.291$), physical health ($\beta = 0.307$), and caregiving hours per week ($\beta = -0.221$).

Conclusions: The findings suggest that gender had a minimal effect on physical health and no effect on physical activity levels in older caregivers. Depression and poor sleep quality were high in some caregivers but did not predict physical activity levels.

Implications for Nursing: The negative effects of caregiving on physical health and physical activity levels in older caregivers are not universal. Nurses should be aware of the caregiving situation and promote health based on the individual.

About 900,000 Canadians and 4.6 million Americans are caregivers to loved ones diagnosed with cancer (National Alliance for Caregiving & AARP Public Policy Institute, 2015; Sinha, 2013). Because of the shift to outpatient-based treatment, current models of cancer care delivery are largely dependent on family members to provide the majority of patient care (Given, Given, & Sherwood, 2012). Therefore, caregivers are important healthcare resources, providing healthcare cost savings of about $25 billion per year in Canada (Hollander, Liu, & Chappell, 2009) and $470 billion per year in the United States (Reinhard, Feinberg, Choula, & Houser, 2015).

Systematic reviews and meta-analyses (Northouse, Williams, Given, & McCorkle, 2012; Pinquart & Sörenson, 2006a) have revealed the detrimental impact of caregiving on physical and mental health (Friðriksdóttir et al., 2011; Ji, Zoller, Sundquist, & Sundquist, 2012; Rivera, 2009; Schulz & Beach, 1999). In addition, research has shown that caregivers rate their physical health lower (Kenny, King,

& Hall, 2014; Mosher, Bakas, & Champion, 2013) and participate less in healthy behaviors, including physical activity (PA), than others (Beesley, Price, & Webb, 2011; Marquez, Bustamante, Kozey-Keadle, Kraemer, & Carrion, 2012; Mochari-Greenberger & Mosca, 2012; Rha, Park, Song, Lee, & Lee, 2015).

Despite the burgeoning body of research, specific subpopulations, such as cancer caregivers aged 60 years or older, have not been well studied. Older adults are important to consider for several reasons; comorbidities, increased disability, poorer physical functioning, and limited financial resources (Given et al., 2012) in older adults may add to the negative impacts of caregiving. Physical health has been investigated in older caregivers of patients with other diseases (Kenny et al., 2014; Mosher et al., 2013); however, little attention has been paid to the physical health of older caregivers of patients with cancer. Knowledge about older caregivers' PA levels is also lacking. PA can be seen as one mechanism to mitigate the negative effects of aging and caregiving, and is considered a marker of physical health (Connell & Janevic, 2009; Gulsvik et al., 2012). However, regular PA may be difficult for older caregivers because research has shown that they care for patients more hours per week than younger caregivers (Sinha, 2013), are more socially isolated, and avoid institutionalizing their care recipients because of feelings of obligation (Given et al., 2012).

Gender may also affect PA levels and physical health in older caregivers. Specifically, women take on the caregiving role more often (Sinha, 2013), rate their physical health lower (Li & Loke, 2013), have higher levels of depression (Kim et al., 2014), report lower levels of social support (Goldzweig et al., 2009), and have lower levels of PA (Brown et al., 2013) than men. Despite this evidence, meta-analyses have shown the effect of gender to be negligible compared to expected differences found in the noncaregiver population (Hagerdoorn, Buunk, Kuijer, Wobbes, & Sanderman, 2000; Pinquart & Sörensen, 2006b). The clinical significance of this gender effect on physical health and PA levels also is not well understood in older cancer caregivers. Examination of gender differences may help to determine if targeted assessment and interventions are needed.

Therefore, the goal of the current research was to address the gap in the caregiver literature with respect to the relationship among age, gender, PA levels, and physical health in older caregivers of patients with cancer. The authors considered the current literature to determine commonly reported problems in caregivers (Friðriksdóttir et al., 2011; Stenburg, Ruland, & Miaskowski, 2009). In addition, the authors reviewed Fletcher, Miaskowski, Given,

and Schumacher's (2012) model of cancer family caregiving to ascertain other contextual variables postulated to affect the caregiving experience. From this research and theoretical literature review, the current authors determined that disrupted sleep, depression, anxiety, caregiving demands, care recipient status, and perceived social support may also affect physical health and PA levels. Specific aims of this study were to (a) examine gender differences in self-rated physical health status, (b) document self-rated health and PA levels, and (c) explore predictors of PA levels among older caregivers. The current authors hypothesized that no difference in self-rated physical health would exist between men and women. In addition, they hypothesized that gender, age, physical health, mental health, depression, anxiety, social support, and caregiving demands would be correlated with PA levels.

Methods

Participants and Procedures

The current authors conducted a cross-sectional survey of caregivers of patients with breast, prostate, or colorectal cancer. Participants were eligible if they were aged 60 years or older and cared for an adult with cancer. The authors did not restrict participation based on the type (e.g., physical support, psychological support, instrumental support) or amount of care provided, and left the decision about who was a caregiver up to the patient and family. If clarification was requested, the authors stated that a caregiver was a family member or friend who provided unpaid care or support to a loved one living with illness. Other eligibility criteria included the ability to speak and read English.

The sample size for the survey was determined based on the study goal to examine gender differences in self-rated physical health. Medium effect sizes for gender on physical health have been reported in the literature (Pinquart & Sörenson, 2006b; Thompson et al., 2004). Setting the effect size at medium (0.5 by Cohen's convention) for a two-tailed independent t test to detect the difference between two groups, with a power of 0.8 and an alpha of 0.05, the sample size was 128 (calculated using G*Power, version 3.1.8). Accounting for an 80% response rate at a sample size of 128, a minimum recruitment of 153 participants was needed.

A convenience sample of participants was recruited from outpatient oncology clinics at Tom Baker Cancer Centre in Calgary, Alberta, Canada. Recruitment for the survey occurred from September 2014 to February 2015. A variety of recruitment strategies were used, including poster advertisement, in-person recruitment during oncology clinics, and advertisement on the University of Calgary Health and Wellness Lab website. In-person recruitment

was conducted by one of the authors. This study was approved by the Health Research Ethics Board of Alberta Cancer Committee.

After informed consent was obtained, participants filled out a self-report survey either at the cancer center or at home. Participants who chose to take the survey home were provided with a stamped envelope and instructions on how to complete and return the survey. Two follow-up telephone calls were made at one month and six weeks following receipt of consent if participants had not yet returned surveys. No monetary incentives were provided to participants.

Measures

The survey consisted of validated self-report instruments, which were chosen based on their documented psychometric properties, their consistent use in the caregiver and exercise literature (Badger, Segrin, Dorros, Meek, & Lopez, 2007; Connell & Janevic, 2009; Godin, 2011; McGowan et al., 2013), and their ease of administration.

Demographic Data

Demographic data, the health status of the caregiver, the estimated time in the caregiver role (number of months), and the number of hours of care provided per week (e.g., transportation, meal preparation, medication management, side effect management, personal care, medical procedures) were collected via self-report. In addition, information about the care recipients was collected, as reported by the caregivers, including the patient's diagnosis, time since diagnosis, type of treatment currently received, relationship to the caregiver, and age.

Physical Activity Levels

The Godin Leisure-Time Exercise Questionnaire (GLTEQ) (Godin & Shepard, 1985) was used to determine PA levels. This four-item instrument is widely used in many populations and has consistent reliability and validity compared to other self-report PA questionnaires (Jacobs, Ainsworth, Hartman, & Leon, 1993). The instrument captures weekly frequency of strenuous, moderate, and mild PA, which is then converted to an overall leisure time PA score.

Scores were used to categorize respondents into one of three categories: insufficiently active (score of 14 or less), moderately active (score of 14 to 23), and active (score of 24 or more). These categories are related to overall health benefits from PA, with those categorized as active receiving the most health benefit from PA (Godin, 2011). Weekly frequency of PA was also determined by asking respondents how often they pursued PA long enough to work up a sweat.

Physical and Mental Health

The SF-36v2® was used to assess self-rated physical and mental health (Ware & Sherbourne, 1992). This 36-item instrument measures eight domains of health (physical functioning, role-physical, bodily pain, general health, vitality, social functioning, role-emotional, and mental health). The domains

TABLE 1. Caregiver Characteristics (N = 130)

Characteristic	Men (n = 53)			Women (n = 77)		
	$\overline{X}$	SD	Range	$\overline{X}$	SD	Range
Caregiver age (years)	70.09	6.55	60–84	70.29	6.88	60–86
Total caregiving time (months)	30.09	46.1	0–312	33.6	46.03	0–240
Caregiving hours per week	15.96	18.03	0–112	24.67	30.12	0–168
Characteristic	n	%		n	%	
Marital status						
Married	51	96		74	96	
Single, separated, or divorced	1	2		2	3	
Widowed	1	2		1	1	
Annual income ($)						
Less than 30,000	6	11		10	13	
30,000–50,000	6	11		19	25	
50,001 or greater	35	66		29	38	
Do not wish to answer	6	11		19	25	
Education						
Some high school	6	11		11	14	
High school diploma	5	9		24	31	
Technical school or college diploma	12	23		23	30	
Undergraduate university degree or higher	30	57		19	25	
Employment status						
Do not work outside the home or retired	37	70		58	75	
Part-time	8	15		12	16	
Full-time	8	15		7	9	
Relationship to patient						
Spouse	51	96		70	91	
Friend or sibling	2	4		3	4	
Daughter or son	–	–		3	4	
No answer	–	–		1	1	
Living with care recipient						
Yes	52	98		70	91	
No	1	2		7	9	

Note. Because of rounding, percentages may not total 100.

are combined into two summary measures, the mental composite score (MCS) and the physical composite score (PCS). The SF-36v2 has been widely used in many populations, is cited thousands of times in the literature, has shown good internal consistency (alpha ≥ 0.8), and has well-documented content and construct validity (Turner-Bowker, Bartley, & Ware, 2002). Normative data have been published on a variety of populations, including Canadians (Hopman et al., 2000). The mean MCS for Canadian men aged 65–74 years is 55, and the mean PCS is 48. The mean MCS for Canadian women aged 64–74 years is 53, and the mean PCS is 53, with higher scores indicating better mental or physical quality of life.

Sleep Quality

The Pittsburgh Sleep Quality index (PSQI) was used to measure sleep quality (Buysse, Reynolds, Monk, Berman, & Kupfer, 1989). This 19-item questionnaire provides a global sleep quality score, and consistent internal reliability and construct validity were found on comparison to four other sleep rating instruments (Carpenter & Andrykowski, 1998). A score of 5 or greater is indicative of poor overall sleep quality (Buysse et al., 1989).

Depression

The Center for Epidemiological Studies–Depression (CES-D) scale (Radloff, 1977) was used to measure depression. The CES-D is a 20-item questionnaire that screens for depression and provides cutoff scores to aid in identifying clinical depression. It has good sensitivity and specificity and high internal consistency (alpha ≥ 0.8) when used with older adults (Lewinsohn, Seeley, Roberts, & Allen, 1997). The CES-D has been used across wide age ranges (Lewinsohn et al., 1997), and is sensitive to differences between caregivers and noncaregivers (Pinquart & Sörensen, 2003).

Anxiety

The State-Trait Anxiety Inventory (STAI), a 40-item questionnaire, was used to assess levels of state and trait anxiety (Spielberger, Gorsuch, Lushene, Vagg, & Jacobs, 1983). This instrument has been used in clinical settings to diagnose anxiety and has been reported to help distinguish anxiety from depression (American Psychological Association, 2017). Internal consistency coefficients have ranged from an alpha of greater than 0.86 to greater than 0.95, and test-retest (over a two-month interval) reliability coefficients have ranged from 0.65 to 0.75 (American Psychological Association, 2017). Higher scores for both state and trait anxiety indicate higher levels of stress, with a score of 40 or higher indicating clinically significant symptoms of anxiety (Knight, Waal-Manning, & Spears, 1983).

Social Support

The Multidimensional Scale of Perceived Social Support (MSPSS) was used to assess perceived levels of social support (Zimet, Dahlem, Zimet, & Farley, 1988). This questionnaire has high internal consistency (alpha ≥ 0.9) and good construct validity (Dahlem, Zimet, & Walker, 1991; Zimet, Powell, Farley, Werkman, & Berkoff, 1990), even when used in older populations (Hann, Oxan, Ahles, Furstenberg, & Stuke, 1995). Total social support scores range from 0–12, with scores falling below 3 indicating low levels of perceived social support and scores higher than 5 indicating high levels of perceived social support.

Statistical Analysis

Data were analyzed using SPSS®, version 22.0. Frequencies, or means and standard deviations, were determined for all study variables. Mean GLTEQ scores were grouped into three categories based on Godin and Shepard's (Godin, 2011) recommendation for ascertaining health benefits from reported PA levels. The independent sample t test was used to assess the difference between men and women based on PCSs. The PCS for men was not normally distributed; therefore, a bootstrap analysis (BCa) was performed to determine the confidence interval (CI). Cohen's d was used to determine the effect size of the gender difference.

Pearson correlations and standard multiple regression were used to examine the relationship between GLTEQ scores and age, PSQI scores, number of hours of caregiving per week, time in the caregiver role, CES-D scores, MSPSS scores, STAI scores, gender, and physical (PCS) and mental (MCS) health. Prior to running the multiple regression, two extreme outliers were identified. Two of the extreme outliners were transformed to

TABLE 2. Care Recipient Characteristics (N = 130)		
Characteristic	**n**	**%**
Type of cancer		
Prostate	51	39
Breast	42	32
Colorectal	36	28
No answer	1	1
Type of treatment		
Chemotherapy	54	42
Combination (chemotherapy and radiation)	24	19
Hormone	11	9
Radiation	5	4
Other	3	2
No treatment	32	25
No answer	1	1

Note. Because of rounding, percentages may not total 100.
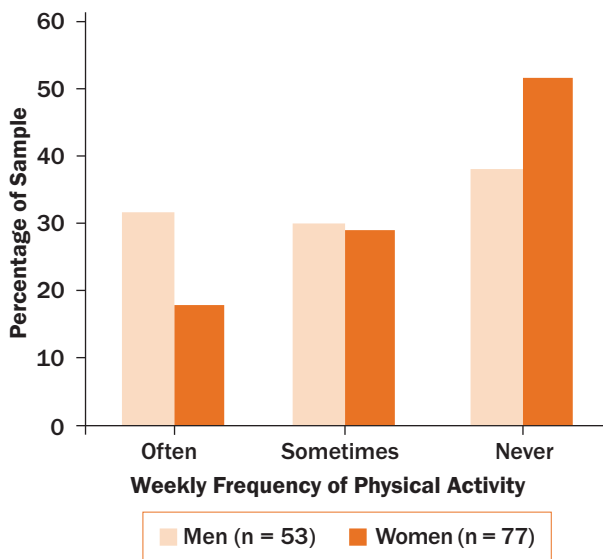
Note. Godin Leisure-Time Exercise Questionnaire score and physical activity were calculated as per Godin (2011).
Note. Weekly frequency of physical activity represents what percentage of the sample engaged in physical activity long enough to work up a sweat in one week.

FIGURE 1. Weekly Frequency of Physical Activity Among Male and Female Caregivers
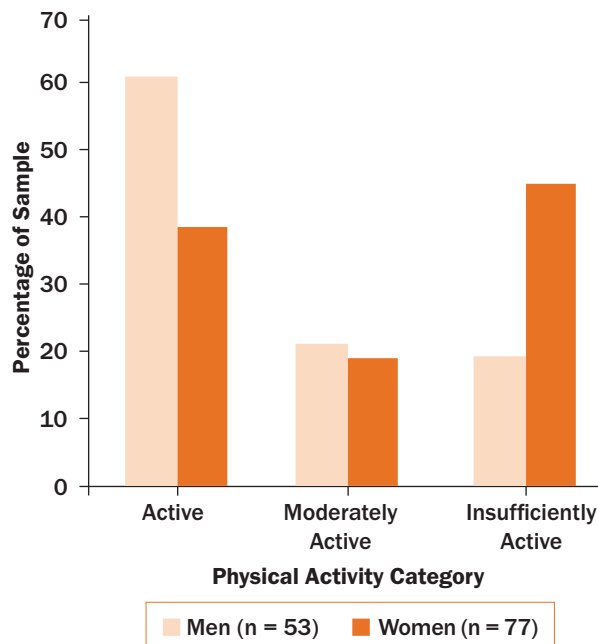
Note. Godin Leisure-Time Exercise Questionnaire score and physical activity were calculated as per Godin (2011).

FIGURE 2. Self-Reported Physical Activity Levels of Male and Female Caregivers

a score equal to the outlier score for caregiving hours per week (Tabachnick & Fidel, 2013). Initial scatterplots showed poor correlations between gender and GLTEQ scores, social support and GLTEQ scores, and caregiving time in months and GLTEQ scores; therefore, these variables were removed from the regression. Pearson correlations showed that gender was not significantly associated with GLTEQ scores; therefore, this variable was removed from the final regression model. Significance levels were set to $p < 0.05$ and 95% CIs calculated.

Results

Sample Characteristics

A total of 596 caregivers were contacted with information about the survey. Of those, 169 participants agreed to participate, and 132 surveys were completed and returned. Two of the completed surveys were not included in the final data analysis because the participants did not meet the age criteria. The final sample size was 130 participants. This resulted in a recruitment rate of 28% and a survey return rate of 78%. Reasons for declining participation were largely because of not meeting inclusion criteria (caregivers were too young).

Demographic and caregiving information is shown in Tables 1 and 2. More women than men participated in the current survey, and the women were the same age as the men, with a mean age of 70 years. Many caregivers were married, affluent, had

at least an undergraduate degree, and were retired. Most participants were caring for their spouses. Caregivers typically had been in the caregiver role for 30 months, and the average number of hours of caregiving per week was 16–24. About the same amount of care recipients had each type of cancer (breast, prostate, and colorectal cancer).

Physical Activity Levels

PA levels for men and women are depicted in Figures 1 and 2. Mean GLTEQ scores were higher in men (30.06) than women (22.69). More than half of the male caregivers were achieving levels of PA to confer substantial benefit, whereas about 33% of women were achieving the same level of PA. Similarly, more women than men were insufficiently active (i.e., not conferring health benefits), with almost half of the women falling into this category. Men were more often engaged in PA long enough to work up a sweat than women on a weekly basis. The weekly frequency of never engaging in PA long enough to work up a sweat was high in both men and women caregivers. Post hoc analysis of mean GLTEQ scores showed no statistically significant difference between men and women (t [128] = 1.77, $p = 0.079$).

Other Variables Measured

Mean scores for physical and mental health (SF-36v2 PCS and MCS), sleep quality (PSQI), depression

(CES-D), and anxiety (STAI-S) are shown in Table 3. Correlations among study variable are shown in Table 4. Caregivers' depression scores were, on average, below the cutoff of 16 (i.e., they were likely not clinically depressed). However, 33% of caregivers had scores higher than 16. The majority of caregivers had poor sleep quality, scoring 6.93, on average, with 64% of those surveyed scoring 5 or greater. On average, caregivers' scores did not suggest they were experiencing clinical symptoms of anxiety. In addition, levels of perceived social support were high in the caregivers surveyed, with 63% scoring 5 or higher.

Gender Differences on SF-36v2 Physical Health Subscale

Men had higher average PCSs ($\overline{X}$ = 52.37, standard error [SE] = 1.101) than women ($\overline{X}$ = 48.39, SE = 1.109). This difference (3.98, BCa 95% CI [0.781, 7.18]) was significant (t [127] = 2.462, p = 0.015). Cohen's d (0.45) showed that this represented a medium effect size.

Correlations Among Study Variables

The current authors found significant positive correlations between PA levels and physical health (r = 0.364, p = 0.00) and between PA levels and mental health (r = 0.25, p = 0.004). Significant negative correlations were found between PA levels and age (r = –0.298, p = 0.001), sleep quality (r = –0.262, p = 0.003), depression (r = –0.247, p = 0.005), state anxiety (r = –0.257, p = 0.003), and caregiving hours per week (r = –0.268, p = 0.002). In addition, physical health was significantly negatively correlated with sleep quality (r = –0.482, p = 0.00), depression (r = –0.372, p = 0.00), state anxiety (r = –0.271, p = 0.002), and gender (r = –0.213, p = 0.015). Physical health was not significantly correlated with age, mental health, or caregiving hours per week. These correlations represent medium associations (values ranging from 0.3 to 0.49) according to Cohen's

(1992) conventions, with values below 0.29 representing small associations.

Predicting Physical Activity Levels

As shown in Table 5, the authors' final regression model included one dependent variable (GLTEQ) and seven predictor variables (CES-D, age, PCS, MCS, STAI-S, caregiving hours per week, and PSQI) to examine predictors of PA levels in caregivers. These variables explained 32% of the variance in PA levels in older caregivers of patients with cancer (F [7,118] = 7.837, p < 0.001). Three variables significantly contributed to the prediction of PA levels, including age (β = –0.291, p = 0.00), physical health (β = 0.307, p = 0.002), and caregiving hours per week (β = –0.221, p = 0.006).

Discussion

The authors conducted a survey with older cancer caregivers to examine specific factors related to health and PA levels, including the potential role of gender. Their findings showed similar levels of PA compared to studies examining PA levels in older adults. The current authors' findings regarding gender differences in physical health and PA levels among caregivers were largely inconclusive, which is consistent with other research of caregiver populations.

The authors found high ratings of overall physical health, which was not expected in the caregiver population. Specifically, PCSs were higher in the sample compared to Canadian norms for men and women. The average PCS of the men in the current study (52) was higher than the PCS of the general population of men of similar age (48) (Hopman et al., 2000). Similarly, the average PCS for women in the current study (48) was higher than the PCS of the general population of women of similar age (47) (Hopman et al., 2000). Variables related to mental health,

TABLE 3. Mean, Standard Deviation, and Range for Study Variables

Variable	GLTEQ	Age (Years)	PCS	MCS	PSQI	CES-D	STAI-S	Caregiving Hours
$\overline{X}$	25.69	70.21	50.02	48.96	6.89	12.65	35.02	21.01
SD	23.52	6.73	9.2	10.6	4.5	10.6	12.13	26.18
Range	0–119	60–86	15–67	14–65	0–19	0–47	20–74	0–168

CES-D—Center for Epidemiological Studies–Depression scale; GLTEQ—Godin Leisure-Time Exercise Questionnaire; MCS—mental composite score; PCS—physical composite score; PSQI—Pittsburgh Sleep Quality Index; STAI-S—State-Trait Anxiety Inventory S-Anxiety
Note. CES-D scores range from 0–60, with scores higher than 16 indicating possible clinical depression. GLTEQ scores from 0–13 indicate "insufficiently active," scores from 14–23 indicate "moderately active," and scores of 24 or more indicate "active." MCSs range from 0–100, with higher scores indicating better mental quality of life. PCSs range from 0–100, with higher scores indicating better physical quality of life. PSQI scores range from 0–21, with scores higher than 5 indicating poor sleep quality. STAI-S scores range from 20–80, with scores higher than 47 indicating clinical depression.

TABLE 4. Study Variable Correlations

Variable	GLTEQ	Age	PCS	MCS	PSQI	CES-D	STAI-S	Caregiving Hours
Age	−0.298**	–	–	–	–	–	–	–
PCS	0.364**	−0.175	–	–	–	–	–	–
MCS	0.25**	0.064	0.253**	–	–	–	–	–
PSQI	−0.262**	0.036	−0.482**	−0.455**	–	–	–	–
CES-D	−0.247**	−0.03	−0.372**	−0.786**	0.545**	–	–	–
STAI-S	−0.257**	−0.045	−0.271**	−0.763**	0.426**	0.794**	–	–
Caregiving hours	−0.268**	−0.049	−0.108	−0.217*	0.241**	0.106	0.128	–
Gender	−0.155	0.014	−0.213*	−0.267**	0.263**	0.223*	0.164	0.177*

* $p < 0.05$ (two-tailed); ** $p < 0.01$ (two-tailed)
CES-D—Center for Epidemiological Studies–Depression scale; GLTEQ—Godin Leisure-Time Exercise Questionnaire; MCS—mental composite score; PCS—physical composite score; PSQI—Pittsburgh Sleep Quality Index; STAI-S—State-Trait Anxiety Inventory S-Anxiety

including the MCS and sleep quality, were consistently low, which is similar to those found in other cancer caregiver research.

Caregiver studies that have used the SF-36 (either version) have revealed conflicting findings related to self-rated health of caregivers compared to non-caregivers (Kenny et al., 2014; Mosher et al., 2013; Thompson et al., 2004), which may be explained by several factors. Comparing different age groups of caregivers may lead to different conclusions about how caregiver health is affected. Older caregivers may experience a certain level of health decline as they age, regardless of the caregiver role (World Health Organization, 2015). Examining different domains of the SF-36 may lead to different findings. For example, in Thompson et al.'s (2004) study, the physical functioning and general health domains, as well as the PCSs, were compared to standardized norms. However, in Kenny et al.'s (2014) study, only the physical functioning domain of caregivers compared to noncaregivers was examined. Given that the PCS is a composite of physical functioning, general health, bodily pain, and physical aspects related to a person's role, certain domains of overall physical health may be affected differently in caregivers. Finally, the current authors may have sampled a healthy group of caregivers. The sample was largely affluent and had a high level of education—two factors that are directly related to health (Public Health Agency of Canada, 2013).

The authors found a statistically significant difference between women and men on PCSs, with men reporting better physical health than women by four points, which represents a medium effect size for gender. The difference in physical health between men and women in the current study is consistent with the findings of other research on caregivers (Mosher et al., 2013; Thompson et al., 2004), and may reflect a clinically important difference. Normative Canadian data show that the gender difference for populations of similar age is two points. Although controversy exists about what represents a clinically significant difference (Hays & Woolley, 2000; Samsa et al., 1999), a range of two to five points is typically cited. The current data support that caregiving slightly increases the gap in physical health between men and women beyond what is already expected in the population.

Caregivers' PA levels (moderately active and above) were unexpectedly higher in both men and women compared to those of the general population of the same age (Statistics Canada, 2014). The authors found no studies in which PA levels in caregivers were measured using the GLTEQ, making direct comparison to the literature difficult. Although some studies have demonstrated that caregivers have lower levels of PA compared to noncaregivers (Beesley et al., 2011; Mochari-Greenberger & Mosca, 2012; Rha et al., 2015), other studies have found that no difference in PA levels exists (Marquez et al., 2012; Son et al., 2010). As noted by Rha et al. (2015), inconsistent results may be explained by researchers using different measures of PA and studying different caregiver populations, with other types and stages of care recipients' disease. The high levels of PA in the current study may be explained by the demographics of the sample. As noted, caregivers in this study were predominately affluent, had high levels of social support, and were well educated, factors known to positively affect PA behaviors

(Ball, Carver, Downing, Jackson, & O'Rourke, 2015; Bauman et al., 2012).

The current authors found a difference in mean PA levels among men and women; however, the difference was not statistically significant. The gender difference in PA levels was not unexpected, given that higher mean PA levels in men versus women have been reported in the general population (Statistics Canada, 2014). The current authors also found a gender difference in inactivity levels in caregivers, with 44% of women insufficiently active and only 19% of men insufficiently active. This inactivity gender difference should be examined further. Inactivity, or sedentary time, is increasingly recognized as a risk factor for negative health outcomes (Thorp, Owen, Neuhaus, & Dunstan, 2011) and may be an important link between gender and health outcomes in caregivers.

The strongest predictor variables for PA levels in caregivers were time spent caregiving per week, age, and PCSs. These findings are consistent with those of other studies of caregivers and of the general population. The amount of time spent providing care has been associated with PA levels in studies with caregivers (Beesley et al., 2011; Mochari-Greenberger & Mosca, 2012). Given that time is a commonly reported barrier to PA (Justine, Azizan, Hassan, Salleh, & Manaf, 2013), the more time caregivers spend providing care, the less time they have to dedicate to PA. PA levels have also been shown to be negatively correlated with age and physical health scores in studies of caregivers and older adults (Chad et al.,

2005; Harwood, Barker, Ownby, & Duara, 2000). As caregivers age and their physical health declines, they will likely spend less time engaging in PA. Whether this physical health and PA decline is an added risk for negative health outcomes in older caregivers has yet to be definitively established.

As hypothesized, psychological variables, including mental health (MCS), depression, sleep quality, and anxiety, were significantly correlated with PA levels. Further examination using multiple regression showed that the psychological variables were not significant predictors of PA levels. Consistent with other studies of caregivers (Marquez et al., 2012; Mazanec, Daley, Douglas, & Lipson, 2011), psychological variables were not shown to affect PA levels. In older populations, other determinants of PA have been noted, including perceptions of the benefits of PA, self-efficacy, social anxiety, and lack of access to facilities (Franco et al., 2015). These determinants may be more predictive of PA levels in older cancer caregivers than the psychological variables used in the current study.

Although the purpose of the current research was not to substantiate a conceptual model, some of the findings aligned with Fletcher et al.'s (2012) model of cancer caregiving. The physical health of caregivers in the current study was not negatively affected by their caregiving role, as evidenced by their SF-36v2 PCSs being comparable to noncaregiver populations. Fletcher et al. (2012) argued that reaction to the stress process does not always result in negative outcomes, because several factors ultimately determine negative

TABLE 5. Standard Multiple Regression Predicting Physical Activity Levels Using the GLTEQ

Variable	b	SE B	β	p	95% CI
Constant	59.42	34.09	–	0.084	[–8.09, 126.92]
Age	–1.02	0.272	–0.291	–	[–1.56, –0.48]
PCS	0.797	0.246	0.307	0.002	[0.31, 1.3]
Caregiving hours	–0.199	0.071	–0.221	0.006	[–0.4, –0.06]
PSQI	–3.84	2.68	–0.137	0.154	[–9.14, 1.46]
CES-D	0.442	0.359	0.19	0.221	[–0.27, 1.15]
STAI-S	–0.243	0.256	–0.116	0.363	[–0.74, 0.27]
MCS	0.199	0.306	0.086	0.517	[–0.41, 0.81]
R^2	0.317*	–	–	–	–
Adjusted R^2	0.277*	–	–	–	–

* $F_{(7,118)} = 7.837$; $p < 0.001$
CESD—Center for Epidemiological Studies–Depression scale; CI—confidence interval; GLTEQ—Godin Leisure-Time Exercise Questionnaire; MCS—mental composite score; PCS—physical composite score; PSQI—Pittsburgh Sleep Quality Index; SE—standard error; STAI-S—State-Trait Anxiety Inventory-S Anxiety

outcomes in family caregivers. Personal resources, economic status, and stage of life are also important to consider (Fletcher et al., 2012). The participants in the current study had high socioeconomic status, were mostly retired, and rated their social support high, all of which may help to mitigate negative effects on health and self-care behaviors in the context of caregiving. The current authors believe that, in future studies, applying Fletcher et al.'s (2012) model to older family caregivers of patients with cancer may provide further understanding of the moderators and mediators of the negative effects of caregiving in this subpopulation.

The results from the current survey provided knowledge about PA levels and physical health status in older cancer caregivers. In this subpopulation of caregivers, gender affected physical health but not PA. However, the gender difference in caregivers was not much different from that of the general population. Considering the small gender difference in physical health and no difference in PA levels, the current authors concluded that gender was not an additional risk factor for health decline in their sample of older caregivers.

Limitations

Several limitations need to be considered when interpreting the findings. The sample was largely affluent and educated (high socioeconomic status) and, therefore, not representative of all older cancer caregivers. The caregiving experience of those with low socioeconomic status likely is different. In addition, the questionnaire used in the current study provided examples of typical caregiver duties and examined how often the caregivers provided this type of care per week and how long they had been in the caregiver role. Ten participants stated they were providing no hours of care per week and no time in the caregiver role. The data from these participants were included in the final analysis because they self-identified as caregivers and agreed to participate after being told that the authors were surveying family caregivers of patients with cancer.

A more comprehensive assessment of caregiver roles and responsibilities is warranted, because other types of support and care may affect caregiver health and PA levels differently. In addition, information about the functional level of the patient was not collected because a concurrent chart review was not carried out. In future research, evaluating patient functional level may provide additional information about the level of care that may be required. This survey included only self-report data, which are subject to recall and response bias. Although self-report is an acceptable method of determining PA

Knowledge Translation

- Older women caregivers rated their physical health worse than older men caregivers.
- Caregivers' ability to participate in regular physical activity is related to their age, physical health, and the amount of time they spend caregiving per week.
- Oncology nurses are well positioned to promote health and healthy behaviors in older caregivers but should provide care based on an assessment of each caregiving situation.

levels and has been shown to be accurate (Prince et al., 2008), caregivers could underestimate or overestimate their PA levels. The addition of an objective measure of activity levels (e.g., accelerometer) in future research would address this limitation. Finally, convenience sampling limits the generalizability of study findings to the population of caregivers. However, convenience sampling is a limitation in all caregiver research because no accurate records of caregiver numbers or access to caregivers via a registry typically exist.

Implications for Nursing Practice and Research

Research has consistently demonstrated that a proportion of caregivers encountered in clinical practice have high levels of depression and anxiety and have difficulty sleeping. Clinicians working with older patients and their family caregivers should be aware that caregivers' health and well-being could be affected; however, the negative effects of caregiving are not universal. As outlined in Fletcher et al.'s (2012) model of cancer family caregiving, negative impacts of caregiving on health and well-being are likely heterogeneous and based on many interrelated factors, including the type and stage of patient illness; caregivers' reaction to the caregiving situation; and personal, social, and economic factors. Clinicians should approach caring for caregivers with a holistic view of their situation, which will help to focus assessment and recommendations based on the needs of each person.

These survey results provide direction for future research to support the health of older caregivers and promote healthy behaviors. Longitudinal studies investigating changes to PA levels and sedentary time, as well as changes to physical and mental health, would enhance healthcare workers' ability to design health promotion interventions. Examining barriers, motivations, and preferences for PA would help healthcare providers tailor interventions to older

caregivers. Studies with a more diverse sample might provide information about the possible health effects of socioeconomic status. Probability-based sampling should be the goal of caregiver research because understanding how generalizable research findings are to the population of caregivers is important when formulating interventions to support health and well-being.

Conclusion

This study adds to the current evidence related to the effects of cancer caregiving on physical health, mental health, and physical activity levels and provides new information about how older cancer caregivers may be affected by taking on the caregiving role. Healthcare providers should be cognizant of the caregiving situation and tailor their assessment and intervention strategies to individual situations. More research on the older caregiver population is needed, considering the expected increase in the number of older patients with cancer and their caregivers in the future.

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