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Physical activity type and intensity among rural breast cancer survivors: patterns and associations with fatigue and depressive symptoms

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Abstract

Introduction—Our study aims were to describe physical activity patterns and associations with fatigue and depressive symptoms among rural breast cancer survivors.

Methods—Population-based, mailed survey of 483 rural breast cancer survivors including the International Physical Activity Questionnaire (IPAQ).

Results—With regard to type and intensity, domestic/gardening and moderate intensity accounted for the largest percentage of total energy expenditure (i.e., 60% and 69%, respectively). MET-mins/week variables were categorized as 0, > 0 to < 500, and ≥ 500 to reflect sedentary, insufficient, and meets current public health recommendations. After adjustment, fatigue was significantly associated with domestic/gardening (mean fatigue for sedentary, insufficient, and meets recommendations were 18.9, 16.4, and 13.4, respectively; $p=.0019$), leisure activity (means were 16.0, 14.5, and 11.8, respectively; $p=.047$), moderate intensity (means were 18.4, 16.7, and 13.7, respectively; $p=.011$), and daily minutes sitting (means for ≤ 120 min, > 120 to ≤ 360 min, and > 360 min of sitting were 12.5, 14.2, and 17.2, respectively; $p=.0029$). Fatigue was not associated with occupational, transportation, walking, or vigorous activity. After adjustment, only leisure activity was associated with depressive symptoms (means for sedentary, insufficient, and meets recommendations were 7.8, 7.7, and 6.2, respectively; $p=.039$).

Conclusions—Physical activity measurement tools that do not include domestic/gardening activities may underestimate physical activity in rural breast cancer populations. Physical activity

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associations with fatigue and depressive symptoms differed based on physical activity type and intensity suggesting hypotheses related to exercise effects on fatigue and depressive symptoms.

Keywords

Exercise; Oncology; Correlate; Predictor; Depression

Introduction

Physical activity is important for improving health and is associated with reduced cancer risk after a breast cancer diagnosis [1–3]. Importantly, rural populations report less physical activity with only 19% of rural breast cancer survivors reporting meeting the current guidelines of ≥ 150 min per week [4–6]. Better understanding the types of physical activity among rural breast cancer survivors would be useful in planning physical activity interventions for this population. Such data has not been previously reported because information about activities such as gardening is often not included in population-based self-report physical activity measurement tools such as the Behavioral Risk Factor Surveillance System (BRFSS) [7].

Physical activity may play a role in fatigue and depression which occur in up to 91% and 42% of cancer survivors, respectively [8]. Importantly, rural breast cancer survivors report greater depressive symptoms than their non-rural counterparts [9]. Understanding etiologic mechanisms for these common problems and developing effective strategies for prevention and treatment are needed but require well-designed randomized trials. Given the time and cost required to implement such trials, less expensive cross-sectional studies may assist in identifying hypotheses worthy of more rigorous testing. Physical activity has been associated with reduced fatigue in cancer survivors, including breast cancer, but results have been inconsistent and the most effective exercise dose is currently unknown [10–12]. Although physical activity may reduce depressive symptoms after cancer treatment, this effect is inconsistent, is not present during treatment, and is less pronounced than that of fatigue [3].

Fatigue after a cancer diagnosis may be caused by physical deconditioning [13], comorbid conditions (e.g., anemia) [14], systemic inflammation [15], psychosocial factors [16], neurotransmitter dysregulation [17], alterations in the hypothalamic-pituitary-adrenal axis function [17], and sleep disruption [17]. Depression shares many of these same possible mechanisms but is strongly influenced by psychosocial (e.g., poor social functioning) and physical (e.g., pain) factors [18]. Also, the role of neurotransmitter dysregulation is better understood for depression as exemplified by effective pharmacologic therapies such as selective serotonin reuptake inhibitors [19]. The mechanistic similarities may explain the potential benefits of physical activity in controlling these symptoms and the strong association between fatigue and depression reported in cancer survivors [14]. In spite of overlapping etiologic mechanisms, the pathways by which physical activity influences these symptoms may not be identical. For example an improvement in fitness level mediated the beneficial effects of an exercise intervention on fatigue in breast cancer survivors [20] while an improvement in fitness may not always be required for improvements in depression [21]. In preparation for designing future randomized controlled trials testing optimal exercise recommendations for improving fatigue and depressive symptoms, we report a post hoc analysis of cross-sectional survey data. Our study aims were: 1) describe the prevalence of physical activity types and intensities within a population-based sample of rural breast cancer survivors and 2) examine the patterns of physical activity associations with fatigue and depressive symptoms by activity type and intensity. Because the greatest health benefits may occur when an individual increases their activity level above a sedentary level, we also

sought to examine associations between daily minutes of sitting with fatigue and depressive symptoms. We hypothesized that participants would report a high percentage of domestic/gardening activities and moderate intensity activity. We also hypothesized that leisure activity, vigorous intensity, and time sitting would have the strongest associations with both fatigue and depressive symptoms. Such associations were expected due to the volitional nature of leisure activity, greater improvement in fitness with vigorous activity, and the benefits of any activity beyond sedentary with regard to other health benefits.

Methods

Study design

Study details related to sample selection, response rate, survey administration, and missing data have been previously described [6,22]. Unique to this report, however, is the reporting of the International Physical Activity Questionnaire (IPAQ) data and its associations with fatigue and depressive symptoms. In brief, our cross-sectional, mailed survey was completed by 483 breast cancer survivors living in the most rural counties of a Midwest, U.S. state. Of the 1598 possible rural breast cancer survivors identified by the state cancer registry, 560 agreed to allow the cancer registry to release their contact information to the investigators with 483 of these returning a useable survey for a response rate of 30% (i.e., 483/1598) [6].

Institutional review board approval with waiver of consent was obtained before study initiation. The state cancer registry obtained its own review board approval and consent before releasing the potential participant's contact information to the study investigators. The role of the state cancer registry was exclusively identification of potential participants and the views expressed in this report may not reflect those of the cancer registry.

Measures

Physical activity was measured by self-report using the International Physical Activity Questionnaire (IPAQ), long form [23–25]. Participants were asked to report moderate and vigorous physical activity performed in the previous 7 days. This 27-item questionnaire utilizes a series of yes/no and fill-in-the-blank questions to assess the time spent per week (i.e., time per day multiplied by days per week) engaged in various types and intensities of physical activity. Each activity type and intensity score is provided a Metabolic equivalent (MET) value according to the published protocol (e.g., MET for walking=3.3, cycling= 6.0, moderate intensity=4.0, moderate intensity yard chores= 4.0, moderate intensity inside chores=3.0, vigorous intensity yard chores=5.5, vigorous intensity leisure=8.0) [23,25]. According to the published IPAQ scoring protocol [25], the MET value was multiplied by the time per week to calculate the MET-mins/week for each physical activity type (i.e., occupational, transportation, domestic/gardening, and leisure) and intensity (i.e., walking, moderate, and vigorous). The MET-mins/week was used because total energy expenditure rather than the time spent in specific exercise intensities is associated with improvement in health outcomes [26]. Also, MET-mins/week accounts for the higher intensities when different intensities were combined for the activity types (e.g., gardening). As an additional marker of sedentary behavior, the IPAQ also assessed the average number of minutes per day the participant spent sitting on a weekday and on a weekend day during the last 7 days; the average daily minutes of sitting for the week were calculated.

Fatigue was assessed using the sum of the 13-item Functional Assessment of Cancer Therapy-Fatigue (FACT-F) scale (0 to 4 Likert scale for a possible range of 0 to 52) [27]. A higher score indicates greater fatigue and the Cronbach's alpha for our sample has been previously reported as .94 [6]. The sum of the short-form Center for Epidemiologic Studies Depression (CES-D) assessed depressive symptoms using a 10-item, 4-point Likert scale

(i.e., 0 to 3 for a possible range of 0 to 30) [28]. A higher score indicates greater depressive symptomatology and the Cronbach's alpha for our sample has been previously reported as .83 [6].

Because of the potential association between physical activity, fatigue, and/or depressive symptoms, the following covariates were considered: age, race, education, number of comorbidities, receipt of adjuvant cancer treatment, and months since diagnosis. All covariates were measured by self-report. Education rather than income was used as the marker of socioeconomic status because all participants provided years of education but 28 refused to report their annual household income [6]. Although considered, breast cancer stage was not used because 30% of participants did not know their stage [6]. Also, cancer registry staging data were not available for 37% of the participants due to a transition in the staging coding process at the time of data extraction. Due to the small number of races other than White, race was dichotomized as White or non-White. For comorbidities, the sum of yes/no responses to the Functional Comorbidity Index was used [29]. Although this index usually contains 18 items, the depression item was removed for the analysis described in this report. Receipt of cancer treatment was defined as previously receiving any adjuvant breast cancer therapy (i.e., chemotherapy, radiation therapy, hormonal therapy, or other pharmacologic therapy such as biologic agents). Because over half of participants reported taking hormonal therapy at the time of survey completion [6], we examined various combinations of treatment types and timing to determine the treatment variable most likely to be associated with fatigue or depressive symptoms using Wilcoxon rank sum test. This exploratory analyses revealed that receipt of any adjuvant therapy, regardless of whether the participant was receiving the treatment at the time of survey completion, demonstrated the strongest associations with fatigue ($p=.019$) and depressive symptoms ($p=.082$) when compared with the other possible treatment combinations.

Data analysis

Descriptive statistics were calculated and the distributions of continuous variables were examined. Due to the skewed distribution of the IPAQ data, the MET-mins/week were categorized as 0, > 0 to < 500 , and ≥ 500 to reflect sedentary, insufficient, and meets current public health recommendations for 150 min of moderate activity per week, respectively [4]. Because individuals are not expected to achieve 150 min for each type or intensity in order to meet recommendations, tertiles or quartiles were initially considered. However, this was not possible due to the large number of individuals reporting no activity in several of the categories (e.g., no occupational activity and no vigorous activity was reported by 69% and 76%, respectively). Therefore, the 3 categories were chosen to compare participants with "none", "some", and "enough based on recommendations". The daily minutes of sitting were categorized based on the 25th and 75th percentiles [i.e., ≤ 120 min ($n=122$), > 120 to < 360 min ($n=233$), and ≥ 360 min ($n=118$)]. Significant differences in potential covariates for fatigue, depressive symptoms, physical activity, and minutes sitting were examined with the following: 1) Spearman correlations for fatigue and depressive symptoms, 2) general linear model with Tukey's multiple comparisons for physical activity and minutes sitting (i.e., age, education, comorbidities, months since diagnosis), and 3) chi square for physical activity or minutes sitting (i.e., race and prior treatment). General linear model with Tukey's multiple comparisons test was used to calculate unadjusted means for fatigue and depressive symptoms across the three levels of physical activity or minutes sitting. General linear model was used to calculate means adjusted for age, race, education, comorbidities, prior adjuvant treatment (yes/no), months since diagnosis and total physical activity MET-mins/week.

Results

Participant characteristics and physical activity behavior

As previously reported [6], the mean age for our sample was 63 ± 12 with 96% being White. Mean years of education was 13 ± 2.5 and mean months since diagnosis was 39 ± 21.5 with mean fatigue and depressive symptoms being 14.6 ± 11.2 and 7.5 ± 5.7 , respectively. Although the mean comorbidities has been reported as 2.6 ± 2.2 [6], the mean for this report was 2.4 due to the removal of the depression item. Also not previously reported, 93% ($n=438$) had received adjuvant therapy.

The descriptive statistics including mean percent of the overall total for each type and intensity of physical activity along with the minutes of sitting are provided in Table 1. As demonstrated by the means and medians, most variables were skewed. Among occupational, transportation, domestic/gardening, and leisure, the highest percentage of energy expenditure was related to domestic/gardening activities. Among walking, moderate, and vigorous, the highest percentage of energy expenditure was related to moderate intensity activity.

Physical activity and sedentary behavior associations with covariates

Table 2 provides the associations among potential covariates for fatigue, depressive symptoms, and physical activity. Being older was associated with less physical activity for all types and intensities with the exception of transportation. Participants reporting less domestic/gardening and moderate activity were more apt to be non-White. Fewer years of education were associated with greater fatigue, greater depressive symptoms, and less physical activity (i.e., domestic/gardening, leisure, and moderate). Participants with more comorbidities reported greater fatigue, more depressive symptoms, and less occupational, domestic/gardening, leisure, walking, and moderate physical activity. Prior adjuvant treatment and fewer months since diagnosis were associated with greater fatigue but not associated with depressive symptoms or physical activity type or intensity. For daily minutes of sitting, no difference in age, race, or months since diagnosis was noted. In contrast, greater minutes sitting was associated with fewer years of education ($p=.039$). Multiple comparisons indicated that participants reporting ≥ 360 daily minutes of sitting also reported fewer years of education (12.9 ± 2.6) when compared with those reporting > 120 to < 360 min (13.7 ± 2.4 years). Similarly, greater minutes of sitting was associated with a higher percentage reporting prior history of adjuvant therapy (≥ 360 min=97%, > 120 to < 360 min=94%, and ≤ 120 min=89%; $p=.029$). For covariates and sedentary behavior, the mean number of comorbidities was higher for those reporting more minutes of sitting per day (≥ 360 min= 2.8 ± 2.2 which was significantly higher than ≤ 120 min= 1.9 ± 1.7 but not significantly different from > 120 to < 360 min= 2.4 ± 2.1 ; $p=.004$).

Physical activity and sedentary behavior associations with fatigue and depressive symptoms

When the unadjusted and adjusted means were examined, no significant differences in mean fatigue were noted for occupational, transportation, walking, and vigorous physical activity. In contrast participants reporting no domestic/gardening activity also reported significantly higher fatigue when compared with those engaging in > 0 to < 500 MET-mins/week of this activity who, in turn, reported higher fatigue when compared with those reporting ≥ 500 MET-mins/week (unadjusted means; Table 3). Participants reporting no leisure or moderate intensity activity reported significantly higher fatigue when compared with those reporting ≥ 500 MET-mins/week of these activities (unadjusted means; Tables 3 and 4). As shown in Fig. 1, the adjusted means for fatigue were significantly different among the three categories for domestic/gardening, leisure, and moderate activity. The reported fatigue met or exceeded

the minimally important difference of 3 [27] for those reporting 0 MET-mins/week when compared with those reporting > 0 to < 500 or ≥ 500 MET-mins/week for each of the three categories. For minutes of sitting, the unadjusted means for fatigue were significantly different among all three categories (≤ 120 min= 11.2 ± 9.5 , > 120 to ≤ 360 min= 14.4 ± 10.8 , and > 360 min= 18.1 ± 12.7 ; $p < .0001$). This pattern was maintained after adjustment (adjusted means for fatigue were ≤ 120 min= 12.5 , > 120 to ≤ 360 min= 14.2 , and > 360 min= 17.2 ; $p = .0029$).

With regard to depressive symptoms, the unadjusted and adjusted means were not significantly different for occupational, transportation, walking, and vigorous intensity. Participants reporting no domestic/gardening activity or no moderate intensity activity had significantly higher depressive symptoms when compared with those reporting > 0 to < 500 or ≥ 500 MET-mins/week of these activities (Tables 3 and 4). Participants reporting no leisure activity had significantly higher depressive symptoms when compared with those reporting ≥ 500 MET-mins/week of leisure activity (Table 3). Although the pattern was maintained, only leisure activity remained significant after adjustment (see Fig. 2). For minutes of sitting, neither the unadjusted means (≤ 120 min= 6.8 ± 5.5 , > 120 to ≤ 360 min= 7.3 ± 5.5 , and > 360 min= 8.4 ± 6.2 ; $p = .082$) nor the adjusted means (≤ 120 min= 7.2 , > 120 to ≤ 360 min= 7.1 , and > 360 min= 8.1 ; $p = .263$) for depressive symptoms were significant.

Discussion

Among our population-based sample of rural breast cancer survivors, the physical activity type responsible for the highest percentage of MET-mins/week was domestic/gardening. Occupational, transportation and leisure activity accounted for smaller percentages of the energy expenditure reported. With regard to intensity, moderate activity accounted for the highest percentage of MET-mins/week. As for sitting duration, the sample, on average, reported sitting for 4.2 h daily (or a median of 3.8 h). Moreover, the associations between physical activity and fatigue varied based on activity type (i.e., domestic/gardening and leisure) and intensity (i.e., moderate) while depressive symptomatology was only associated with type (i.e., leisure).

Our unique reporting of the mean percent of total for each type of exercise improves our understanding of physical activity behavior patterns among rural breast cancer survivors. The relatively large percentage of MET-mins/week attributable to domestic/gardening activities is expected given that rural communities are often farmland. However, our study is the first to document this with a population-based survey in the U.S. and suggests that prior studies reporting less physical inactivity among rural populations using national surveys (e.g., Behavioral Risk Factor Surveillance Survey) may underestimate total energy expenditure in rural populations because of their focus on leisure activity [7].

Importantly, we are the first to report sitting behavior in rural, U.S. women. Also, no prior report of the associations between sitting duration and fatigue or depressive symptoms in any population has been published, to date. Although few reports have assessed sitting duration in a manner that can be compared with our findings, our results are similar to the median of 5 h per day reported by Australian women between the ages of 26 and 36 (not cancer survivors) [30]. Although the association between sitting duration and breast cancer risk is not known, our 75th percentile (i.e., 360 min) is the amount of sitting during a work day that has been associated with an increase in ovarian cancer risk in Chinese women [31]. Also relevant, men who sit for more than half of the work day have an increased risk of prostate cancer [32]. Therefore, interventions reducing time spent sitting may reduce health risk in at least 25% of our sample.

It is noteworthy that less fatigue was associated with greater domestic/gardening, leisure, and moderate activity across the three categories while less depressive symptoms were only associated with ≥ 500 MET-mins/week of leisure activity when compared with none or > 0 to < 500 MET-mins/week. These differences suggest variability in potential underlying etiologies for fatigue and depressive symptoms. For example, fatigue may respond to exercise, in large part, because of its graded increase in muscle strength and fitness while depressive symptoms may improve due to changes in the hypothalamic-pituitary-adrenal axis through exercise effects on body composition and insulin resistance [33]. It is also possible that, unlike biologic outcomes related to disease risk which benefit from total energy expenditure regardless of source [26], outcomes with psychosocial influences such as fatigue and depressive symptoms may require interventions that focus on the purpose and context of the physical activity in addition to energy expenditure only.

Because our cross-sectional design precludes conclusions about causation, it is important to consider the plausibility of a reciprocal relationship between fatigue and depressive symptoms and physical activity behavior. The lack of association with occupational activity may be related to less volitional control when compared with that of leisure activity, a possibility supported by the strong associations with leisure physical activity. Similarly, the domestic/gardening activities may have a partial volitional component (e.g., gardening listed as a preferred summer exercise activity by 5% of rural breast cancer survivors in a prior study [6]). Walking may not have been associated with fatigue or depressive symptoms because most of the walking MET-mins/week were from occupational walking (i.e., mean=476 MET-mins/week) and transportation walking (i.e., mean=296) rather than walking for leisure (i.e., mean=196).

Although no data were available for comparison of responders to non-responders, population level cancer registry data suggests that our sample was similar to the population sampled. Specifically, all women diagnosed with breast cancer in 2002 through 2006 in the counties included in this report had a mean age of 64 ± 15 (similar to our sample mean of 63 ± 12) with 4% being non-White (equal to the 4% in our sample) [6]. With regard to stage, the percentage at the population level of 50% localized and 4% distant disease is similar to the previously reported stage prevalence among participants who knew their stage (i.e., 52% reporting stage I and 5% reporting stage IV) [6]. Although our response rate of 30% is similar to that of several other population-based or registry-based mailed survey studies in cancer survivors [34–36], this response rate coupled with the tendency for IPAQ to over-estimate physical activity [37], required us to focus on the mean percent of total activity rather than absolute prevalence. Nevertheless, the reported physical activity suggests patterns and their associations have implications for future research and practice. Our results continue to support the usefulness of meeting current public health recommendations (i.e., ≥ 500 MET-mins/week) [4]. However, leisure activity may be more important for individuals with depressive symptoms. For reduction in fatigue, moderate rather than vigorous intensity with a gradual increase in quantity rather than intensity over time may be optimal. Public health interventions for rural breast cancer survivors should consider a broad range of physical activity types (not leisure alone) while also focusing on reducing time spent sitting. Future epidemiologic studies comparing rural and urban populations should include a measure of occupational and domestic/gardening activity. When feasible, such studies should combine accelerometer measurements with physical activity diaries to obtain additional detail related to exercise intensity, amount, and type. Randomized trials should examine the differences among physical activity types and intensities with regard to their effect on fatigue and depressive symptoms. Related to these trials, testing for a nonlinear response to physical activity intensity and moderating effect of psychosocial factors is warranted. Lastly, the mechanistic hypotheses related to adherence and symptom etiology generated by our study results warrant further study. Such research is needed to advance the

effort to reduce fatigue and depressive symptoms in cancer survivors through physical activity.

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Fig. 1.

Adjusted means for physical activity categories demonstrating significant unadjusted associations with fatigue. Means adjusted for age, race, education, comorbidities, prior adjuvant treatment (yes/no), and months since diagnosis

Fig. 2.

Adjusted means for physical activity categories demonstrating significant unadjusted associations with depressive symptoms. Means adjusted for age, race, education, comorbidities, prior adjuvant treatment (yes/no), and months since diagnosis

Table 1

Physical activity characteristics and daily minutes of sitting among rural breast cancer survivors based on the International Physical Activity Questionnaire (IPAQ)

Physical activity type and intensity	Mean $\pm$ SD	Median	Mean $\pm$ SD for percent of overall total ^c
Type			
Occupational, MET-mins/week ^a (<i>n</i> =479 ^b)	1423 $\pm$ 4967	0	15 $\pm$ 27%
Transportation, cycle or walking, MET-mins/week ^a (<i>n</i> =476)	317.1 $\pm$ 789.2	33	11 $\pm$ 18%
Domestic/gardening, MET-mins/week ^a (<i>n</i> =469)	1760 $\pm$ 2167	960	60 $\pm$ 31%
Leisure, MET-mins/week ^a (<i>n</i> =477)	428.8 $\pm$ 842.3	66	14 $\pm$ 21%
Intensity			
Walking, MET-mins/week ^a (<i>n</i> =475)	968.5 $\pm$ 2064	297	23 $\pm$ 24%
Moderate MET-mins/week ^a (<i>n</i> =464)	2325 $\pm$ 3048	1320	69 $\pm$ 27%
Vigorous MET-mins/week ^a (<i>n</i> =477)	643.8 $\pm$ 2629	0	8 $\pm$ 16%
Daily minutes sitting (<i>n</i> =471)	254.2 $\pm$ 163.8	225.7	n/a

^a MET-mins/week = metabolic equivalents * minutes per week;

^b Total n may vary due to missing values;

^c Occupational, transportation, domestic/gardening, and leisure totaled; walking, moderate, and vigorous totaled; Percent of total calculated for each participant was used to calculate mean percent for sample

Table 2

Associations among potential covariates for fatigue, depressive symptoms, and physical activity in rural breast cancer survivors [Spearman correlations for fatigue, depression; general linear model (age, education, comorbidities, months since diagnosis) or chi square (race, prior treatment) for physical activity; number indicates significant differences among the corresponding MET-mins/week categories of 0 (group 0), > 0 to < 500 (group 1), and ≥ 500 (group 2); NS = not significant]

	Age	Race	Education	Comorbidity score	Prior adjuvant treatment	Months since diagnosis
Fatigue	NS ^c	NS	-.14 ^b	.35 ^b	-.11 ^a	-.15 ^b
Depressive symptoms	NS	NS	-.14 ^b	.30 ^b	NS	NS
Occupational	0>1,2 ^b	NS	NS	0>1,2 ^b	NS	NS
Transportation	NS	NS	NS	NS	NS	NS
Domestic/gardening	0>1,2 ^b	0<1,2 ^b	0<1,2 ^b	0>1,2 ^b	NS	NS
Leisure	0>1,2 ^b	NS	0,1<2 ^b	0>1,2 ^b	NS	NS
Walking	0,1>2 ^b	NS	NS	0>1,2 ^b	NS	NS
Moderate	0>1>2 ^b	0<1,2 ^b	0<1,2 ^a	0>1,2 ^b	NS	NS
Vigorous	0>1,2 ^b	NS	NS	NS	NS	NS

^a $p < .05$,

^b $p < .01$,

^c NS = not significant ($p > .05$)

Unadjusted means for fatigue and depressive symptoms by physical activity type among rural breast cancer survivors

Table 3

MET-mins/week ^{a, b}	Fatigue mean (standard deviation)			Depressive symptoms mean (standard deviation)		
	0	> 0 to < 500	≥ 500	p value	0	> 0 to < 500
Occupational	14.8 (11.5)	12.8 (10.1)	15.1 (11.1)	>.05	7.5 (5.6)	6.6 (5.7)
Transportation	15.0 (11.4)	15.3 (11.4)	11.7 (10.1)	>.05	7.4 (5.6)	7.8 (5.8)
Domestic/gardening	20.7 (13.7) ^{b, c}	16.0 (11.7) ^{a, c}	13.1 (10.2) ^{a, b}	<.0001	10.1 (5.4) ^{b, c}	7.2 (5.7) ^a
Leisure	16.2 (11.6) ^c	14.6 (11.1)	11.5 (10.3) ^a	.001	7.9 (5.5) ^c	7.7 (5.8)

^a MET-mins/week = metabolic equivalents * minutes per week

^b Italicized letters after the unadjusted values indicate significant difference from corresponding groups [i.e., 0 (group a), 0 to 500 (group b), and ≥ 500 (group c)]

Table 4

Unadjusted fatigue and depressive symptoms means by physical activity intensity among rural breast cancer survivors

MET-mins/week ^{a, b}	Fatigue mean (standard deviation)		Depressive symptoms mean (standard deviation)	
	0	> 0 to < 500	0	> 0 to < 500
Walking	16.5 (12.1)	14.2 (10.5)	13.8 (11.3)	7.6 (5.4)
Moderate	21.1 (13.9) ^c	16.2 (11.7)	13.4 (10.4) ^a	7.1 (5.5) ^d
Vigorous	14.9 (11.4)	13.6 (11.0)	13.6 (10.9)	7.5 (5.6)

^aMET-mins/week = metabolic equivalents * minutes per week

^bItalicized letters after the unadjusted values indicate significant difference from corresponding groups [i.e., 0 (group a), 0 to 500 (group b), and ≥ 500 (group c)]