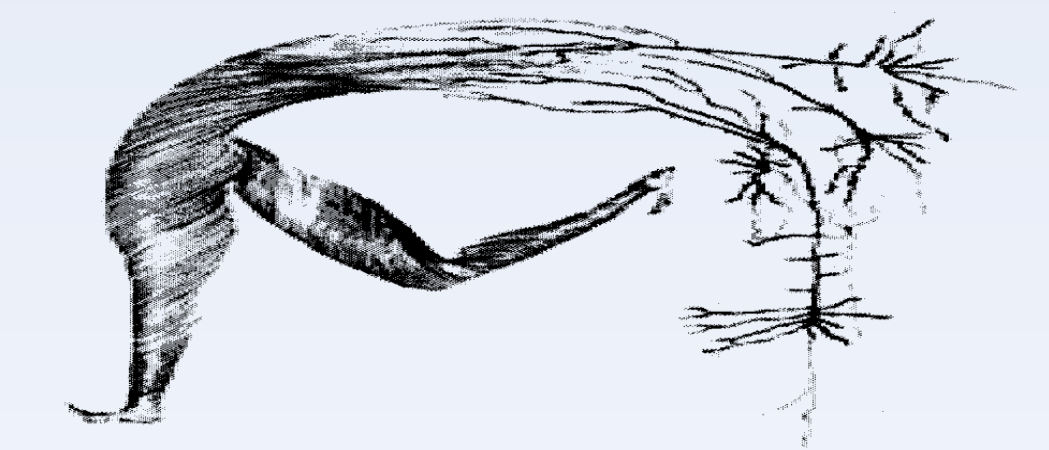


The Descriptive Epidemiology of Daily Sitting Time as a Measure of Sedentary Behavior in Multiple Sclerosis



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Introduction

Sedentary behavior (i.e., behavior involving sitting or lying that does not increase energy expenditure during the waking hours) is pervasive among adults in Western countries and world-wide. Sedentary time has been associated with disease risk factors such as blood glucose and obesity, as well as increased risks of morbidity and mortality, independent of physical activity. Little is known, however, about the epidemiology of this behavior in multiple sclerosis (MS).

Purpose

We compared self-reported sitting time (ST), as a measure of sedentary behavior, between persons with MS and healthy controls, and examined ST across demographic and clinical characteristics of those with MS.

Participants

This sample included 1081 persons with MS and 150 controls. The characteristics are included in Table 1.

Measures

ST was measured using item seven from the abbreviated version of the International Physical Activity Questionnaire (IPAQ). Physical activity was measured with the Godin Leisure-Time Exercise Questionnaire (GLTEQ). The participants completed a battery of questionnaires that included information on disease duration, disability, sex, age, race, height and weight for BMI, education and income.

Method

We conducted a secondary analysis data amalgamated from 13 previous investigations of physical activity and its associations with quality of life, social cognitive and symptomatic outcomes. All studies were approved by the same University Institutional Review Board. All participants provided written informed consent. Participants were either sent a battery of questionnaires through the United States Postal Service (USPS) with a stamped, pre-addressed return envelope or completed questionnaires during a baseline testing session in the laboratory.

Data Analysis

The data were analyzed using SPSS v.21.0. The primary analytic model for examining sitting behavior involved a between-subjects analysis of variance (ANOVA) on self-reported ST per day from question seven of the IPAQ. The between-subjects factors were based on group (i.e., MS vs. healthy control), or sociodemographic (i.e., sex, age, BMI, marital status, number of children, employment, race, education, and income) and clinical (i.e., MS type, disease duration, and ambulatory status based on PDDS score) factors in those with MS separately. We performed multiple linear regression analyses with stepwise entry to examine the independent contributions of variables associated ST in only the MS sample.

Results

There was not a significant difference in ST between persons with MS and controls; see Table 1. This was unchanged after controlling for sociodemographic variables that differed between groups. Persons with MS were significantly less active than controls based on GLTEQ scores (Table 1). ST was weakly associated with GLTEQ scores in MS ($r=-.21, p<.001$), but not controls. In persons with MS, the ANOVA identified statistically significant differences in ST when considering BMI, marital status, children, employment status, MS type, and PDDS score (Figure 1). The regression analysis revealed that ST significantly differed as functions of marital status, physical activity level, employment status, education, and disability status among those with MS (Table 2).

Conclusion

ST does not differ between persons with MS and healthy controls, but those with MS report still a large amount of this sedentary behavior that is potentially an independent correlate of health and disease outcomes. ST has been associated with morbidity and mortality, independent of physical activity level, in healthy populations. Thus, a future line of research should be directed toward decreasing ST among persons with MS through interventions and examining the secondary effects on morbidity and disease-specific manifestations.

Table 1. Sociodemographic and clinical characteristics with MS and controls.

Variable	Group		p-value
	Control (n=150)	MS (n=1081)	
Sex (% female)	91%	84%	0.01
Age (years)	43.2 ± 9.9	47.0 ± 10.3	<.001
BMI (cm/kg ²)	26.2 ± 5.8	27.7 ± 6.7	.007
Marital Status (% married)	63%	68%	0.19
Children (% with children)	72%	71%	0.76
Employment (% employed)	95%	61%	<.001
Race (% Caucasian)	82%	93%	<.001
Education (% college graduate)	81%	58%	<.001
Income (% over \$40,000)	81%	68%	0.37
MS Type (% RRMS)	-	90%	-
Disease duration (% less than 10 years)	-	61%	-
PDDS score (% without impairment)	-	61%	-
Time sitting (minutes)	449.6 ± 169.6	450.9 ± 220.6	0.95
GLTEQ	41.6 ± 26.7	23.9 ± 23.1	<0.001

Note: Values shown are mean ± standard deviation, unless otherwise noted.

MS: Multiple Sclerosis; RRMS: Relapsing-Remitting Multiple Sclerosis; PDDS: Patient Determined Disease Steps scale; GLTEQ: Godin Leisure-Time Exercise Questionnaire.

Figure 1. Minutes of Sitting Time Between Groups as a Function of Sociodemographic and Clinical Characteristics Among Persons with MS

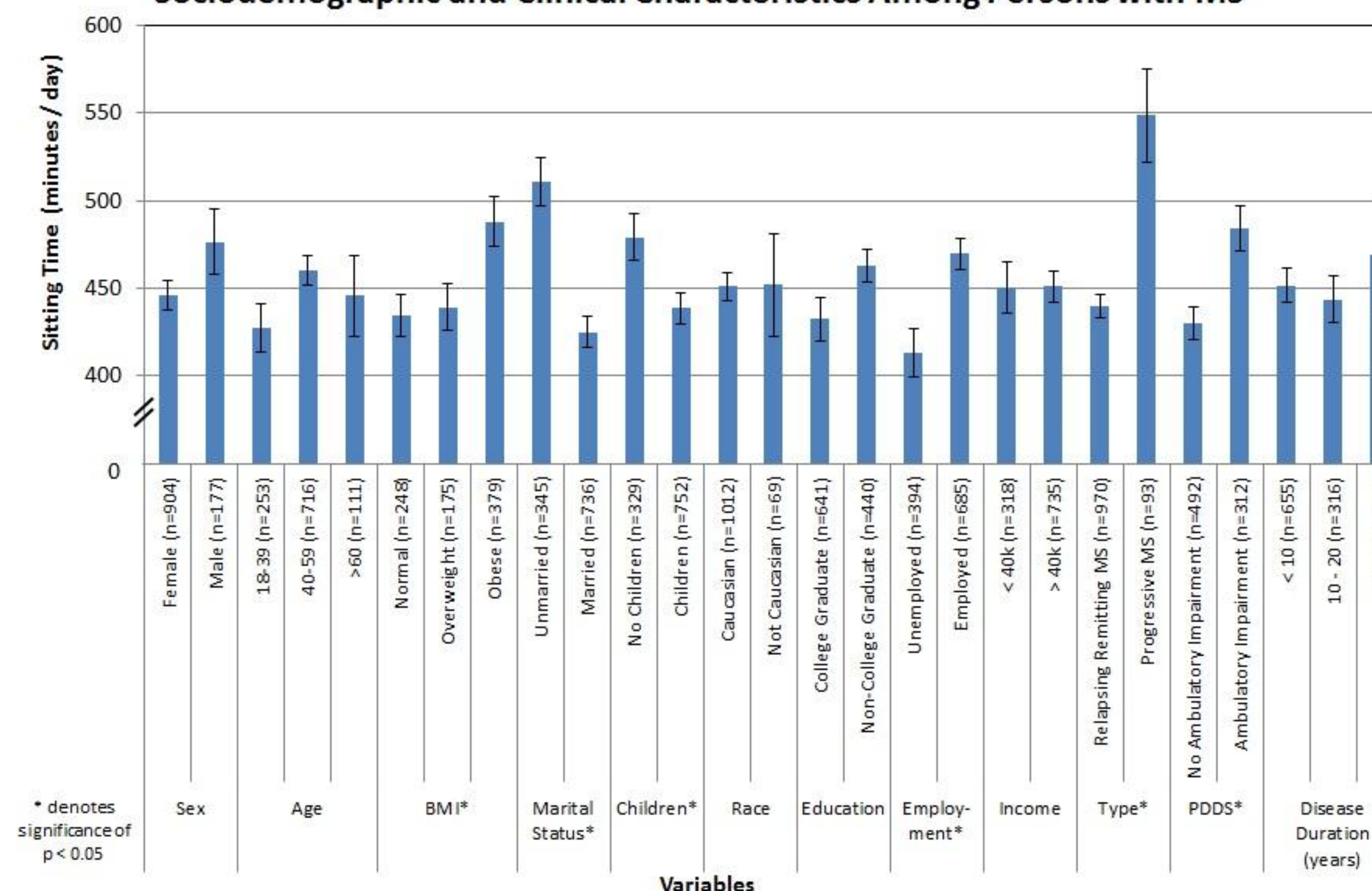


Table 2. Summary of hierarchical regression analysis for variables predicting sitting time in persons with MS.

Step	Variable	B	SE B	β
Step 1	Marital Status	-85.77	16.45	-0.19*
Step 2	Marital Status	-85.77	16.18	-0.19*
	GLTEQ	-1.81	0.35	-0.18*
Step 3	Marital Status	-87.42	16.05	-0.19*
	GLTEQ	-1.92	0.35	-0.19*
	Employment	57.73	15.64	0.13*
Step 4	Marital Status	-87.25	15.91	-0.19*
	GLTEQ	-1.76	0.35	-0.18*
	Employment	74.21	16.12	0.17*
	PDDS	58.97	15.75	0.14*
Step 5	Marital Status	-85.97	15.87	-0.19*
	GLTEQ	-1.83	0.35	-0.19*
	Employed	69.12	16.19	0.16*
	PDDS	59.13	15.70	0.14*
	Education	17.40	7.02	0.09**

Note: Marital status coding: 0=unmarried; 1=married; GLTEQ range: 0-198 units/day; Employment coding: 0=unemployed; 1=employed; PDDS coding: 0=no mobility impairment; 1=mobility impairment. $R^2 = 0.034$ for step 1, $p<0.001$; $\Delta R^2=0.033$ for step 2, $p<0.001$; $\Delta R^2=0.017$ for step 3, $p<0.001$; $\Delta R^2=0.017$ for step 4, $p<0.001$; $\Delta R^2=0.007$ for step 5, $p<0.001$.

MS: Multiple Sclerosis; B: unstandardized beta-coefficient; SE B: standard error of the unstandardized beta-coefficient; β: standardized beta-coefficient; GLTEQ: Godin Leisure-Time Exercise Questionnaire; PDDS: Patient Determined Disease Steps.