Levels and Rates of Physical Activity in Older Adults with Multiple Sclerosis

Rachel E. Klaren, Emerson Sebastiao, Chung-Yi Chiu, Dominique Kinnett-Hopkins, Edward McAuley, Robert W. Motl

University of Illinois Urbana-Champaign, Urbana, IL, USA

EXERCISE NEUROSCIENCE RESEARCH LABORATORY

Introduction

There are greater numbers of older adults living with multiple sclerosis (MS) than ever before and this coincides with both increased survival of those with MS and the shifting demographic landscape worldwide. However, little its known about predicting and managing the progression and consequences of MS in older adults. There is much evidence supporting the safety and benefits of physical activity in adults with MS and recent evidence of beneficial effects on physical function in older adults. However, there is very little known about physical activity participation in older adults with conditions such as MS.

Purpose

This study compared levels of physical activity (i.e., sedentary behavior, light physical activity (LPA), and moderate-to-vigorous physical activity (MVPA)) and rates of meeting public health guidelines for MVPA (i.e., ≥30 min/day) among young (i.e., ages 20-30 years), middle-aged (i.e., ages 40-59 years), and older adults (i.e., ages ≥60 years) with MS.

Participants

This sample included 963 persons with MS. The characteristics of the participants are included in Table 1.

Measures

ActiGraph accelerometer (7164 model) worn on a belt around the waist during the waking hours of the day over a 7-day period.

Method

The same university institutional review board approved all of the studies. After telephone screening for inclusion and provision of a signed informed consent, all participants received an accelerometer, a log sheet, and instructions for wearing the device. We computed time spent in sedentary behavior, LPA, and MVPA using appropriate cut-points for persons with MS through ActiLife software.

Data Analysis

The data were analyzed using SPSS v.21.0. Only participants with two or more valid days of accelerometer data were included in the analysis (N=963). The primary analysis involved a between-subjects ANOVA on accelerometer variables (i.e., accelerometer wear time; number of valid days; sedentary behavior in min/day; LPA in min/day; and MVPA in min/day). This analysis further involved *post-hoc* decomposition with Bonferroni corrections for examining specific differences in accelerometer variables between age groups. We expressed group differences in mean scores based on Cohen's d and interpreted the values as small, moderate, and large based on criteria of 0.2, 0.5, and 0.8, respectively. Finally, we examined differences among age groups in percentage of persons with MS accruing ≥30 min/day of MVPA using a χ^2 test.

Results

Accelerometer variables are provided in Table 2. There is a statistically significant difference in sedentary behavior (min/day) and the *post-hoc* analysis indicated that middle-aged and older adults with MS spent more time in sedentary behavior per day than young adults with MS, and these were small-to-moderate in magnitude (d=0.25 and 0.47, respectively). There was a statistically significant difference in MVPA (min/day) and this is illustrated in Figure 1. The *post-hoc* analysis indicated that older adults with MS spent less time in MVPA per day than middle-aged and young adults with MS, and these were small-to-moderate in magnitude (d=0.36 and 0.64, respectively). Middle-aged adults with MS further spent less time in MVPA per day compared with young adults with MS and this difference was small in magnitude (d=0.26). There further was a significant difference among age groups in percentage of persons with MS meeting public health guidelines for MVPA (i.e., accruing ≥30 min/day of MVPA. Only 14.0% of older adults with MS accrue ≥30 min/day of MVPA compared with 20.8% and 28.4% of persons in middle-aged and young adults with MS, respectively.

Figure 1. Minutes per day of moderate-to-vigorous physical activity (MVPA) between age groups of people with MS
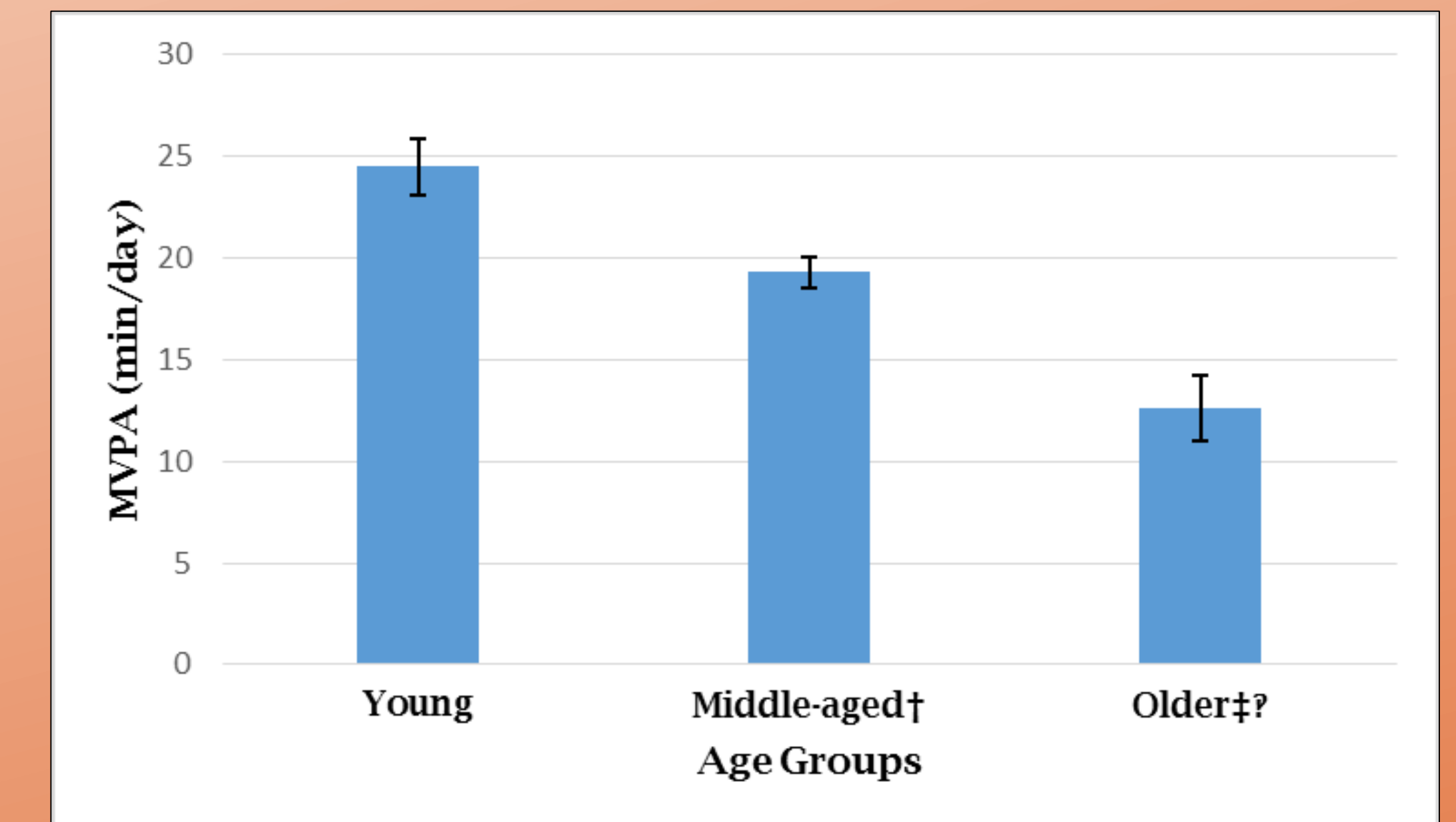
†=p<0.05 for Young vs. Middle-aged groups; ‡=p<0.05 for Young vs. Older age groups; ?=p<0.05 for Middle-aged vs. Older age groups; Young=age of 20-39 years; Middle-aged=age of 40-59 years; Older=ages ≥60 years. Values represent mean score and standard error of the mean.

Conclusion

This study provided the first objective estimates of physical activity (i.e., LPA and MVPA) and sedentary behavior among older adults (i.e., ages ≥60) with MS. Collectively, our data indicated that older adults with MS engaged in less MVPA and more sedentary behavior than middle-aged and young adults with MS. Such results highlight the importance of developing physical activity interventions as an effective means for managing the progression and consequences of MS in older adults.

Table 1. Demographic and clinical characteristics in 963 persons with MS by years of age (i.e., 20-39, 40-59, and ≥60)

Variable	Age Groups			
	Young (n=194)	Middle-aged (n=662)	Older (n=107)	*p*-value
Age, years	33.1 (4.7)	49.6 (5.4)	63.0 (3.6)	.001*
Sex, % female	82.2	85.5	77.6	.09
Race, % Caucasian	91.2	94.2	96.3	.20
BMI, kg/m²	27.6 (6.8)	27.1 (6.8)	27.6 (7.4)	.24
Education, (% college graduate)	66.0	59.6	58.9	.26
Income, (% >$40K/year)	60.1	73.3	63.6	.001*
Type of MS, %RRMS	96.9	92.0	82.2	.01*
Disease duration, years	6.3 (5.0)	10.8 (7.2)	16.5 (9.2)	.001*
PDDS score (mdn, IQR)	1.0 (3.0)	2.0 (2.0)	3.0 (3.0)	.001*

Data presented as mean (SD), unless otherwise noted. MS=multiple sclerosis; RRMS=relapsing-remitting MS; PDDS=Patient Determined Disease Steps; *=Significance at *p*<0.05; Young adults=ages 20-39; Middle-aged=ages 40-59; Older adults=ages ≥60 years

Table 2. Accelerometer variables in 963 persons with MS by years of age (i.e., 20-39, 40-59, and ≥60)

Variable	Age Groups			*F*-value	*p*-value
	Young (n=194)	Middle-aged (n=662)	Older (n=107)		
Wear time, min/day	823.4 (70.8)	838.9 (86.1)	840.2 (70.8)	2.9	.057
Number of valid days‡?	5.8 (1.3)	6.0 (1.3)	6.5 (1.0)	11.1	.001*
Sedentary behavior, min/day†‡	509.6 (83.7)	532.8 (100.4)	554.1 (89.9)	8.0	.001*
LPA, min/day	289.4 (75.0)	287.7 (85.2)	275.0 (84.2)	1.2	.302
MVPA, min/day†‡?	24.5 (20.1)	19.3 (20.2)	12.6 (16.7)	12.6	.001*

Data presented as mean (SD), unless otherwise noted. MVPA=moderate-to-vigorous physical activity; Based on post-hoc Bonferroni corrections: †=*p*<0.05 for Young vs. Middle-aged groups; ‡=*p*<.05 for Young vs. Older age groups; ?=*p*<.05 for Middle-aged vs. Older age groups; Young adults=ages 20-39; Middle-aged=ages 40-59; Older adults=ages ≥60 years

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