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Rates, Patterns, and Correlates of Fitness Tracker Use Among Older Adults with Multiple Sclerosis

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Abstract

Background—Older adults with multiple sclerosis (MS) engage in alarmingly low levels of physical activity. Fitness trackers may be a promising approach for promoting and monitoring physical activity among older adults with MS.

Objective/Hypothesis—This study reports on the rates, patterns of fitness tracker use in adults with MS who are over 60 years of age. We hypothesized that older adults with MS who use fitness trackers "users" would report significantly more physical activity than those who don't "non-users."

Methods—Participants across the United States completed an online survey that included self-reported demographic and clinical characteristics, fitness tracker use questionnaire, and Godin Leisure-Time Exercise Questionnaire (GLTEQ) for measuring total and health-promoting physical activity (GLTEQ-HCS).

Results—Of the 440 participants who completed the full survey, 112 (28%) identified as fitness tracker users. The most common activity monitors were Fitbit®, Smartphone app, Apple® watch, and Garmin®. Fitness tracker users mostly reported having relapsing-remitting MS, less disability (i.e., lower Patient Determined Disability Steps), higher income, and higher rates of employment. There was a statistically significant difference in GLTEQ Total ($t(438) = -3.8$, $p=.001$) and GLTEQ-HCS ($t(438) = -2.8$, $p=.006$) scores between fitness tracker users and non-users. Self-reported step counts were strongly correlated with both GLTEQ Total ($\rho = .50$) and GLTEQ-HCS ($\rho = .54$) scores in fitness tracker users.

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All procedures were approved by University of Alabama at Birmingham Institutional Review Board. Informed consent was obtained from all participants prior to data collection. Authors have no competing interests pertaining to the research.

Conclusions—Further research is warranted investigating fitness tracker use and interests among older adults with MS and how technology may be applied as a behavioral tool to increase physical activity among this growing portion of the MS population.

Keywords

Behavior; Fitness Tracker; Multiple Sclerosis; Physical Activity; Rehabilitation

Introduction

One million adults within the United States are currently living with multiple sclerosis (MS),[1] and the prevalence of MS is most common among adults 55 years of age and older.[1] These older adults with MS likely experience the compounding effect of disease-related pathology along with aging-related changes on physical and cognitive functioning.[2–5] Physical activity is an evidence-based approach for addressing both MS-related and aging-related physical and cognitive dysfunction,[6] however older adults with MS engage in alarmingly low rates of physical activity.[7,8] This underscores the importance of identifying timely and appropriate approaches for monitoring and promoting physical activity among older adults with MS.

Wearable fitness trackers, or activity monitors, are one proposed method for increasing physical activity behavior among older adults.[9] Fitness trackers encompass a wide range of devices from simple spring-loaded pedometers that measure steps as a binary event through complex, triaxial accelerometers that measure steps via proprietary algorithms as well as other outcomes such as heart rate. The majority of research on fitness tracker use and physical activity has focused on young-middle aged adults, yet older adults are increasingly interested in new technologies for improving overall health and wellbeing.[10] Indeed, qualitative research focusing on approaches for integrating technology and physical activity promotion among older adults highlights the importance of detailed instructions and tailored trackers for unique motor patterns and preferences.[11] Older adults further express concerns regarding accuracy, comfort, and overall usability of fitness trackers for monitoring daily activities, and this may be complicated among older persons with physical and cognitive dysfunction.[12]

There has been recent interest in fitness tracker use among persons with MS.[13] One study of 629 persons with MS reported that 40% of the sample reported regularly using a fitness tracker and the most common types were Fitbit®, Apple® watch, iPhone®, and Garmin®.[14] Adults with MS who use fitness trackers reported significantly more physical activity than adults who were non-users and fitness tracker users were generally younger with higher income and rates of employment (i.e., disposable income for purchasing fitness trackers).[14] This is consistent with research examining older adults in the general population, wherein individuals who are younger, male, and more educated were more likely to use a fitness tracker.[10] Fitness trackers further have been identified as an effective tool for self-monitoring in behavioral interventions among adults with MS and other neurological diseases such as Parkinson's.[15–17] To date, little is known regarding the use and utility of fitness trackers as a behavior change tool among older adults with MS.

This study examined the rate and pattern of fitness tracker use among adults with MS over the age of 60 years (i.e., older adults with MS). We initially described the rate of fitness tracker use among older adults with MS, including the type of tracker, and then examined age, sex, and socioeconomic status as correlates of fitness tracker use among older adults with MS. We further expected that "users" would report more physical activity than "non-users". This study provides a foundation for additional research identifying best practices for promoting physical activity via fitness tracker use as an approach for managing symptoms and disease progression in the aging MS population.

Methods

Participants

Participants across the United States were recruited for a cross-sectional study examining correlates of physical activity among older adults with MS. The study was advertised via an e-mail distribution from the National MS Society (NMSS) with a link for an online survey. To be included, participants self-reported a medical diagnosis of MS, age of 60 years or older, and consent for participation.

Measures

Demographics and clinical characteristics—Participants self-reported sex, marital status, age, employment status, race, education, annual household income, type of MS, and disease duration. The Patient Determined Disease Steps (PDDS) scale measured disability status.[18]

Physical activity—The Godin Leisure Time Exercise Questionnaire (GLTEQ) was included as a self-report measure of physical activity.[19] Participants were asked to report the number of exercise bouts exceeding 15 minutes per day during the previous week. The total GLTEQ score was calculated by multiplying the frequency of strenuous, moderate, and mild bouts by nine, five, and three metabolic equivalents, respectively, and summing the weighted scores for a range of 0–119. The GLTEQ Health Contribution Score (GLTEQ-HCS) was calculated by summing the weighted values for strenuous and moderate activity only (range of 0–98), with higher scores representing more health-promoting physical activity.[20]

Fitness tracker use—The research team developed 4 items assessing fitness tracker use based on previous research.[14] Item 1 identified users of fitness trackers by asking, "Do you currently use an activity monitor or pedometer?" ('Yes' or 'No'). The type of fitness tracker used was assessed by Item 2, "What kind of activity monitor do you use? (i.e., brand & model)" (open-ended). Item 2 was coded to classify fitness trackers into categories for descriptive purposes (e.g., FitBit®). Average step counts on weekdays and weekend days were addressed by Items 3 and 4, "One average how many steps do you take on a weekday/weekend day?" (open-ended).

Procedures

Study procedures were approved by a University Institutional Review Board. Qualtrics survey software delivered the online questionnaire. The NMSS e-mailed a brief overview of the study and Qualtrics questionnaire link. The link was active for data collection from July-December of 2019. The active link began with informed consent and assessment of eligibility using self-reported items to confirm age of 60 years or older ('Yes' or 'No') and MS diagnosis ('Yes' or 'No'). The full questionnaire was completed in Qualtrics and participants provided a postal address in the final question for receipt of $10 remuneration.

Data Analysis

All analyses were performed using SPSS Statistics 24 (IBM, Inc., Armonk, NY). Baseline descriptive characteristics are reported as n(%) or mean ± standard deviation unless otherwise specified. Fitness tracker users and non-users were grouped and differences in demographic and clinical characteristics were assessed using independent samples t-tests or chi-square, as appropriate. The differences in physical activity between fitness tracker users and non-users were examined using independent samples t-tests. The magnitude of differences between fitness trackers users and non-users were expressed as Cohen's *d* and interpreted using guidelines of ≥.20 for small difference, ≥.50 for moderate difference, and ≥.80 for large difference.[21] Spearman's Rank Order Correlations were used to examine associations between self-reported step count (averaged between weekday and weekend days) and GLTEQ Total and HCS in activity monitor users given non-normal distributions. The magnitude of correlation coefficients were interpreted based on Cohen's guidelines for small≥ .10, moderate≥ .30, and large≥ .50.[21]

Results

There were 440 persons who consented and provided usable data, and sample characteristics are in Table 1. Among the 440 participants, 112 (28%) reported using a fitness tracker ("users"), whereas 318 (72%) reported not using a fitness tracker ("non-users"). The most popular fitness tracker was Fitbit® (n=58; 47%), followed by Smartphone app (n=29; 24%), Apple® watch (n=12; 10%), and Garmin® (n=6; 5%); other fitness trackers included pedometers and other smart watches.

Fitness tracker use differed by demographic and clinical characteristics. Fitness tracker users mostly reported having relapsing-remitting MS (X^2 (2, N = 436) = 26.03, p=.001), lower PDDS scores (X^2 (8, N = 440) = 52.84, p=.001), higher income (X^2 (5, N = 410) = 22.72, p=.001), and higher rates of employment (X^2 (1, N = 440) = 12.50, p=.001).

Among the full sample, the mean GLTEQ Total score was 25.6±21.1 and mean GLTEQ-HCS was 15.1±18.5. There was a statistically significant (t(438)= −3.8, p=.001) and small magnitude difference (*d*=0.40) in GLTEQ Total scores between fitness tracker users (31.2±19.8) and non-users (22.9±21.1). There was a statistically significant (t(438)= −2.8, p=.006) and small magnitude of difference (*d*=0.30) in GLTEQ-HCS between fitness tracker users (19.0±18.1) and non-users (13.6±18.4).

Average step counts reported among the 112 fitness tracker users was 5563±3747 steps per day; we did not have step count data for non-users. Spearman's correlation analyses indicated that self-reported step counts per week were strongly correlated with both GLTEQ Total (ρ= .50) and GLTEQ-HCS (ρ= .54) scores; see scatterplots in figure 1.

Discussion

Among our sample of older adults with MS, approximately one in four report using a fitness tracker, and this is lower than adults of all ages with MS,[13] but higher than the general population older adults.[10] Fitness tracker use varied significantly by MS disability status, MS clinical course, employment status, and income, but not age or gender, as reported in previous research.[10,13] Fitness tracker use was significantly associated with levels of total and health promoting physical activity, and steps per day was associated with overall and health promoting physical activity among users. Overall, our results indicate that among older adults with MS, fitness tracker use is most common among those who have less disability, a higher rate of employment, and report higher income, and fitness tracker use is associated with more physical activity. This suggests that fitness trackers may be an important tool for promoting physical activity in the aging MS population.

We report that 28% of older adults with MS currently use a fitness tracker. This is less than previously been reported among adults of all ages with MS (40%),[13] yet it is considerably more than fitness tracker use in the general population of older adults (50–64 years = 14%, >65 years = 9%).[10] Such a difference may be explained by the high prevalence of internet and mobile technology use in the MS population.[22,23] This is further consistent with the growing interest in self-monitoring one's condition with mobile technology in MS.[24] Focal research is needed examining older adults with MS versus controls from the general population that could assess factors associated with fitness tracker use such as level of income.

Fitness tracker users reported higher rates of employment and overall income than non-users. This association is consistent with previous literature highlighting associations between physical activity and socioeconomic status in various populations.[25–27] Additional research is needed that examines the direction of this relationship, as it is possible that only those with higher rates of employment and income can afford fitness trackers. This might support the importance of identifying whether access to a lower cost, yet highly functional device would impact overall prevalence among older adults with MS. Unlike previous research, we did not identify a difference in age between users and non-users. Such differences in age may be attenuated after the age of 60 among persons with MS.

Fitness tracker use in this sample varied by disability status and MS clinical course, which are established predictors of physical activity in MS.[28,29] This discrepancy between users and non-users highlights the need for more accessible and accurate fitness trackers among those with greater disability. Indeed, there is growing evidence that older adults with various mobility disabilities are interested in technology for tracking physical activity,[30,31] yet the accuracy of fitness trackers among persons with moderate-severe MS and progressive disease course is not yet established. The lack of accuracy, comfort, and usability of devices may preclude use of fitness trackers in free-living conditions and behavioral interventions for individuals with greater mobility disability. Fitness trackers are evidence-based self-monitoring tools in theory-based behavioral interventions in both adults with MS and older adults in the general population,[16,32] highlighting the importance of further investigation of strategies that promote accessibility, usability, and uptake in the aging MS population.

Consistent with previous research,[14] total and health promoting physical activity were significantly higher among fitness tracker users. Therefore, expansion of fitness tracker use among older adults with MS may be one approach for increasing physical activity in this population. Such approaches for promoting physical activity are critical given potential meaningful benefits of physical activity for older adults with MS such as improvements in walking performance.[8] Collectively, fitness trackers are one approach for promotion and monitoring of physical activity and increased physical activity among older adults is critical given the association between physical activity, independence, participation, and overall health.[33]

The limitations of this study include the self-report nature of fitness tracker use, steps per day, and physical activity. Future research studies may consider use of novel resources such as Fitabase® for downloading step counts directly from manufacturers. Fitness tracker users reported significantly more physical activity, and this may be the driving factor for fitness tracker use (e.g., those who are more active are more likely to purchase a fitness tracker) that cannot be ascertained in the current study. Further research examining the impact of introducing fitness trackers as a self-monitoring tool among older adults with MS who are not already active is needed as well as focal assessment of reasons for non-use in this population. Lastly, fitness trackers generally measure steps by design, which may not be an appropriate analogue for persons with significant mobility impairment that requires discrete examination.

Conclusions

Our results indicate that 28% of older adults with MS are using commercially available fitness trackers, and fitness tracker users are significantly more active than non-users. Given the potent effects of physical activity on MS symptoms and disease progression, further investigation regarding the impact of fitness tracker use among sedentary older adults with MS is warranted. Such research may involve evidence-based behavioral interventions that utilize fitness trackers as a primary component for initiating and maintaining behavior change in conjunction with education and social support via behavioral coaches.

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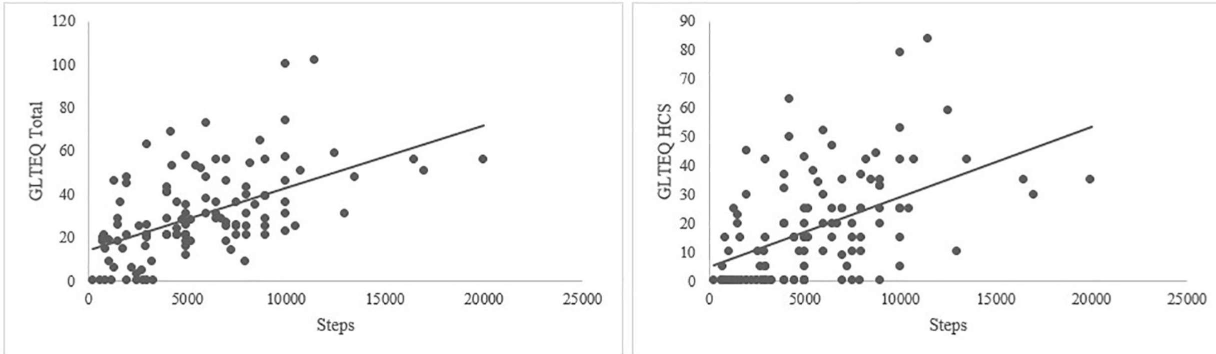

Figure 1.

Scatterplots of the Association Between Self-Reported Average Steps per Day from Fitness Trackers and Overall and Health-Promoting Physical Activity from Godin Leisure-Time Exercise Questionnaire (GLTEQ)

Table 1.

Sample demographics and clinical characteristics

Variable, *units (n)*	Full Sample, n=440	Fitness Tracker Users, n=122	Non-Users, n=318	P-value
	Mean±SD	**Mean±SD**	**Mean±SD**	
Age, *years (431)*	66.1±7.9	66.0±11.3	66.1±6.1	.91
MS Duration, *years (440)*	20.1±13.4	18.8±14.9	20.6±12.7	.20
	Median(IQR)	**Median(IQR)**	**Median(IQR)**	
PDDS *(440)******	3.0(4.0)	1.0(3.0)	4.0(5.0)	.001
	n(%)	**n(%)**	**n(%)**	
MS Clinical Course *(436)******				.001
RRMS	267(61.2)	98(80.3)	169(53.8)	
Primary Progressive	52(11.9)	17(13.9)	45(14.3)	
Secondary Progressive	117(26.8)	7(5.7)	100(31.8)	
Gender *(440)*				.91
Female	341(77.5)	95(77.9)	246(77.4)	
Male	99(22.5)	27(22.1)	72(22.6)	
Marital Status *(439)*				.65
Married	306(69.7)	88(72.1)	218(68.6)	
Single	29(6.6)	9(7.4)	20(6.3)	
Divorced/Separated	74(16.9)	18(14.9)	56(17.6)	
Widow/Widower	30(6.8)	6(5.0)	24(7.5)	
Employed *(440)******				.001
Yes	95(21.6)	40(32.8)	55(17.3)	
No	345(78.4)	82(67.2)	263(82.7)	
Race *(439)*				.41
Caucasian	409(93.2)	112(91.8)	297(93.4)	
African American	11(2.5)	2(1.6)	9(2.8)	
Latino/a	1(2)	1(0.8)	0(0)	
Other	18(4.1)	6(5.0)	12(3.7)	
Education *(440)*				.74
High School	33(7.5)	7(5.7)	26(8.1)	
1–3 Years College	92(20.9)	28(23.0)	64(20.1)	
College Graduate	158(35.9)	43(35.2)	115(36.2)	
Masters Degree	117(26.6)	29(23.8)	88(27.7)	
PhD or Equivalent	40(9.1)	15(12.3)	25(7.9)	
Annual Household Income *(410)******				.001
Less than $15,000	12(2.9)	2(1.7)	10(3.4)	
$15,000–24,000	41(10.0)	2(1.7)	39(13.3)	
$25,000–49,000	82(20.0)	21(17.9)	61(20.8)	
$50,000–74,000	93(17.8)	22(18.8)	71(24.2)	

$75,000–99,000	73(17.8)	30(25.6)	34(14.7)	
$100,000 or greater	109(26.6)	40(34.2)	69(23.5)	
Physical Activity				
GLTEQ Total ***	25.6±21.1	31.2±19.8	22.9±21.1	.001
GLTEQ HCS **	15.1±18.5	19.0±18.1	13.6±18.4	.006
Self-reported Steps Per Day	N/A	5563±3747	N/A	N/A

Note: IQR= Interquartile Range; PDDS= Patient Determined Disease Steps; RRMS= Relapsing Remitting Multiple Sclerosis; GLTEQ= Godin Leisure Time Exercise Questionnaire; HCS= Health Contribution Score

*p<.05

**p<.01

***p<.001

self-reports steps per day were not available for non-users and are not reported for the full sample or subsample of non-users.