Supplementary Online Content

Block VJ, Bove R, Zhao C, et al. Association of continuous assessment of step count by remote monitoring with disability progression among adults with multiple sclerosis. *JAMA Netw Open.* 2019;2(3):e190570. doi:10.1001/jamanetworkopen.2019.0570

This supplementary material has been provided by the authors to give readers additional information about their work.

eTable 1. Demographic Information for All Participants

Demographic	Total	EDSS 0-1.5	EDSS 2-3.5	EDSS 4.0	EDSS 4.5-5.5	EDSS 6.0	EDSS 6.5
Study Sample	95	14	23	14	12	18	14
Sex, Female. N (%)	59 (62.1)	9 (15.3)*	17 (28.8)*	5 (8.5)*	7 (11.9)*	14 (23.7)*	7 (11.9)*
Age (years), mean (SD)	49.6 (13.6)	38.7 (13.2)	43.1 (11.5)	57.3 (11.7)	53.7 (9.6)	53.3 (11.1)	58.5 (13.2)
Disease Duration (years), median [IQR]	13 [5.0- 20.5]	4.6 [3.0-8.0]	7.4 [2.9-14.5]	20.5 [9.9-30.9]	12.7 [8.7-15.3]	14.8 [5.6-22.9]	20.5 [14.6-22]
Relapsing MS (N)	60	14	20	7	6	9	7
Progressive MS (N)	35	0	3	7	6	9	7

Legend: MS = multiple sclerosis, EDSS = expanded disability status scale, N = number, SD = standard deviation, IQR = inter quartile range

* = percentages calculated using total Female as denominator (N=59)

eTable 2. Demographic Table of Withdrawn or Lost to Follow-up Compared With the Completer Cohort

Demographics and Outcomes	Completer Cohort (n=79)	Withdrawn or lost to follow-up (n=16)	Total (n=95)	*P* Value (chi^2)
Female. N (%) **Male.** N (%)	30 (38.0) 49 (62.0)	6 (37.5) 10 (62.5)	36 (37.9) 59 (62.1)	.97 (.001)
EDSS. Median [IQR]	4.0 [2.5, 6.0]	3.5 [2.4, 4.9]	4.0 [2.5, 6.0]	.275
Age. Mean (SD)	50.3 (13.7)	45.9 (12.6)	49.6 (13.6)	.237
Disease Duration (years) Median [IQR]	13.0 [5.5, 20.5]	8.0 [3.0, 16.8]	13.0 [5.0, 20.5]	.620
MS subtype. RR: N (%), Prog: N (%)	49 (62), 30 (38)	11 (69), 5 (31)	60 (63), 35 (37)	.82 (.05)
T25FW. Mean (SD)	7.3 (5.8)	7.4 (5.0)	7.3 (5.6)	.922
TUG. Mean (SD)	12.2 (12.0)	10.8 (6.0)	11.9 (11.2)	.650
MSWS-12. Mean (SD)	36.2 (15.5)	36.1 (15.7)	36.2 (15.4)	.983
MFIS-5. Mean (SD)	9.9 (4.9)	9.8 (5.8)	9.9 (5.0)	.958
MHI-5. Mean (SD)	20.4 (2.1)	19.6 (3.1)	20.2 (2.3)	.249
BLCS. Mean (SD)	6.0 (5.9)	5.2 (6.7)	5.9 (6.0)	.660
PES. Mean (SD)	13.1 (5.6)	16.1 (6.2)	13.6 (5.8)	.057
WHODAS. Mean (SD)	10.4 (7.5)	12.4 (9.3)	10.7 (7.8)	.357

Legend: EDSS = Expanded disability status scale, IQR = interquartile range, SD = standard deviation, N/A = not applicable.

T25FW = Timed-25-Foot walk, TUG = Timed-up and Go, MSWS-12 = 12-item MS walking scale, MFIS-5 = 5 item Modified Fatigue Impact Scale, MHI-5 = 5-item Mental health Inventory, BLCS = Bladder control scale, PES = pain effects scales, WHODAS = World Health Organization Disability Assessment Schedule.

eTable 3. Comparison of Shorter Epochs of Remote Average Daily Step Count to Continuous 1-Year Monitoring in People Without Ambulatory Disability (EDSS < 4.0) and People With Ambulatory Disability (EDSS ≥ 4.0)

Slope of continuous average daily step count monitoring for 1 year compared to the slope derived from:	EDSS < 4.0 (slope of 1 year = - 9.34)		EDSS ≥ 4.0 (slope of 1 year = - 3.31)	
	Slope of shorter monitoring time	[*P* Value]	Slope of shorter monitoring time	[*P* Value]
Weeks 1 to 3	330.21	.005*	125.33	.000**
Weeks 1 to 4	186.32	.048*	96.65	.000 **
Weeks 1 to 5	-96.42	.615	117.47	.000 **
…				
Weeks 1 to 31	-4.11	.594	-11.64	.021*
Weeks 1 to 32	-3.71	.545	-10.27	.048*
Weeks 1 to 33	-3.66	.520	-8.09	.184
…				
First 2 weeks (1-2), and last 2 weeks (51-52)	-13.13	.616	2.31	.056
Baseline (weeks 1-4), month 6 and month 12.	-13.21	.615	2.35	.096

Legend: EDSS = Expanded Disability Status Scale.

Significance: * p <.05, ** p <.001

To determine how shorter epochs of remote average daily step count compare to continuous monitoring for 1-year, we analyzed the difference in slopes for shorter durations, systematically eliminating one month at a time, compared to 1-year data. We dichotomized by EDSS to account for walking disability: participants with some walking disability (EDSS ≥ 4.0) and participants with minimal-to-no walking disability (EDSS<4.0). Shown in the table are the weeks where there was a transition to or from significance between the slopes.

eTable 4. Odds of Disability Worsening at 1 Year in a Multivariable Logistic Regression Model

Outcome or Demographic	Odds Ratio	Confidence Interval	*P* Value
EDSS Clinically Meaningful Worsening†			
Median Average Daily Step Count at Baseline < 4766	4.01	1.17 – 13.78	.03
Age at Baseline (years)	2.45	0.81 – 7.43	.11
Sex (Male)	0.97	0.93 – 1.02	.21
Disease Duration	0.98	0.92 – 1.04	.47
Timed-25 Foot Walk Worsening†			
Median Average Daily Step Count at Baseline < 4766	3.50	1.02 – 12.03	.04
Age at Baseline (years)	3.02	0.94 – 9.69	.06
Sex (Male)	0.99	0.94 – 1.04	.64
Disease Duration (years)	1.01	0.95 – 1.07	.76

Legend: EDSS = Expanded Disability Status Scale.

† Clinically-meaningful disability (EDSS) change was defined as: a 1.5 point change when baseline EDSS score was 0.0 to 1.0; a 1.0 point change when baseline EDSS score was 1.5 to 5.0; and a 0.5 point change when baseline EDSS score was 5.5 to 6.5. A 20% change was considered clinically meaningful for T25FW.
Significance p values: *P*<.05. Adjusting for disease duration did not significantly alter the results.