Supplementary materials

Assessment time point	E_A	METs	PhAD	Steps
Baseline (n=56)	0.875 (<0.0001)	0.796 (<0.0001)	0.844 (<0.0001)	0.817 (<0.0001)
6 months (n=55)	0.897 (<0.0001)	0.730 (<0.0001)	0.877 (<0.0001)	0.777 (<0.0001)
12 months (n=54)	0.865 (<0.0001)	0.694 (<0.0001)	0.80 (<0.0001)	0.850 (<0.0001)
18 months (n=52)	0.871 (<0.0001)	0.691 (<0.0001)	0.837 (<0.0001)	0.762 (<0.0001)
24 months (n=50)	0.889 (<0.0001)	0.772 (<0.0001)	0.837 (<0.0001)	0.788 (<0.0001)
30 months (n=48)	0.878 (<0.0001)	0.820 (<0.0001)	0.861 (<0.0001)	0.819 (<0.0001)

Supplementary Table 1: Spearman's rho correlation coefficients (p-value) between RAM components and overall RAM scores at each assessment time point.

Baseline correlations	E$_A$	METs	PhAD	Steps	RAM score
EDSS (n=54)	**-0.343 (0.011)**	**-0.411 (0.002)**	**-0.325 (0.016)**	**-0.589 (<0.0001)**	**-0.419 (0.002)**
MSFC (n=55)	**0.316 (0.019)**	**0.365 (0.006)**	**0.305 (0.024)**	**0.493 (0.0001)**	**0.376 (0.005)**
T25FW (n=55)	**-0.331 (0.014)**	**-0.412 (0.002)**	**-0.317 (0.018)**	**-0.640 (<0.0001)**	**-0.444 (0.001)**
9-HPT (n=55)	-0.212 (0.121)	-0.254 (0.061)	-0.220 (0.106)	**-0.436 (0.001)**	**-0.321 (0.017)**
MSIS-phys (n= 55)	**-0.299 (0.027)**	**-0.287 (0.033)**	**-0.278 (0.04)**	**-0.447 (0.001)**	**-0.356 (0.008)**
PASAT (n=55)	0.137 (0.318)	0.154 (0.261)	0.126 (0.359)	0.134 (0.329)	0.105 (0.444)
MSIS-psych (n=55)	-0.142 (0.303)	-0.185 (0.177)	-0.119 (0.385)	-0.234 (0.085)	-0.143 (0.297)
Fatigue score (n=55)	-0.163 (0.235)	-0.231 (0.09)	-0.153 (0.265)	-0.203 (0.138)	-0.14 (0.307)
BDI (n=54)	-0.108 (0.437)	-0.052 (0.707)	-0.043 (0.758)	-0.179 (0.195)	-0.112 (0.422)

6 month correlations	E$_A$	METs	PhAD	Steps	RAM score
EDSS (n=39)	-0.140 (0.396)	-0.270 (0.097)	-0.125 (0.45)	**-0.355 (0.027)**	-0.236 (0.147)
MSFC (n=55)	0.265 (0.050)	0.225 (0.099)	0.249 (0.066)	**0.316 (0.019)**	**0.342 (0.011)**
T25FW (n=55)	**-0.30 (0.026)**	**-0.282 (0.037)**	**-0.282 (0.037)**	**-0.497 (0.0001)**	**-0.421 (0.001)**
9-HPT (n=55)	-0.147 (0.283)	-0.181 (0.187)	-0.161 (0.240)	**-0.333 (0.013)**	**-0.284 (0.035)**
MSIS-phys (n=54)	-0.260 (0.057)	-0.288 (0.034)	-0.246 (0.073)	**-0.346 (0.010)**	**-0.323 (0.017)**
PASAT (n=55)	0.143 (0.298)	0.005 (0.974)	0.099 (0.472)	-0.039 (0.780)	0.102 (0.457)
MSIS-psych (n=54)	-0.071 (0.609)	-0.129 (0.352)	-0.075 (0.592)	-0.155 (0.263)	-0.074 (0.593)
Fatigue score (n=55)	-0.184 (0.18)	-0.239 (0.079)	-0.228 (0.095)	-0.215 (0.114)	-0.181 (0.187)
BDI (n=55)	-0.013 (0.923)	-0.098 (0.475)	-0.003 (0.985)	-0.153 (0.264)	-0.041 (0.768)

12 month correlations	E$_A$	METs	PhAD	Steps	RAM score
EDSS (n=44)	**-0.381 (0.011)**	**-0.370 (0.013)**	**-0.387 (0.009)**	**-0.514 (0.003)**	**-0.433 (0.003)**
MSFC (n=54)	**0.330 (0.015)**	**0.276 (0.043)**	**0.314 (0.021)**	**0.504 (0.0001)**	**0.395 (0.003)**
T25FW (n=54)	**-0.432 (0.001)**	**-0.399 (0.003)**	**-0.405 (0.002)**	**-0.635 (<0.0001)**	**-0.512 (<0.0001)**
9-HPT (n=53)	-0.235 (0.09)	-0.184 (0.188)	-0.230 (0.097)	**-0.492 (0.0002)**	**-0.399 (0.003)**
MSIS-phys (n=54)	-0.235 (0.088)	-0.233 (0.089)	-0.206 (0.135)	**-0.456 (0.001)**	**-0.341 (0.012)**
PASAT (n=54)	0.116 (0.404)	0.08 (0.566)	0.122 (0.378)	0.032 (0.817)	0.027 (0.844)
MSIS-psych (n=54)	-0.002 (0.986)	-0.021 (0.88)	0.014 (0.922)	-0.175 (0.205)	-0.096 (0.491)
Fatigue score (n=54)	-0.111 (0.426)	-0.11 (0.429)	-0.105 (0.45)	-0.159 (0.25)	-0.136 (0.328)
BDI (n=54)	-0.126 (0.363)	-0.099 (0.477)	-0.104 (0.452)	**-0.273 (0.046)**	-0.174 (0.208)

18 month correlations	E$_A$	METs	PhAD	Steps	RAM score
EDSS (n=28)	-0.284 (0.136)	-0.244 (0.203)	-0.253 (0.185)	**-0.585 (0.001)**	**-0.498 (0.006)**
MSFC (n=49)	0.241 (0.085)	0.199 (0.158)	0.246 (0.079)	**0.495 (0.0002)**	**0.476 (0.0004)**
T25FW (n=49)	**-0.328 (0.018)**	**-0.304 (0.028)**	**-0.329 (0.017)**	**-0.543 (<0.0001)**	**-0.490 (0.0002)**
9-HPT (n=49)	**-0.347 (0.013)**	**-0.357 (0.011)**	**-0.371 (0.008)**	**-0.510 (0.0002)**	**-0.534 (<0.0001)**
MSIS-phys (n=48)	**-0.334 (0.019)**	-0.273 (0.057)	**-0.353 (0.013)**	**-0.406 (0.004)**	**-0.462 (0.001)**
PASAT (n=49)	0.085 (0.559)	-0.064 (0.661)	0.052 (0.72)	0.043 (0.766)	0.176 (0.221)
MSIS-psych (n=48)	0.009 (0.951)	0.047 (0.746)	-0.007 (0.964)	-0.082 (0.574)	-0.067 (0.647)
Fatigue score (n=48)	0.024 (0.868)	0.052 (0.722)	0.003 (0.984)	0.014 (0.926)	0.023 (0.876)
BDI (n=48)	-0.020 (0.892)	-0.037 (0.8)	-0.026 (0.86)	-0.163 (0.263)	-0.110 (0.453)

24 month correlations	E_A	METs	PhAD	Steps	RAM score
EDSS (n=42)	-0.30 (0.053)	**-0.320 (0.039)**	-0.275 (0.077)	**-0.679 (<0.0001)**	**-0.520 (0.0004)**
MSFC (n=50)	**0.304 (0.032)**	**0.352 (0.012)**	**0.301 (0.033)**	**0.629 (<0.0001)**	**0.507 (0.0002)**
T25FW (n=50)	**-0.347 (0.014)**	**-0.374 (0.008)**	**-0.310 (0.029)**	**-0.668 (<0.0001)**	**-0.514 (0.0001)**
9-HPT (n=50)	-0.205 (0.153)	**-0.332 (0.018)**	-0.216 (0.131)	**-0.550 (<0.0001)**	**-0.403 (0.004)**
MSIS-phys (n=50)	**-0.353 (0.012)**	**-0.383 (0.006)**	**-0.373 (0.008)**	**-0.433 (0.002)**	**-0.440 (0.001)**
PASAT (n=50)	0.162 (0.26)	0.098 (0.498)	0.144 (0.317)	0.165 (0.252)	0.240 (0.093)
MSIS-psych (n=50)	-0.211 (0.141)	-0.217 (0.130)	-0.206 (0.152)	-0.148 (0.306)	-0.168 (0.244)
Fatigue score (n=50)	-0.059 (0.684)	-0.149 (0.303)	-0.063 (0.665)	-0.156 (0.28)	-0.085 (0.557)
BDI (n=49)	-0.156 (0.284)	-0.196 (0.178)	-0.175 (0.229)	-0.235 (0.104)	-0.186 (0.20)

30 month correlations	E_A	METs	PhAD	Steps	RAM score
EDSS (n=43)	**-0.347 (0.019)**	**-0.375 (0.011)**	**-0.363 (0.014)**	**-0.665 (<0.0001)**	**-0.609 (<0.0001)**
MSFC (n=46)	**0.376 (0.008)**	**0.421 (0.003)**	**0.399 (0.005)**	**0.599 (<0.0001)**	**0.588 (<0.0001)**
T25FW (n=46)	**-0.484 (0.0004)**	**-0.510 (0.0002)**	**-0.487 (0.0004)**	**-0.708 (<0.0001)**	**-0.705 (<0.0001)**
9-HPT (n=46)	**-0.390 (0.006)**	**-0.373 (0.009)**	**-0.401 (0.005)**	**-0.443 (0.002)**	**-0.496 (0.0003)**
MSIS-phys (n=46)	**-0.295 (0.042)**	**-0.346 (0.016)**	**-0.304 (0.036)**	**-0.378 (0.008)**	**-0.437 (0.002)**
PASAT (n=46)	0.167 (0.257)	0.135 (0.361)	0.170 (0.247)	0.154 (0.295)	0.250 (0.086)
MSIS-psych (n=46)	-0.138 (0.35)	-0.222 (0.13)	-0.127 (0.39)	-0.103 (0.487)	-0.166 (0.260)
Fatigue score (n=46)	-0.207 (0.157)	-0.239 (0.102)	-0.222 (0.130)	-0.122 (0.407)	-0.216 (0.140)
BDI (n =46)	-0.124 (0.401)	-0.139 (0.345)	-0.108 (0.463)	-0.088 (0.550)	-0.159 (0.280)

Supplementary Table 2: Spearman's rho correlation coefficients (p-value) between scores at all assessment time points. Significant correlations are highlighted in bold.

Disability measure	N	Mean (or Median*) slope	SD (or IQR*)	Significance (2-tailed)
EDSS*	54	-0.08*	0.18*	**0.007**
MSFC score*	55	-0.05*	0.19*	**0.002**
T25FW, seconds*	50	-0.07*	0.21*	**<0.0001**
9-HPT, seconds*	55	-0.05*	0.23*	0.074
PASAT*	55	-0.01*	0.21*	0.257
MSIS-phys	55	-0.04	0.25	0.254
MSIS-psych*	55	0.0*	0.33*	0.527
Fatigue score	55	-0.05	0.36	0.267
BDI*	55	0.01*	0.39*	0.912
E_A, joules	54	-0.09	0.27	**0.023**
METs	54	0.11	0.29	**0.006**
PhAD, hours	54	-0.09	0.23	**0.008**
Step count	54	-0.15	0.24	**<0.0001**
RAM score*	54	-0.05*	0.15*	**0.026**

*Supplementary Table 3: To assess if overall progression was significantly different from zero, one sample t-tests (for parametric data) or one sample Wilcoxon tests (for non-parametric data, denoted by *) were employed. Mean (*or median) slopes of variables against time (dy/dt, where y=variables of disability measures, t=time) and standard deviation (*or interquartile range, IQR) are shown with significant changes (p values) highlighted in bold. All outcome variables were converted to z-scores for this analysis, therefore a negative value represents worsening of scores for all outcome variables.*

Disability measure	Baseline median (IQR)		End median (IQR)		Significance (exact, 2-tailed)		Effect size	
	EDSS <6.0	EDSS ≥6.0	EDSS <6.0	EDSS ≥6.0	EDSS <6.0	EDSS ≥6.0	EDSS <6.0	EDSS ≥6.0
EDSS	3.5 (2.5)	6.0 (0.5)	4.0 (4.0)	6.5 (0.5)	0.15	**0.0004**	0.48	0.59
MSFC score	0.73 (0.71)	-0.11 (1.06)	0.53 (0.78)	-0.23 (1.55)	0.495	**0.0004**	0.24	0.56
T25FW, seconds	5.95 (2.24)	11.62 (9.27)	5.94 (2.66)	14.75 (14.37)	0.10	**0.0003**	0.53	0.56
9-HPT, seconds	22.21 (7.58)	27.58 (10.34)	23.98 (8.79)	26.56 (14.21)	0.32	0.14	0.34	0.24
PASAT	50.0 (8.0)	44.5 (23.0)	51.5 (13.0)	45.5 (30.25)	0.90	**0.008**	0.05	0.42
MSIS-phys	36.0 (22)	53.0 (13.75)	34.5 (19.25)	53.5 (19.5)	0.54	0.48	0.21	0.12
MSIS-psych	14.0 (6.0)	18.0 (10.5)	15.0 (10.25)	20.0 (10.75)	0.63	0.50	0.23	0.11
Fatigue score	11.0 (9.0)	14.0 (9.0)	13.5 (6.5)	16.5 (8.0)	**0.02**	0.24	0.75	0.19
BDI	2.0 (2.0)	4.0 (7.0)	2.5 (6.0)	5.0 (8.0)	0.59	0.89	0.2	0.02
E_A, joules	1434.97 (545.53)	1018.41 (1627.61)	1153.77 (1292.15)	769.27 (1383.13)	0.06	0.31	0.6	0.17
METs	1.44 (0.13)	1.21 (0.36)	1.32 (0.17)	1.18 (0.42)	**0.03**	**0.01**	0.69	0.42
PhAD, hours	1.36 (1.11)	0.84 (1.57)	1.05 (0.91)	0.65 (1.27)	**0.05**	0.23	0.63	0.2
Step count	6636.75 (2926.67)	2190.23 (1767.83)	4273.75 (3704.14)	1480.58 (1790.39)	**0.009**	**0.003**	0.79	0.47
RAM score	0.42 (0.27)	-0.07 (0.79)	0.22 (0.48)	-0.25 (0.76)	0.08	0.06	0.56	0.31

Change correlations	E$_A$	METs	PhAD	Steps	RAM score
EDSS (n=47)	0.065 (0.663)	-0.196 (0.187)	0.005 (0.975)	-0.128 (0.390)	-0.032 (0.833)
MSFC (n=50)	-0.191 (0.184)	-0.09 (0.532)	-0.17 (0.238)	-0.091 (0.531)	-0.11 (0.449)
T25FW (n=50)	0.155 (0.282)	0.024 (0.867)	0.137 (0.343)	0.076 (0.6)	0.007 (0.964)
9-HPT (n=50)	0.178 (0.216)	0.088 (0.543)	0.203 (0.157)	0.093 (0.519)	0.124 (0.391)
MSIS-phys (n=50)	0.197 (0.171)	0.168 (0.243)	0.182 (0.207)	0.014 (0.922)	0.129 (0.374)
PASAT (n=50)	0.140 (0.333)	0.140 (0.332)	0.165 (0.253)	0.178 (0.215)	0.176 (0.221)
MSIS-psych (n=50)	0.226 (0.114)	0.154 (0.284)	0.186 (0.195)	0.272 (0.056)	**0.306 (0.031)**
Fatigue Score (n=50)	0.046 (0.749)	0.098 (0.498)	0.057 (0.693)	0.013 (0.931)	0.108 (0.456)
BDI (n=49)	**0.295 (0.039)**	0.075 (0.608)	0.250 (0.083)	0.246 (0.088)	**0.356 (0.012)**

Supplementary Table 5: Spearman's rho correlation coefficients (p-value) between change scores.

Significant correlations are highlighted in bold.

Slope correlations	E_A	METs	PhAD	Steps	RAM score
EDSS (n=53)	0.111 (0.427)	0.009 (0.949)	0.118 (0.399)	0.163 (0.244)	0.150 (0.282)
MSFC (n=54)	-0.023 (0.87)	0.103 (0.46)	-0.041 (0.771)	-0.049 (0.727)	-0.094 (0.498)
T25FW (n=54)	0.062 (0.656)	0.064 (0.648)	0.057 (0.683)	0.221 (0.109)	0.110 (0.428)
9-HPT (n=54)	0.174 (0.209)	-0.080 (0.567)	0.125 (0.37)	0.125 (0.368)	0.054 (0.701)
MSIS-phys (n=54)	-0.007 (0.962)	0.079 (0.572)	-0.011 (0.936)	0.026 (0.853)	-0.020 (0.885)
PASAT (n=54)	-0.130 (0.351)	0.092 (0.507)	-0.145 (0.296)	0.125 (0.368)	-0.024 (0.861)
MSIS-psych (n=54)	0.168 (0.23)	-0.034 (0.807)	0.179 (0.2)	-0.002 (0.989)	0.023 (0.871)
Fatigue Score (n=54)	0.101 (0.466)	-0.029 (0.836)	0.102 (0.461)	-0.053 (0.702)	-0.013 (0.925)
BDI (n=54)	0.002 (0.988)	-0.082 (0.554)	0.011 (0.935)	-0.117 (0.399)	-0.166 (0.231)

Supplementary Table 6: Spearman's rho correlation coefficients (p-value) between the slopes of the outcome variables over the 30-month follow-up period. All outcome variables were converted to z-scores for this analysis.

Rate of change of slopes correlations	E$_A$	METs	PhAD	Steps	RAM score
EDSS (n=43)	0.044 (0.779)	**-0.399 (0.008)**	0.043 (0.783)	0.150 (0.337)	-0.085 (0.589)
MSFC (n=50)	-0.128 (0.367)	-0.106 (0.456)	-0.136 (0.337)	-0.109 (0.441)	-0.17 (0.228)
T25FW (n=50)	0.009 (0.951)	-0.031 (0.83)	-0.007 (0.959)	0.253 (0.071)	-0.02 (0.889)
9-HPT (n=50)	-0.209 (0.137)	-0.129 (0.361)	-0.207 (0.141)	-0.133 (0.346)	-0.271 (0.052)
MSIS-phys (n=50)	**0.279 (0.047)**	-0.189 (0.184)	0.273 (0.052)	**0.343 (0.014)**	0.245 (0.084)
PASAT (n=50)	-0.128 (0.365)	0.136 (0.335)	-0.129 (0.361)	0.01 (0.946)	-0.089 (0.529)
MSIS-psych (n=50)	0.244 (0.082)	**-0.332 (0.016)**	0.255 (0.068)	**0.274 (0.05)**	0.206 (0.143)
Fatigue Score (n=50)	0.102 (0.472)	0.046 (0.747)	0.066 (0.64)	-0.06 (0.674)	0.141 (0.319)
BDI (n=50)	0.183 (0.193)	0.003 (0.984)	0.195 (0.165)	0.222 (0.114)	0.211 (0.132)

Supplementary Table 7: Spearman's rho correlation coefficients (p-value) between the rate of change of slopes of the outcome variables. Slopes were calculated for every six monthly epoch except for EDSS which was calculated using two 18 month epochs. Significant correlations are highlighted in bold. All outcome variables were converted to z-scores for this analysis.

Averaged over:	N	Mean	SD	Mean rank	Mean rank difference	Z	Significance, (approximate, 2-tailed)
One Day	326	2890.1	2674.0	966.1	11.2	0.253	>0.9999
Two Days	326	3005.9	2731.3	988.8	-11.5	0.260	>0.9999
Three Days	326	3017.3	2771.8	987.6	-10.3	0.234	>0.9999
Four Days	326	2957.5	2745.8	977.4	-0.1	0.002	>0.9999
Five Days	326	2925.5	2683.8	973.7	3.6	0.082	>0.9999
Six Days	326	2912.9	2604.8	977.3	-	-	-

Supplementary Table 8: A Kruskal-Wallis test was performed to assess whether there was a difference in the mean step count between RAM device wear duration of six days versus shorter periods (p=0.996).

Time points (months)	6	12	18	24	30
E_A	-	+	+	-	-
METs	-	+	+	+	+
PhAD	-	+	+	-	+
Steps	-	-	+	+	+
RAM score	-	-	+	+	+
EDSS[1]	-	+	+	-	+
MSFC[2]	-	-	-	-	+
T25FW[2]	-	-	-	-	+
9HPT[2]	-	-	-	-	-
PASAT[2]	-	-	-	-	-
MSIS-phys[3]	-	-	-	-	-
MSIS-psych[4]	-	-	-	-	-

Supplementary Table 9: RAM variable responsiveness was assessed using Wilcoxon signed rank tests, at each time point corresponding to a clinic visit (i.e. at 6, 12, 18, 24 and 30 months), compared to baseline. If the RAM variable was significantly responsive at that time point ($p<0.05$), a "+" is shown, otherwise a "-" is shown. For the other variables the median value at each time point was compared to baseline medians. If the variable had exhibited a minimum clinically important difference (MID) [1-4], a "+" is shown, otherwise a "-" is shown.

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