Supplementary Table 2. Detailed information on studies focusing on wearables in laboratory. Time is expressed in years. Mean (SD) and median [IQR]. MS: multiple sclerosis, HC: healthy controls, RR: remitting relapsing, PP: primary progressive, SP: secondary progressive, PDDS: patient determined disease steps, EDSS: expanded disability status scale. ns: non-significant, s: significant, nt: not tested; ECG: electrocardiogram, sEMG: surface electromyography. *refer to Box 1

Authors DOI	**Population of interest** Number of patients % female Age	**Type of MS**	**Severity** **Duration of disease**	**Comparator population type** Sample size (% female) Age (unless stated otherwise)	**Wearables** type of sensor, number of axes, number of wearables, primary position (respectively)	**Domain*** Results reported (significance)
Hale et al, 2007 10.1682/JRRD.2005.09.0155	n=10 90.0% 49 (9)	RR: n=7, SP: n=3	EDSS: 3.5 (median), range: 1.5-6.0 16.3 (12.2)	**healthy** n=10 (70% female) age: 40 (6)	**TriTrac RT3** accelerometer 3 axes 1 wearable upper back	**Physical activity** Group difference MS vs HC (nt) Test-retest reliability (s)
Motl et al, 2009 10.1016/J.APMR.2009.03.020	n=24 83.3% 43.5 (12.2)	RR: n=21, PP: n=1, benign: n=2	PDDS: 1.5 (1.4) 9.1 (7.3)	**healthy** n=24 (83% female) age: 40.9 (11.4)	**ActiGraph** accelerometer 1 axis 1 wearable waist	**Physical activity** Association with other measures (nt) Group difference MS vs HC (nt)
Kayes et al, 2009 10.1016/J.APMR.2008.10.012	n=31 67.7% 50 (median), range: 34-80	RR: n=11, SP: n=5, CP: n=12, benign: n=3	not reported 7 (median), range: 1-40	**none**	**Actical** accelerometer 3 axes 1 wearable waist **Polar heart rate monitor** ECG 1 wearable chest	**Physical activity** Test-retest reliability (ns) Subjective patient acceptability (nt)
Motl et al, 2010 10.1016/J.MEDENGPHY.2010.08.015	n=24 83.3% 43.0 (11.7)	RR: n=24	PDDS: 1 (median), range: 0-4 11.1 (8.5)	**none**	**ActiGraph 7164** accelerometer 1 axis 2 wearables waist, ankle	**Physical activity, Gait** Association with MS severity (ns) Association with other measures (mixed)
Alaqtash et al, 2011 10.1016/J.ENGAPPAI.2011.04.010	n=4 0.0% 43.5 (14.5), range: 29-63	RR: n=4	not reported not reported	**healthy** n=10 (0% female) age: 26.2 (5.2), range: 21-38	**ADXL330 iMEMS** accelerometer 3 axes 8 wearables waist, upper leg, lower leg, foot	**Gait** Group difference MS vs HC (nt)

Weikert et al, 2011 10.7224/1537-2073-13.4.170	n=24 83.3% 42.0 (11.7)	RR: n=24	PDDS: 1 (median), range: 0-4 11.1 (8.5)	**none**	**ActiGraph 7164** accelerometer 1 axis 1 wearable waist **Cosmed K4b2** portable metabolic system measuring oxygen consumption head	**Physical activity** Association with other measures (mixed) Group difference MS vs MS (mixed)
Schmidt et al, 2011 10.1519/JPT.0B013E31820AA921	n=9 not reported 55.9 (mean)	not reported: n=9	EDSS: 5.2 (mean), 95% CI: 3.9-6.6 not reported	**PD patients** n=11 (36% female) age: 66.8 (mean) Severity: -Modified Hoehn and Yahr Staging: mean 2.9, 95% CI 2.1-3.7; -Unified Parkinson Disease Rating Scale: acitivity of daily life: mean 13.3, 95% CI 9.0-17.6, motor 14.5, 95% CI 10.8-18.1	**StepWatch Activity Monitor** accelerometer 2 axes 1 wearable ankle	**Physical activity** Group difference MS vs Parkinson's disease (nt)
Sandroff et al, 2012 10.1682/JRRD.2011.03.0063	n=43 88.4% 47.2 (9.1)	RR: n=39, PP: n=2, SP: n=2	PDDS: 1 (median), range: 0-5 10.8 (7.7)	**healthy** n=43 (88% female) age: 46.5 (10.0)	**ActiGraph 7164** accelerometer 1 axis 1 wearable waist **ActiGraph GTX3** accelerometer 3 axes 1 wearable waist	**Physical activity** Association with other measures (nt) Group difference MS vs HC (mixed)
Motl et al, 2012 10.1016/J.GAITPOST.2011.09.005	n=51 84.3% 53.1 (11.3)	RR: n=45, not reported: n=6	EDSS: 4.0 (median), range: 2.0-6.5, mild disability: n = 21, EDDS: range:2-3.5, moderate disability: n = 13, EDDS: range: 4.0-5.5, severe disability: n = 17, EDDS: range: 6.0–6.5 13.4 (9.4)	**none**	**Actibelt** accelerometer 3 axes 1 wearable waist	**Physical activity** Association with other measures (s)

Spain et al, 2012 10.1016/J.GAITPOST.2011.11.026	n=31 61.3% 39.8 (mean), range: 24-67	RR: n=28; high-risk clinically isolated syndromes (one brainstem, one spinal cord, and one pyramidal tract symptoms with cerebral white matter changes): n=3	EDSS: 3.0 (median), range: 0-5.0 6.8 (median), range: 0.2-33	**healthy** n=28 (67% female) age: 37.4 (mean), range: 26 - 60	**Xsens** accelerometer, gyroscope, magnetometer 3 axes 6 wearables sternum, lower back, wrist, ankle	**Physical activity** Group difference MS vs HC (s)
Coote et al, 2012 10.1016/J.APMR.2012.05.010	n=30 70.0% Age by MS group: Group MS-A: 50.6 (mean), 95% CI: 46.5-54.8, Group MS-B: 56.1 (mean), 95% CI: 49.0-63.2	RR: n=9, PP: n=1, SP/P: n=15, benign: n=5	not reported Disease duration by MS group: Group MS-A: 10.16 (8.07), Group MS-B: 15.36 (9.11)	**healthy** n=15 (73% female) age: 46.1 (mean), range: 39.7 - 52.6	**SenseWear Armband** accelerometer 2 axes 1 wearable upper arm **ActivPal** accelerometer 1 axis 1 wearable upper leg **Oxycon Mobile** portable metabolic system measuring oxygen consumption head	**Physical activity** Association with other measures (s)
Huisinga et al, 2013 10.1007/S10439-012-0697-Y	n=15 73.3% 43.75 (11.9)	not reported: n=15	EDSS: 4.21 [1.0] not reported	**healthy** n=15 (80% female) age: 42.2 (10.3)	**MTX Xsens** accelerometer, gyroscope, magnetometer 3 axes 6 wearables sternum, lower back, wrist, lower leg	**Physical activity** Association with MS severity (s) Association with other measures (s) Group difference MS vs HC (s)
Hilfiker et al, 2013 10.1186/1756-0500-6-260	n=18 66.7% 54 (11), range: 37-72	not reported: n=18	EDSS: 5.11 (1.27), range: 3-6.5 not reported	**none**	**Dynaport** accelerometer 3 axes 1 wearable lower back	**Physical activity** Responsiveness to intervention (s)
Morrison et al, 2013 10.1016/J.JNS.2012.10.007	n=32 68.8% 59.2 (12.4)	not reported: n=32	not reported not reported	**healthy** n=12 (33% female) age: 64.3 (6.8)	**V94-41** accelerometer 1 axis 2 wearables hand	**Dexterity/Tremor** Group difference MS vs HC (s)
Sandroff et al, 2014 10.1016/J.JNS.2014.02.024	n=54 83.3% 50.9 (9.2)	RR: n=42, PP: n=6, SP: n=5, not reported: n=1	EDDS: 4.0 (median), range: 1.0-6.5 11.9 (7.5)	**none**	**ActiGraph GTX3** accelerometer 3 axes 1 wearable waist	**Physical activity** Group difference MS vs MS (s)

					Cosmed K4b2 portable metabolic system measuring oxygen consumption head	
Huisinga et al, 2014 10.1016/J.APMR.2014.01.004	n=40 80.0% Age by severity group: mild: 41.4 (10.5), moderate: 50.3 (11.8)	not reported: n=40	mild MS group: SR-EDSS: 3.9 (1.2) moderate MS group: SR-EDSS: 5.0 (1.3) not reported	**healthy** n=20 (85% female) age: 41.8 (10.7)	**MTX Xsens** accelerometer, gyroscope, magnetometer 3 axes 6 wearables sternum, lower back, wrist, lower leg	**Physical activity, balance** Group difference MS vs HC (mixed) Group difference MS vs MS (mixed)
Carpinella et al, 2014 10.1186/1743-0003-11-67	n=21 42.9% 47.4 (9.0)	RR: n=10, PP: n=4, SP: n=7	EDSS: 7 (median), range: 2-8.5 15 (median), range: 1-33	**healthy** n=12 (42% female) age: 44.3 (9.5)	**MTX Xsens** accelerometer, gyroscope, magnetometer 3 axes 1 wearable lower arm	**Physical activity** Group difference MS vs HC (s)
Ayache et al, 2015 10.1016/J.NEUCLI.2015.09.013	n=16 75.0% 49.6 (10.7), range: 31-74	not reported: n=16	EDSS: 4.4 (2.4), range: 1.5-8.5 not reported	**MS patients without tremor** n=10 (60% female) age: 47.9 (6.6), range: 35-58 Type: not reported Severity of MS: EDDS: 33.4 (1.6), range: 2 -6 Disease duration [yrs]: not reported	**TREM0000** accelerometer 1 axis 1 wearable hand	**Dexterity/Tremor** Group difference MS vs MS (s)
Gong, 2015 10.1109/BSN.2015.7299400	n=28 46.4% not reported	not reported: n=28	not reported not reported	**healthy** n=13 (female ratio not reported) age: not reported	**TEMPO Inertial sensors** accelerometer, gyroscope 3 axes 5 wearables lower back, wrist, ankle	**Physical activity** Group difference MS vs HC (s)
Gong, 2015 10.4108/EAI.28-9-2015.2261504	n=41 not reported not reported	not reported: n=41	not reported not reported	**none**	**TEMPO Inertial sensors** accelerometer, gyroscope 3 axes 5 wearables lower back, wrist, ankle	**Physical activity** Association with MS severity (s) Association with other measures (s)

Solomon et al, 2015 10.1186/S12984-015-0066-9	n=20 80.0% 40 (mean), 95% CI: 35-45	not reported: n=20	EDSS: 2.0 (median), range: 1.0-2.5 4 (mean), 95% CI: 1-7	**healthy** n=20 (80% female) age: not reported	**ADPM Opal IMU** accelerometer, gyroscope, magnetometer 3 axes 6 wearables sternum, lower back, wrist, ankle	**Physical activity, balance** Association with other measures (s) Group difference MS vs HC (s)
Carpinella et al, 2015 10.1088/1741-2560/12/4/046011	n=20 40.0% 46.4 (8.5)	RR: n=9, PP: n=4, SP: n=7	EDSS: 6.2 (1.6), range: 2-8.5 15 .4 (11.6), range: 1-33	**healthy cohabitants** n=13 (38% female) age: 44.2 (9)	**MTX Xsens** accelerometer, gyroscope, magnetometer 3 axes 1 wearable hand	**Dexterity/Tremor** Association with other measures (mixed) Group difference MS vs HC (mixed) Group difference MS vs MS (mixed)
Moon et al, 2015 10.1155/2015/964790	n=17 64.7% 62.8 (7.4)	RR: n=10, PP: n=3, SP: n=4	EDSS: 6.0 [4.75-6.0] 19.2 (9.0)	**healthy** n=17 (71% female) age: 62.8 (5.9)	**MTX XSens** accelerometer, gyroscope, magnetometer 3 axes 2 wearables lower leg	**Gait** Association with other measures (mixed) Group difference MS vs HC (s)
Ayache et al, 2015 10.1016/J.JNS.2015.09.360	n=18 77.8% 47.7 (10.3)	RR: n=10, P: n=8	EDSS: 4.3 (2.4) 14.4 (11.7)	**MS with no visible tremor** n=14 (64% female) age: 54 (0.4) Type: RR: n=8, P: n=6 Severity: EDSS: 3.5 (1.4) Disease duration [yrs]: 11.4 (8.7)	**TREM0000** accelerometer 1 axis 2 wearables upper arm, hand	**Dexterity/Tremor** Group difference MS vs MS (mixed)
Balto et al, 2016 10.1177/2055217316634754	n=45 not reported 46.7 (10.0), range: 23-62	RR: n=43, not reported: n=2	EDSS: 3.0 [1.5], range: 1.0-5.0 11.4 (9.3), range: 0.0-35.0	**none**	**Yamax SW-200** mechanical pedometer 1 axis waist **Jawbone UP2** accelerometer 3 axes wrist **Jawbone UP Move** accelerometer 3 axes waist **Fitbit Flex** accelerometer 3 axes waist	**Physical activity** Association with MS severity (ns) Association with other measures (ns)

					Fitbit One accelerometer 3 axes waist **Smartphone (iPhone 5)** accelerometer 3 axes pocket	
Gong, 2016 10.1109/JBHI.2016.2589902	n=28 75.0% 40.5 (9.4)	not reported: n=28	EDSS: 2.0 [0-4.0] 6.7 (5.9)	**healthy** n=13 (53% female) age: 39.3 (10.3)	**TEMPO Inertial sensors** accelerometer, gyroscope 3 axes 5 wearables lower back, wrist, ankle	**Physical activity** Group difference MS vs HC (s) Group difference MS vs MS (s)
Pau et al, 2016 10.1016/J.MSARD.2016.10.007	n=105 70.5% Age by severity group: MS class 1 [EDSS=0-1.5]: 39.6 (8.3), MS class 2 [EDSS=2.0-4.0]: 43.6 (9.3), MS class 3 [EDSS=4.5-6.0]: 52.1 (10.2)	not reported: n=105	EDSS by MS class: MS class1: 1.0 (0.2), MS class 2: 2.6 (0.6), MS class 3: 4.6 (1.1) not reported	**healthy** n=47 (45% female) age: 39.4 (12.7)	**G-Sensor** accelerometer, gyroscope, magnetometer 3 axes 1 wearable lower back	**Physical activity** Association with MS severity (s) Association with other measures (s) Group difference MS vs HC (s) Group difference MS vs MS (s)
Dandu, 2016 10.1109/BSN.2016.7516271	n=86 not reported range: 19-61	not reported: n=86	EDSS: range: 0-7 not reported	**healthy** n=29 (female ratio not reported) age: range: 19-54	**ActiGraph** accelerometer 3 axes 1 wearable waist	**Physical activity** Association with MS severity (s) Association with other measures (s) Group difference MS vs HC (s)
Brodie et al, 2016 10.1080/10255842.2016.1140747	n=5 100.0% 56 (8)	not reported: n=5	EDSS: 4.3 (1.0) not reported	**healthy** n=5 (100% female) age: 56 (8)	**ADPM Opal IMU** accelerometer, gyroscope 3 axes 1 wearable lower back	**Physical activity** Group difference MS vs HC (s)
Engelhard, 2016 10.1016/J.GAITPOST.2016.07.184	n=89 82.0% 46 [38-52], range: 19-61	not reported: n=89	EDSS: 2.5 [2-3.5], range: 0-7 not reported	**healthy** n=29 (69% female) age: 40 (19-54)	**ActiGraph GT3X** accelerometer 3 axes 1 wearable waist	**Physical activity** Association with MS severity (mixed) Association with other measures (mixed)

Lorefice et al, 2017 10.1007/S00415-017-8612-Y	n=60 68.3% 41.5 (11.6)	PP: n=4, not reported: n=56	EDSS: 2.3 (1.2) 11.6 (7.5)	**none**	**G-Sensor** accelerometer 3 axes 1 wearable lower back	**Physical activity** Association with other measures (mixed)
McGinnis et al, 2017 10.1371/JOURNAL.PONE.0178366	n=30 70.0% range: 29-74	not reported: n=30	EDSS: range: 0-7 not reported	**healthy** n=7 (43% female) age: range: 37-71	**BioSTampRC Sensors** accelerometer 3 axes 5 wearables lower back, upper leg, lower leg	**Physical activity** Association with other measures (mixed) Group difference MS vs MS (ns)
Pau et al, 2017 10.1016/J.MSARD.2017.04.002	n=106 68.9% Age by severity group: EDSS 0-1.5: 39.8 (8.2), EDSS 2-3.5 43.5 (9.5), EDSS 4-6.5 48.6 (10.1)	RR: n=99, PP: n=1, SP: n=6	EDSS by severity group: EDSS 0-1.5: 1.0 (0.2), EDSS 2-3.5: 2.6 (0.6), EDSS 4-6.5: 5.2 (1.1) not reported	**healthy** n=42 (28% female) age: 39.6 (13.5)	**G-Sensor** accelerometer 3 axes 1 wearable lower back	**Balance** Association with MS severity (ns) Group difference MS vs HC (s)
Qureshi, 2017 10.1109/BSN.2017.7936025	n=65 not reported range: 18-64	not reported: n=65	not reported not reported	**none**	**Sensor Nodes** accelerometer 3 axes 2 wearables ankle	**Gait** Association with MS severity (s) Association with other measures (s)
Craig et al, 2017 10.1186/S12984-017-0251-0	n=15 80.0% 48.2 (8.7)	RR: n=15	EDSS: 1.89 (0.98) 12.2 (5.9)	**healthy** n=15 (80% female) age: 47.8 (9.5)	**APDM Opal IMU** accelerometer, gyroscope, magnetometer 3 axes 6 wearables sternum, lower back, wrist, ankle	**Gait** Test-retest reliability (mixed)
Teufl et al, 2017 10.1177/0308022617726259	n=12 58.3% 51.5 (14.1)	RR: n=7, SP: n=5	not reported 13.9 (9.1)	**none**	**Axivity AX3** accelerometer 3 axes 1 wearable wrist	**Dexterity/Tremor** Association with other measures (s) Group difference MS vs MS (nt) Responsiveness to change (nt)
Pau et al, 2017 10.1016/J.GAITPOST.2017.08.023	n=50 42.0% 39.4 (12.8)	not reported: n=50	EDSS: 1.0 (mean) not reported	**healthy** n=50 (42% female) age: 39.4 (12.8)	**G-Sensor** accelerometer 3 axes 1 wearable upper back	**Gait** Group difference MS vs HC (mixed)
Craig et al, 2017 10.1016/J.CLINBIOMECH.2017.07.011	n=40 not reported 40 (9)	RR: n=40	EDSS: 1.63 (0.7) not reported	**healthy** n=40 (female ratio not reported) age: 44 (10)	**APDM Opal IMU** accelerometer 3 axes 2 wearables sternum, ankle	**Gait** Group difference MS vs HC (mixed)

Coulter et al, 2017 10.1016/J.MEDENGPHY.2017.03.008	n=20 55.0% 53.7 (7.4)	not reported: n=20	EDSS: 5.85 (0.75), 6 [0.5], range: 4-6.5 not reported	**none**	**activPAL3** accelerometer 3 axes 1 wearable upper leg	**Physical activity**
El-Gohary et al, 2017 10.1016/J.APMR.2017.01.030	n=52 78.8% 49.5 (9.8)	RR: n=33, PP: n=6, SP: n=13	SR-EDSS: 4.3 (0.9) 12.7 (10.6)	**healthy** n=21 (67% female) age: 49.9 (11.9)	**APDM Opal system** accelerometer, gyroscope, magnetometer 3 axes 3 wearables lower back, ankle, foot	**Balance** Group difference MS vs HC (mixed)
Sun et al, 2018 10.1159/000485958	n=39 74.4% Age by MS severity: mild: 55.9 (11.3) severe: 60.1 (8.0)	RR: n=30, PP: n=2, SP: n=7	EDSS by MS severity: mild: 3.2 (0.6), severe: 6.2 (0.3) Duration of disease by MS severity: mild: 17.5 (8.5), severe: 20.1 (10.2)	**healthy** n=15 (67% female) age: 57.9 (12.9)	**BioStamp** accelerometer, gyroscope 3 axes 1 wearable lower back **Xsens MTx** accelerometer, gyroscope, magnetometer 3 axes 1 wearable lower back	**Balance** Association with other measures (s) Group difference MS vs HC (s) Group difference MS vs MS (s)
Findling et al, 2018 10.3389/FNEUR.2018.00686	n=33 72.7% Age MS type: remitting: 43.7 (10.5) relapsing: 42.0 (12.7)	RR: n=33 (remitting: n=24, relapsing: n=9)	EDSS by MS type: remitting: 2.45 (1.01), relapsing: 3.11 (0.96) Disease duration by MS type: remitting: 10.2 (4.5), relapsing: 9.8 (8.2)	**healthy** n=40 (63% female) age: 39.7 (12.6)	**SwayStar** gyroscope 2 axes 1 wearable lower back	**Balance** Group difference MS vs HC (s) Group difference MS vs MS (s)
Huisinga et al, 2018 10.1016/J.HUMOV.2017.12.009	n=36 88.9% 45.6 (11.7)	not reported: n=36	SR-EDSS: 4.3 (1.2) not reported	**healthy** n=20 (85% female) age: 41.8 (10.7)	**MTX Xsens** accelerometer, gyroscope, magnetometer 3 axes 6 wearables sternum, lower back, wrist, lower leg	**Balance** Group difference MS vs HC (s)

Carpinella et al, 2018
10.1109/TNSRE.2018.2881324
	n=10
	60.0%
	51 [35-66]
		not reported: n=10	not reported
			8.5 [7-17]
				mixed
				healthy: n=20 (50% female), age: 57 (mean), range: 51-7;
				stroke: n=10 (60% female), age: 59 (mean), range: 47-70;
				PD: n=20 (40% female), age: 73 (mean), range: 61-77
					MTW XSense
					accelerometer, gyroscope, magnetometer
					3 axes
					1 wearable
					sternum
						Gait
						Association with other measures (mixed)
						Group difference MS vs HC (s)
						Group difference MS vs Parkinson's disease (mixed)

Sirhan et al, 2018 10.1007/S00702-018-1939-4	n=30 50.0% 38.8 (5.7)	RR: n=26, P: n=4	EDSS: 3.0 (median), range: 2.0-5.0 11.8 (6.8)	**healthy** n=15 (53% female) age: 37.4 (6.3)	**Axial** accelerometer 3 axes 3 wearables lower back, foot	**Gait** Association with other measures (mixed) Group difference MS vs HC (mixed)
Pau et al, 2018 10.1016/J.MSARD.2017.11.021	n=45 91.1% 40.5 (10.5)	not reported: n=45	EDSS: 2.4 (1.2), range: 1-5.5 not reported	**healthy** n=40 (73% female) age: 41.3 (10.4)	**G-Sensor** accelerometer, gyroscope, magnetometer 3 axes 1 wearable lower back	**Gait** Association with other measures (s) Group difference MS vs HC (mixed)
Witchel et al, 2018 10.3389/FNEUR.2018.00684	n=17 76.5% 53.06 (11.06)	not reported: n=17	SR-EDSS: 4.0 (1.8) not reported	**healthy** n=23 (61% female) age: 46.13 (11.12)	**x-IMU** accelerometer, gyroscope, magnetometer 3 axes 1 wearable lower back	**Physical activity** Group difference MS vs HC (mixed)
Dandu, 2018 10.1109/JBHI.2017.2773629	n=115 not reported not reported	not reported: n=115	not reported not reported	**healthy** n=29 (female ratio not reported) age: not reported	**ActiGraph GT3X** accelerometer 3 axes 1 wearable waist **TEMPO Inertial sensors** accelerometer, gyroscope 3 axes 6 wearables lower back, wrist, ankle	**Physical activity** Association with other measures (mixed)
Psarakis et al, 2018 10.1088/1361-6579/AAC0A3	n=12 75.0% 52 (9.1)	not reported: n=12	EDSS: 4.25 [1.1] not reported	**healthy** n=12 (67% female) age: 55.8 (12.3)	**APDM Opal IMU** accelerometer, gyroscope, magnetometer 3 axes 2 wearables head, lower back	**Gait** Association with MS severity (mixed) Association with other measures (mixed) Group difference MS vs HC (s)
Shema-Shiratzky et al, 2019 10.1007/S00415-019-09500-Z	n=58 70.7% Age by MS severity: mild: 49 (11.2) moderate 48.9 (8.0)	RR: n=58	EDSS by MS severity: mild: 2.5 [2-3], moderate: 5.25 [4-6] Disease duration by MS severity: mild: 13.8 (10.9), moderate: 13.6 (7.5)	**none**	**APDM Opal IMU** accelerometer, gyroscope, magnetometer 3 axes 3 wearables lower back, ankle	**Balance** Association with other measures (mixed) Group difference MS vs MS (mixed)

Anastasi et al, 2019 10.1002/PMRJ.12137	n=9 44.4% 49.6 (16.4)	not reported: n=9	not reported 15.1 (6.8)	**healthy** n=20 (50% female) age: 58 (14.5)	**MTW XSens** accelerometer, gyroscope, magnetometer 3 axes 1 wearable sternum	**Gait** Association with other measures (s) Group difference MS vs HC (s) Group difference MS vs other disease (s)
Angelini et al, 2019 10.3390/S20010079	n=13 76.9% 51 (median), range: 35-63	RR: n=13	EDSS: 4.5 (median), range: 2.0-6.5 not reported	**MS patients** n=13 (77% female) age: 57 (mean), range: 34-64 Type: SP: n=13 Severity: 4.5 [2.5-6.5] Disease duration [yrs]: not reported	**MTW XSens** accelerometer, gyroscope, magnetometer 3 axes 3 wearables lower back, ankle **APDM Opal IMU** accelerometer, gyroscope, magnetometer 3 axes 3 wearables lower back, ankle	**Gait, other: comparison of 33 IMU-based metrics** Association with other measures (mixed)
Grinberg et al, 2019 10.1016/J.GAITPOST.2019.02.022	n=25 68.0% 35.2 (8.6)	not reported: n=25	not reported not reported	**healthy** n=25 (72% female) age: 34.3 (6.1)	**APDM IMU** accelerometer, gyroscope, magnetometer 3 axes 3 wearables lower back, foot	**Gait** Group difference MS vs HC (mixed)
Daunoraviciene, 2020 10.1109/MSM49833.2020.9201642	n=31 61.3% Age by sex: women: 40 (12.3) men: 34.4 (11.3)	not reported: n=31	EDSS: 3.71 (1.43), range: 2.0-6.0 not reported	**healthy** n=23 (74% female) age: women: 28 (4.0), men: 31.14 (5.7)	**Shimmer IMU** accelerometer, gyroscope, magnetometer 3 axes 6 wearables upper leg, lower leg, foot	**Dexterity/Tremor** Group difference MS vs HC (mixed) Group difference MS vs MS (mixed)
Cohen et al, 2020 10.1007/S00415-020-10276-W	n=21 66.7% 44 (mean), range: 25-66	radiologically isolated syndrome: n=21	not reported not reported	**healthy** n=32 (72% female) age: 42.4 (mean), range: 20-58	**iPhone X (smartphone)** touchscreen 1 wearable hand	**Dexterity/Tremor** Association with other measures (mixed) Group difference MS vs HC (s) Test-retest reliability (s)
Cofré Lizama et al, 2020 10.1016/J.GAITPOST.2020.02.006	n=30 83.3% 42.5 (9.2)	RR: n=30	EDSS: 1.2 (0.9), range: 0-2.5 Disease duration: <15	**healthy** n=15 (60% female) age: 36.8 (7.0)	**Cometa accelerometer** accelerometer 3 axes 1 wearable lower back	**Gait** Group difference MS vs HC (mixed)

Ibrahim et al, 2020 10.1186/S12984-020-00798-9	n=49 65.3% 41.6 (10.4)	not reported: n=49	EDSS: 3.7 (median), range: 1-6.5 not reported	**none**	**Shimmer IMU** accelerometer, gyroscope, magnetometer 3 axes 2 wearables foot	**Gait** Association with other measures (s)
Tulipani et al, 2020 10.1016/J.GAITPOST.2020.06.014	n=21 not reported 55.3 (8.6)	not reported: n=21	EDSS: 3.4 (1.2) not reported	**MS patients (non-fallers)** n=17 (female ratio not reported) age: 4.8 (13.5) Type: not reported Severity: EDSS: 2.3 (1.2) Disease duration [yrs]: not reported	**Biostamp MC10** accelerometer 3 axes 2 wearables sternum, upper leg	**Balance** Association with MS severity (s) Association with other measures (s) Group difference MS vs MS (s)
Maillart et al, 2020 10.1111/ENE.14091	n=116 61.2% 46 (10)	RR: n=86, progressive: n=29, not reported: n=1	EDSS: 3.6 (1.6) 12 (7)	**healthy** n=69 (65% female) age: 39 (11)	**Smartphone** accelerometer, gyroscope, magnetometer, touchscreen 3 axes 1 wearable hand	**Gait, dexterity/tremor** Association with other measures (s) Group difference MS vs HC (s) Test-retest reliability (s) Subjective patient acceptability (nt)
Akhbardeh et al, 2020 10.1002/ACN3.50988	n=117 75.2% 47 (12.4)	not reported: n=117	EDSS: 2.5 (median), range: 1-7 10 (median), range: 0.4-44	**healthy** n=30 (50% female) age: 39.7 (10.7)	**MYO-band** accelerometer, gyroscope, sEMG 3 axes 1 wearable lower arm, lower leg	**Balance, dexterity/tremor** Association with MS severity (s) Association with other measures (s) Group difference MS vs HC (s) Test-retest reliability (nt)
Flachenecker et al, 2019 10.1016/J.MSARD.2019.101903	n=102 67.6% 43.0 (11.6)	RR: n=68, PP: n=12, SP: n=22	EDSS: 4.0 (median), range: 1.0-7.0 10.1 (10.5)	**healthy** n=22 (46% female) age: 34.2 (15.5)	**Shimmer IMU** accelerometer, gyroscope, magnetometer 3 axes 2 wearables foot	**Gait** Association with MS severity (s) Association with other measures (s) Group difference MS vs HC (s) Group difference MS vs MS (s) Test-retest reliability (s)
Vienne-Jumeau et al, 2020 10.3389/FNEUR.2020.00261	n=22 59.1% Age by walking aid: yes: 57 (9) no: 59 (13)	P: n=22	EDSS by walking aid: walking aid: 6.0 [6.0-6.5], no aid: 3.5 [3.0-6.0] not reported	**healthy** n=10 (60% female) age: 26 (1)	**XSens IMU** accelerometer, gyroscope, magnetometer 3 axes 2 wearables foot	**Gait** Association with MS severity (s) Association with other measures (ns) Group difference MS vs MS (s)

						Responsiveness to change (s)
Daunoraviciene, 2020 10.3233/THC-208003	n=28 57.1% 38 (11.9)	not reported: n=28	EDSS: range: 2.0-6.5 not reported	**healthy** n=23 (70% female) age: 29.1 (4.6)	**Shimmer IMU** accelerometer, gyroscope, magnetometer 3 axes 6 wearables upper arm, lower arm, hand, upper leg, lower leg, foot	**Dexterity/Tremor** Group difference MS vs HC (mixed) Group difference MS vs MS (mixed)
Sato et al, 2020 10.1016/J.MSARD.2020.102031	n=29 89.7% 52.03 (9.94)	RR: n=29	EDSS: 3.26 (2.19) 12.75 (8.73)	**MS patients (PMS)** n=29 (66% female) age: 60.38 (8.3) Type: P: n=29 Severity: EDSS: 6.0 (1.7) Disease duration [yrs]: 21.85 (12.35)	**APDM Opal IMU** accelerometer, gyroscope, magnetometer 3 axes 2 wearables hand, foot	**Dexterity/Tremor** Group difference MS vs HC (mixed) Group difference MS vs MS (mixed)
Brull et al, 2020 10.3390/S20154329	n=3 not reported not reported	not reported: n=3	EDS: 6.5 (median), range: 4.5-7.5 not reported	**none**	**MTi-1 XSens** accelerometer, gyroscope, magnetometer 3 axes 1 wearable tip of cane or crutch (others) **HBM C9C** force sensor 1 wearable tip of cane or crutch (others) **Bosch BMP280** barometer 1 wearable tip of cane or crutch (others)	**Gait**
Ader et al, 2020 10.3390/BIOS10090128	n=37 62.2% 45.1 (9.9)	RR: n=37	EDSS: 1.0 (median), range: 0-4.5 7.4 (7.7)	**none**	**Kinesis Gait IMU** accelerometer, gyroscope 3 axes 2 wearables lower leg	**Gait** Test-retest reliability (nt)

Huang et al, 2020 10.3390/S20216160	n=40 50.0% 50.9 (9.8)	P: n=40	EDSS: 5.5 (1.1) not reported	**healthy** n=15 (60% female) age: 52.7 (4.4)	**BTS bioengineering G-Walk IMU** accelerometer 3 axes 1 wearable lower back, waist **BTS bioengineering FREEEMG-1000** sEMG 8 wearables upper leg, lower leg	**Gait** Association with MS severity (mixed) Association with other measures (mixed) Group difference MS vs HC (s) Group difference MS vs MS (mixed)
Shalmoni et al, 2020 10.1007/S00702-020-02190-2	n=26 61.5% 47.9 (9.1)	RR: n=17, P: n=9	EDSS: 4.5 (median), range: 3.0-5.5 9.3 (7.6)	**none**	**APDM Opal IMU** accelerometer, gyroscope, magnetometer 3 axes 3 wearables lower back, foot	**Gait, balance** Responsiveness to intervention (ns)
Craig et al, 2020 10.1016/J.CLINBIOMECH.2020.105100	n=15 53.3% 48 (9.6)	not reported: n=15	EDSS: 4.4 (1.1) not reported	**MS patients (non-fallers)** n=25 (80%) 44 (9.9) Type: not reported Severity: EDSS: 3.3 (1.9) Disease duration: not reported	**APDM Opal IMU** accelerometer, gyroscope, magnetometer 3 axes 2 wearables lower back, foot	**Gait** Association with MS severity (mixed) Association with other measures (mixed) Group difference MS vs MS (s)
Pilloni et al, 2020 10.1002/ACN3.51224	n=9 66.7% 52.1 (12.8)	RR: n=2, SP: n=7	EDSS: 5.3 (1.1) not reported	**MS patients (sham tDCS)** n=6 (83% female) age: 53.5 (9.8) Type: RR: n=3, SP: n=3 Severity: EDSS: 4.5 (1.7) Disease duration [yrs]: not reported	**BTS Bioengineering G-Walk IMU** accelerometer, gyroscope, magnetometer 3 axes 1 wearable lower back	**Gait** Group difference MS vs MS (mixed) Responsiveness to intervention (mixed)
Angelini et al, 2020 10.1007/S00415-020-09928-8	n=57 66.7% 49.8 (8.4)	SP: n=57	EDSS: 5.5 (median), range: 3.0-6.5 not reported	**healthy** n=24 (67% female) age: 49.8 (8.4)	**APDM Opal IMU** accelerometer, gyroscope, magnetometer 3 axes 3 wearables lower back, lower leg	**Gait** Association with MS severity (s) Group difference MS vs HC (mixed) Test-retest reliability (nt)
Meyer et al, 2020 10.1109/JBHI.2020.3025049	n=37 70.3% 51 (12)	not reported: n=37	EDSS: 2.99 (1.47) not reported	**none**	**Biostamp MC10** accelerometer 3 axes 2 wearables sternum, upper leg **APDM Opal IMU** accelerometer, gyroscope,	**Gait, balance** Group difference MS vs MS (s)

					magnetometer 3 axes 4 wearables sternum, lower back, lower leg	
Angelini et al, 2021 10.1109/TBME.2021.3061998	n=114 62.3% Age by MS severity: mild: 43.6 (10.5) noderate: 43.6 (10.5) severe: 43.6 (10.5)	RR: n=41, PP: n=3, SP: n=70	not reported not reported	**healthy** n=24 (67% female) age: 49.9 (8.3)	**APDM Opal IMU** accelerometer, gyroscope, magnetometer 3 axes 3 wearables lower back, lower leg	**Gait** Group difference MS vs HC (mixed) Group difference MS vs MS (mixed)
Krysko et all, 2021 10.1002/ACN3.51187	n=68 72.1% 48.3 (12.1)	RR: n=53, PP: n=9, SP: n=6	EDSS: 2.5 (median), range: 0.0-7.0 10.5 (median), range: 0.1-44.0	**none**	**MYO-band** accelerometer, gyroscope, sEMG 3 axes 1 wearable lower arm, lower leg	**Dexterity/Tremor** Association with MS severity (s) Association with other measures (s) Group difference MS vs MS (s) Responsiveness to change (mixed)
Teufl et al, 2021 10.1177/2055668320966955	n=5 60.0% 57.6 (15.3)	SP: n=5	not reported 13.5 (3.1)	**healthy** n=10 (50% female) age: 42.4 (10.9)	**Axivity AX3** accelerometer 3 axes 1 wearable wrist	**Dexterity/Tremor** Group difference MS vs HC (nt)
Hsieh et al, 2021 10.1016/J.GAITPOST.2020.11.011	n=12 75.0% 62.1 (8.1)	RR: n=7, PP: n=1, SP: n=4	EDSS: 6 [5.3– 6.4] 18.6 (10.1)	**MS patients (non-assisted device users)** n=15 (87% female) age: 46.5 (12.2) Type: RR: n=14, not reported: n=1 Severity: EDSS: 2.5 [2.5–3.5] Disease duration [yrs]: 12.9 (11.6)	**Samsumg Galaxy S6 (smartphone)** accelerometer 3 axes 1 wearable sternum **APDM Opal IMU** accelerometer, gyroscope, magnetometer 3 axes 1 wearables attached to smartphone	**Balance** Association with other measures (mixed) Group difference MS vs MS (s)