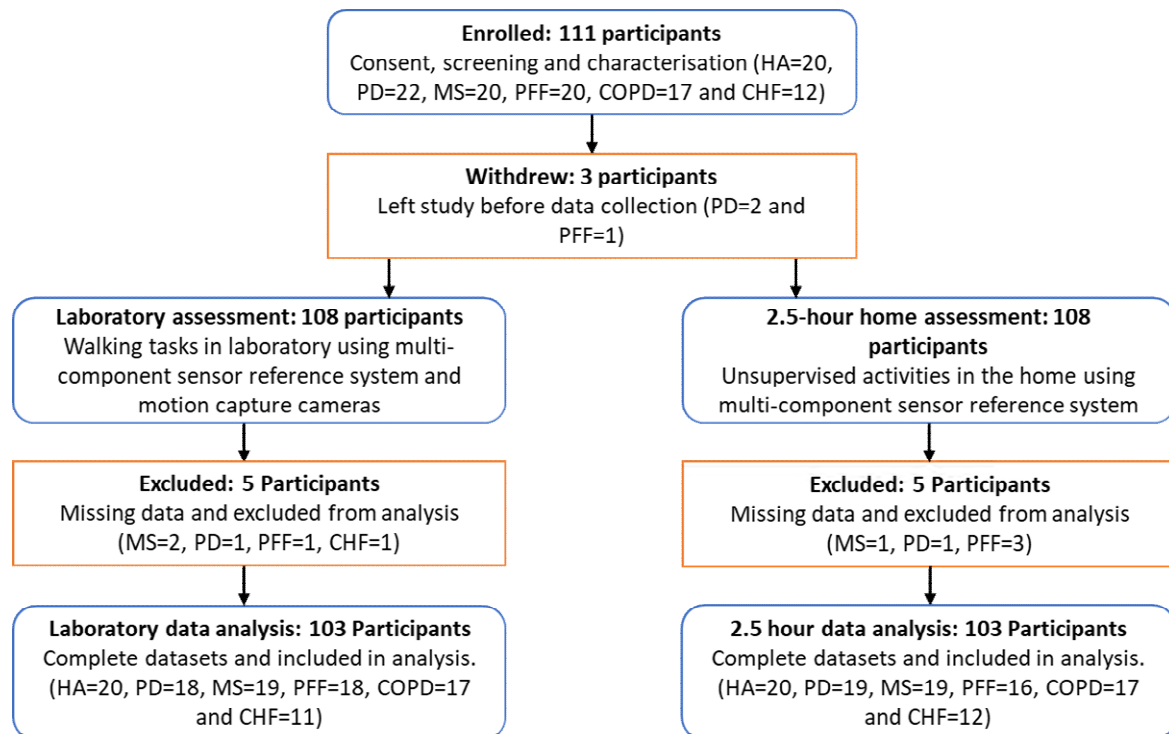## 1. Participant Flow

A convenience sample of 111 participants were recruited from six cohort groups; healthy adults (HA) and patients with potentially altered mobility due to Parkinson's Disease (PD), Multiple Sclerosis (MS), Proximal Femoral Fracture (PFF), Chronic Obstructive Pulmonary Disease (COPD) and Congestive Heart Failure (CHF).

2. Baseline Characteristics

		HA (n = 20)	PD (n = 20)	MS (n = 20)	PFF (n = 19)	COPD (n = 17)	CHF (n = 12)
Characterisation of groups							
General	**Sex (Male/Female)**	11/9	16/4	11/9	8/11	9/8	8/4
	Age (years)	71.7±5.8	69.8±7.2	48.7±9.7	80.0±8.5	69.4±9.1	69.1±11.7
	Height (m)	1.66±0.10	1.73±0.07	1.71±0.13	1.69±0.08	1.69±0.07	1.74±0.10
	Weight (Kg)	75.1±11.8	78.2±14.4	84.0±22.9	68.4±16.0	73.7±14.2	84.5±16.8
Cognition	**MoCA[†]**	27.7±2.6	24.6±4.0	26.7±3.1	24.1±4.2	24.6±3.4	27.1±2.9
No. of Fallers	**Had a fall in last 12 months**	3	10	11	19	1	3
Pain - VAS Score (0, no pain – 100 worst)	**General**	11.1±18.6	20.5±26.4	23.4±24.7	13.2±16.9	14.1±16.1	16.8±28.1
	When Walking	8.1±13.9	21.8±27.2	26.4±32.5	25.5±27.4	13±14.4	17.8±30.1
No. of Walking Aid Users	**General Use**	1	6	5	13	1	4
	Laboratory	0	1	3	6	0	4
Cohort-specific Outcomes	**LLFDI[†]**	73.53±14.22	60.26±12.51	57.34±10.66	52.59±16.61	59.07±7.96	67.29±21.35
	UPDRS III[†]	-	28.4±13.6	-	-	-	-
	H&Y Score[†]	-	I n=4, II n=11, III n=5	-	-	-	-
	EDSS[†]	-	-	3.5±1.7	-	-	-
	SPPB[†]	-	-	-	6.2±3.9	-	-
	CAT score[†] (0, best – 40, worst)	-	-	-	-	16.6±8.9	-
	FEV$_1$[†] (L)	-	-	-	-	1.6±0.6	-
	FVC[†] (L)	-	-	-	-	2.9±0.7	-
	6MWT[†] DISTANCE (m)	-	-	-	-	357.6±88.5	370.7±115.6
	KCCQ[†]	-	-	-	-	-	80.5±20.2

Table 1. Summary of participant demographics and clinical characteristics (mean ± standard deviation). Acronyms used in table for: Montreal Cognitive Assessment (MoCA), Late-Life Functional and Disability Instrument (LLFDI), Unified Parkinson's Disease Rating Scale (UPDRS), Hoehn and Yahr Score (H&Y), Expanded Disability Status Scale (EDSS), Short Physical Performance Battery (SPPB), COPD Assessment Test (CAT), Forced expiratory volume (FEV1), Forced vital capacity (FVC) six-minute walk test (6MWT) and Kansas City Cardiomyopathy Questionnaire (KCCQ)

3. Outcome Measures:

Table 2 presents a summary of walking speed results obtained in the laboratory, comparing the single sensor results against the in-lab reference system.

COHORT	% of Walking aid users	Walking Speed (RS) [m/s]	Walking Speed (SS) [m/s]	Relative Error [%]	ICC	p-value
HA	0%	0.85 [0.80 , 0.90]	0.85 [0.80 , 0.89]	13.65 [10.10 , 17.21]	0.79 [0.69 , 0.86]	0.88
PD	5.26%	0.83 [0.77 , 0.88]	0.86 [0.82 , 0.90]	14.76 [10.77 , 18.75]	0.87 [0.81 , 0.91]	0.31
MS	16.67%	0.82 [0.77 , 0.88]	0.85 [0.81 , 0.90]	17.37 [12.47 , 22.26]	0.83 [0.75 , 0.88]	**0.04**
COPD	0%	0.86 [0.80 , 0.91]	0.88 [0.83 , 0.94]	11.88 [7.33 , 16.44]	0.92 [0.87 , 0.95]	0.73
CHF	44.44%	0.81 [0.71 , 0.91]	0.84 [0.76 , 0.91]	19.58 [13.34 , 25.82]	0.87 [0.77 , 0.93]	0.33
PFF	31.25%	0.75 [0.68 , 0.83]	0.78 [0.73 , 0.83]	23.41 [14.38 , 32.43]	0.85 [0.78 , 0.90]	0.18

Table 2. In-lab assessments results (relative error, Intra Class Correlation (ICC) and p-values) for walking speed for each cohort. Values are expressed as mean and 95% confidence intervals [CI]. RS: Reference system, SS: Single Sensor.

Table 3 presents a summary of walking speed results obtained during the 2.5-hour assessment in the real world, comparing the single sensor results against the home reference system.

COHORT	Walking Speed (RS) [m/s]	Walking Speed (SS) [m/s]	Relative Error [%]	ICC	p-value
WALKING SPEED results for all Walking Bouts					
HA	0.68 [0.66 , 0.70]	0.72 [0.70 , 0.74]	13.70 [12.15 , 15.25]	0.88 [0.85 , 0.90]	0.00
PD	0.74 [0.71 , 0.77]	0.79 [0.77 , 0.82]	18.04 [14.59 , 21.49]	0.79 [0.74 , 0.83]	0.00
MS	0.70 [0.67 , 0.72]	0.80 [0.77 , 0.82]	24.70 [21.23 , 28.18]	0.71 [0.65 , 0.76]	0.00
COPD	0.65 [0.63 , 0.67]	0.73 [0.72 , 0.75]	21.14 [17.92 , 24.36]	0.70 [0.64 , 0.75]	0.00
CHF	0.90 [0.85 , 0.95]	0.86 [0.82 , 0.90]	13.93 [11.32 , 16.55]	0.86 [0.80 , 0.89]	0.07
PFF	0.62 [0.59 , 0.65]	0.66 [0.64 , 0.69]	20.38 [15.52 , 25.25]	0.63 [0.53 , 0.71]	0.01
WALKING SPEED results for Walking Bouts >10s					
HA	0.72 [0.69 , 0.74]	0.75 [0.72 , 0.77]	11.53 [10.12 , 12.94]	0.90 [0.87 , 0.92]	0.05
PD	0.79 [0.76 , 0.82]	0.82 [0.79 , 0.85]	11.39 [9.19 , 13.59]	0.83 [0.77 , 0.88]	0.00
MS	0.74 [0.70 , 0.78]	0.82 [0.78 , 0.86]	18.10 [14.40 , 21.80]	0.80 [0.74 , 0.85]	0.00
COPD	0.68 [0.66 , 0.71]	0.76 [0.73 , 0.78]	17.50 [14.34 , 20.65]	0.72 [0.64 , 0.78]	0.00
CHF	0.97 [0.91 , 1.03]	0.91 [0.87 , 0.96]	10.53 [8.42 , 12.65]	0.87 [0.81 , 0.92]	0.00
PFF	0.62 [0.58 , 0.66]	0.66 [0.63 , 0.69]	19.87 [11.65 , 28.09]	0.65 [0.52 , 0.75]	0.05

Table 3. 2.5-hour assessments results (relative error, Intra Class Correlation (ICC) and p-values) for walking speed for each cohort considering all walking bouts, and walking bouts only >10seconds of duration. Values are expressed as mean and 95% confidence intervals [CI]. RS: Reference system, SS: Single Sensor.

4. Adverse Events:

No adverse event reporting was planned as this is an observational study.