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Walking impairment is a key factor of disability in Multiple Sclerosis (MS). Various gait alterations were described using wearable sensors but in-clinic performed Expanded Disability Status Scale (EDSS) is still the standard in quantifying disability and making treatment decisions. Walking Bouts (WB) are defined as sequences of minimum two consecutive strides of both legs. Although most daily WB are known to be short, EDSS focuses on maximum walking distance. Real-world biomarkers of disability remain lacking. This study aimed to investigate characteristics of daily WB in people with MS (pwMS) and explore correlation with established scores.

40 ambulatory pwMS (EDSS  $\leq$  6.5) were recruited and assessed with EDSS and other standard in-clinic measures at the MS Outpatient Unit at University Medical Center Schleswig-Holstein.

Daily WB and step count were collected continuously for seven days with wearable tri-axial accelerometers. Relations between gait parameters and in-clinic scores were examined by Pearson Correlation. Differences of EDSS subgroups (mild EDSS  $\leq$  3.0 vs moderate EDSS 3.5 – 6.5) were assessed with Students' T Test.

Among 39 participants with valid data 71,29% were female. Median age was 39 (21 – 60) years and median EDSS score was 3.0 (1.0 – 6.5). Average daily sensor wearing period was 19 hours. Overall, 259.43 ( $\pm$  122.81) WB per individual were detected. Step counts and number of WB correlated with in-clinic scores. EDSS score did not correlate significantly with step counts but *average step counts per WB* ( $r = -0.47$ ;  $p < 0.01$ ). EDSS subgroups were discriminated by *longest WB* (1.076 vs 659 steps) and *average step count per WB* (17.07 vs 13.52 steps;  $p < 0.01$ ).

These findings demonstrate a reduction of step count per WB corresponding to short everyday walking distances. EDSS scores correlate with WB characteristics without explicitly reflecting them. Therefore, daily WB are suggested as relevant markers of disability.

### **Conflict of Interest**

***The company movisens GmbH (Karlsruhe, Germany) provided three inertial measurement units of the move 4<sup>®</sup> model as a loan for the duration of this study.***

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