

Invisible decline: assessing disability in Multiple Sclerosis through wearable devices



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Objectives

Multiple Sclerosis (MS) is a chronic, demyelinating disease with high clinical heterogeneity. Conventional clinical scales may fail to detect subtle changes. This study aims to evaluate the validity of wearable devices in capturing disability, with particular focus on their ability to detect subclinical changes over time.

Materials and methods

Population: 70 MS patients (both relapsing & progressive forms)

Inclusion criteria: 18–60 yrs, EDSS < 5, no relapses in past 12 months, no smartwatch use and no surgery preventing mobility

Data collection: iOS & Android smartphones

Clinical tools: EDSS, T25FW, 9HPT

Wearable parameters: step count, walking speed, step length, double support time, gait asymmetry

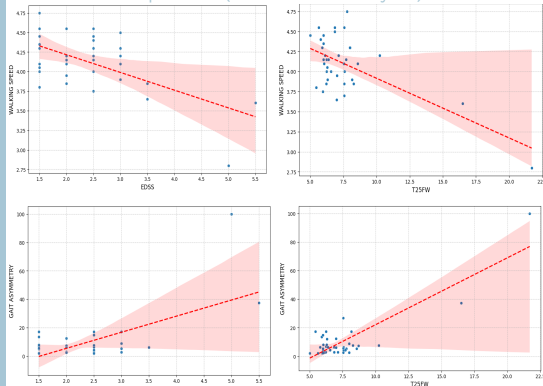
Definition of worsening: ↑ EDSS, double support time, gait asymmetry OR ↓ step count, walking speed, step length (over 12 months)

Statistics: Pearson's correlation with Bonferroni correction ; longitudinal trends via mixed models

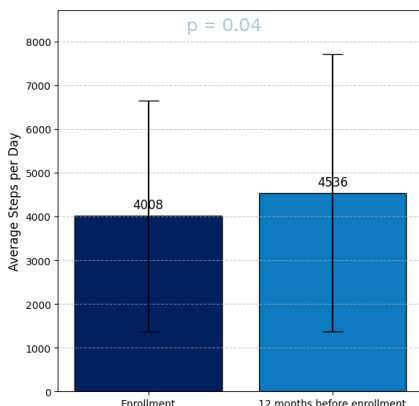
Results

Correlation between walking speed and gait asymmetry and established clinical tools (EDSS and T25FW)

$p < 0.001$ (for all metrics analyzed)



Daily step count reduction did not associate with changes of clinical or other wearable metrics



Conclusion

Wearable devices can detect disability with accuracy comparable to standard clinical scales, and they appear more sensitive in capturing subclinical changes: the use of accessible wearable technology enables a more patient-centered approach to disease assessment, offering continuous and non-invasive monitoring that can improve the detection of subtle evolution in mobility over time.



24-28 Ottobre 2025
Padova Congress

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