

# PD SENSORS: SPHERE Technology in Parkinson's Disease



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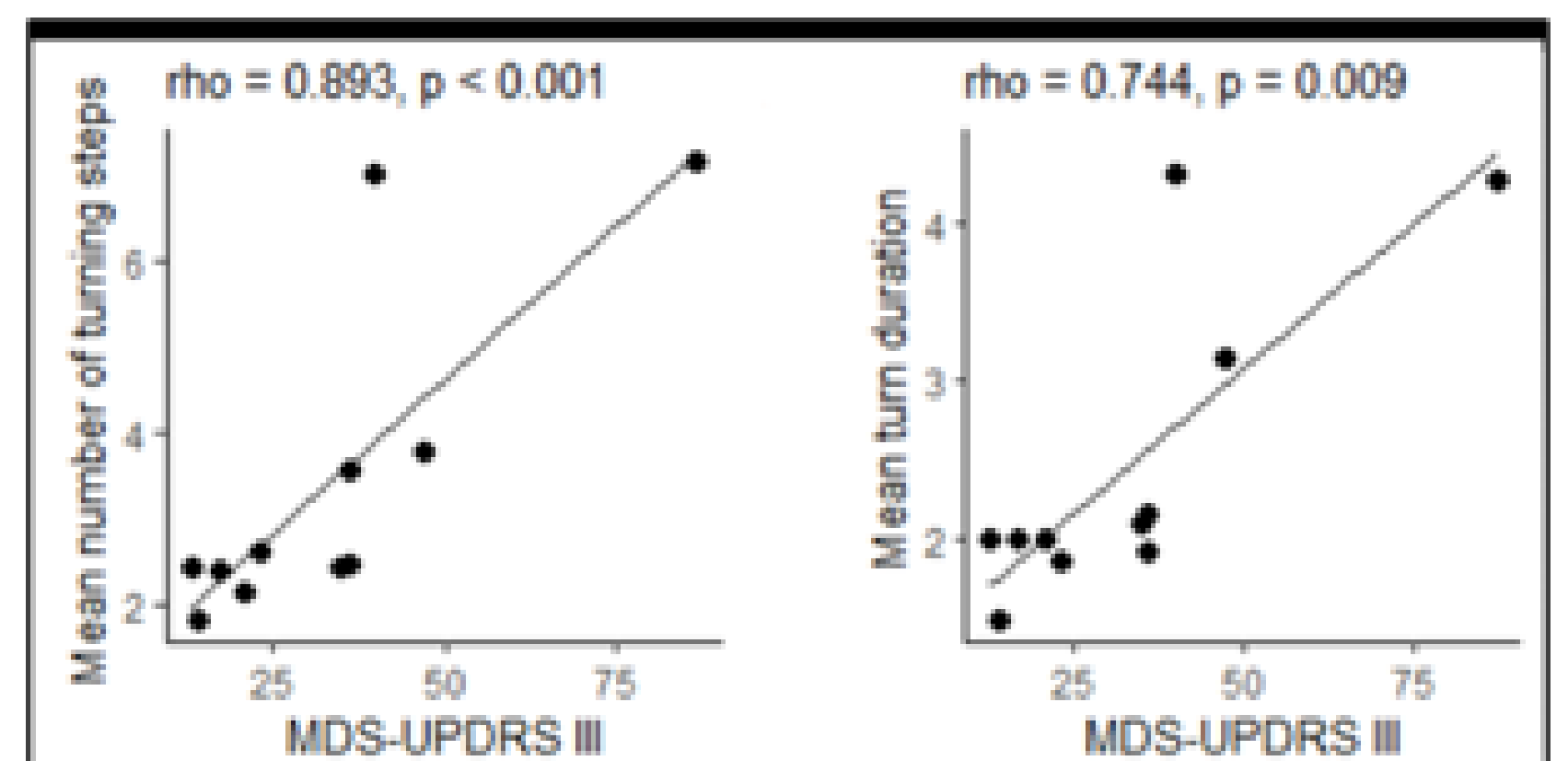
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## 1. Introduction

Parkinson's disease (PD) is a neurodegenerative disease which causes gait dysfunction in patients, amongst other symptoms. There is no cure; the way in which PD is measured in clinical trials of potential neuroprotective therapies uses "snapshot" clinician-patient interactions which do not capture the hour-by-hour fluctuations in symptoms and slow progression. Mobility ability is linked to quality of life in PD. Mobility-related outcomes could be functionally-relevant digital biomarkers in PD.

Figure 1. Correlations between turning of gait parameters and the gold-standard clinical rating scale score (MDS-UPDRS III)

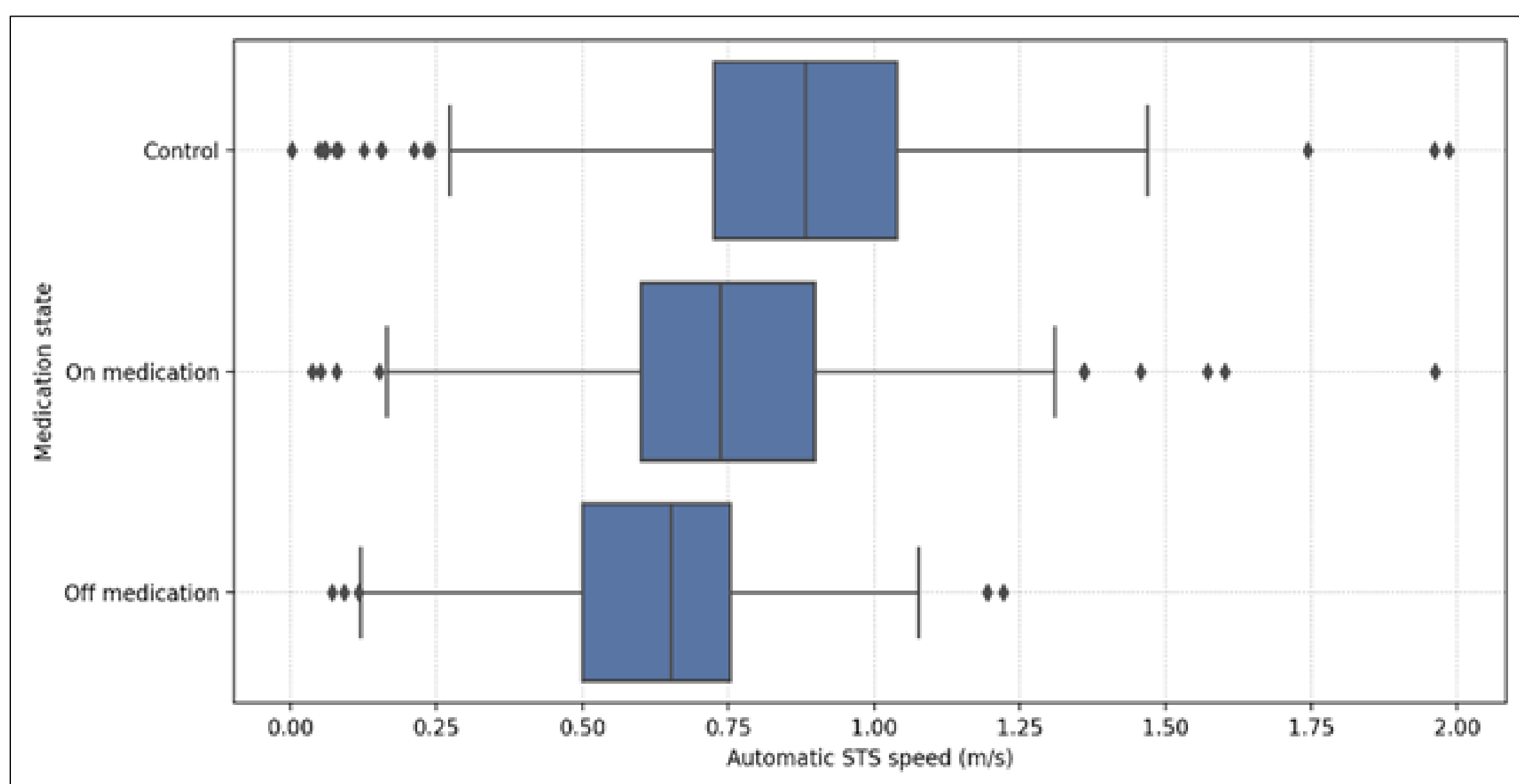


## 2. Results

Analysis of the video data, labelled second-by-second by human raters, shows the promise of mobility-related activities as markers of symptom progression in PD.

Sit-to-stand (STS)<sup>1</sup>, turning of gait<sup>2</sup> and room-to-room transition<sup>3</sup> duration all can differentiate between the ON and OFF (withholding symptom improving medications) medication states in PD, and between PD and control (see figure 2 for STS). Furthermore, there are strong correlations between STS duration/speed, and turning duration/number of steps taken to turn (figure 1), and the gold-standard clinical rating scale scores.

Figure 2. Illustration of average STS speed (m/s) in control participants compared to participants with PD ON and OFF medications



## 3. Conclusions

Mobility-related parameters from real-world data show promise as digital biomarkers of disease progression in PD.

Larger datasets for longer periods of time are needed for fine-tuning of algorithms to automatically detect and quantify mobility-related activities in diverse naturalistic settings of people's own homes.

## References

[1] Morgan, C et al. Turning at Home in Parkinson's Disease. Park Rel Dis 2022 (under review).

[2] Morgan C et al. Real-World Sit to Stand Evaluation. International Movement Disorders Annual Congress 2022.

[3] Jovan F et al. Multimodal Indoor Localisation in Parkinson's Disease using Transformers: Observational Study in a Free-living Setting. JBHI 2022 (under review).



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