Monitoring Levodopa responsiveness in Parkinson's Disease using mobile health technology: the Digital Levodopa Challenge

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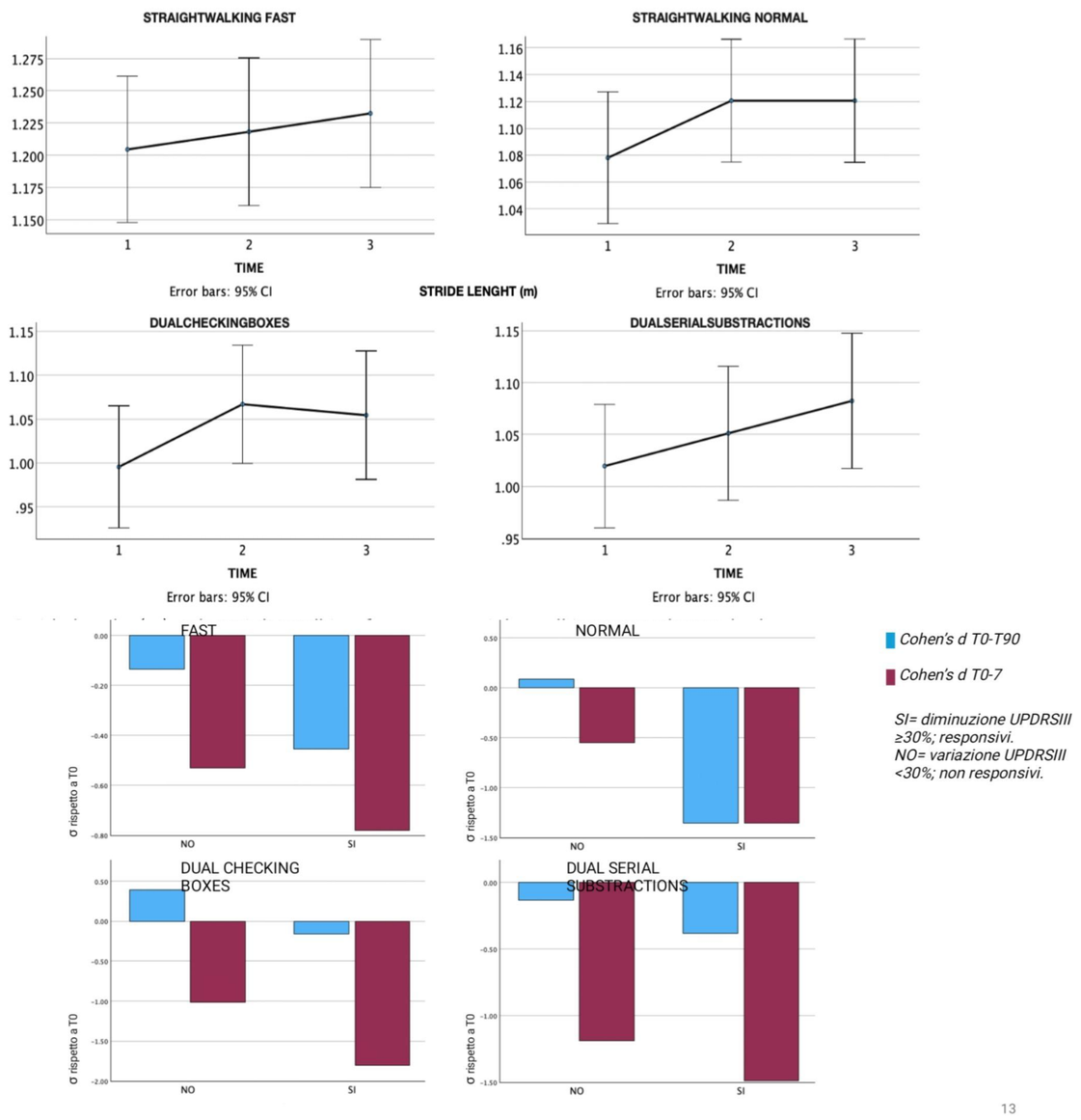
OBJECTIVE: In Parkinson's disease (PD), conventional clinical assessments may overlook subtle motor changes and inadequately represent real-world performance. The aim of this study was to test the individual response of drug naïve PD patients to a Levodopa Challenge test using clinical scales and mobile health technology.

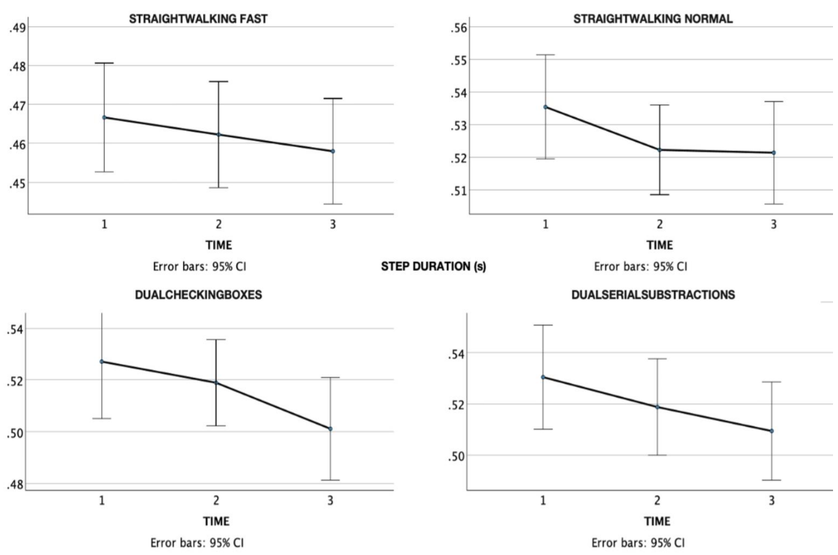
RESULTS & DISCUSSION:

- The PD group showed greater improvements in UPDRS III scores than the non-PD group at all time-points. Within the PD group, significant improvements were especially greater among the *Clinically-Established* compared to the *Probable* group, specifically at T120 and at T7d.
- Significant motor improvements were noted from T0 to T90, in stride length and step duration across all walking conditions, with the most pronounced changes occurring during fast-paced and dual-task walking. **Normal walking tasks** demonstrated the greatest sensitivity to Levodopa with no differences between T120 and T7 days performances.
- L-dopa challenge correctly identified subjects with PD in clinic. The adoption of MHT assessment may enhance sensitivity in probable PD. Further ongoing longitudinal studies will evaluate the ability of MHT to predict short term progression over time.

MATERIALS & METHODS:

- 52 patients with suspected PD underwent a L-dopa Challenge test to clinically evaluate their response. Among 52, 41 patients received a diagnosis of PD, either *Clinically-Established* or *Probable* (Postuma et al., 2015), whereas 11 individuals exhibited movement alterations not related to neurodegenereative parkinsonism.
- Clinical examination comprehensive of UPDRS III at baseline, 60 minutes, 120 minutes and after 7 days of continuous treatment.
- A subset of 36 patients diagnosed with idiopathic PD were further evaluated from a motor stand-point collecting gait data through wearable sensor devices. Walking tasks encompassed normal, fast-paced, and dual-task conditions, box-checking and serial subtraction. Stride length and step duration served as the principal metrics. Patients were either classified as **responders** (≥15% or ≥30% improvement in UPDRS III) or **non-responders**.





CONCLUSIONS:

- Wearable sensor devices demonstrated **enhanced sensitivity** to subtle motor changes when compared to traditional assessments, supporting their application in real-world monitoring and personalized management of Parkinson's Disease.

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