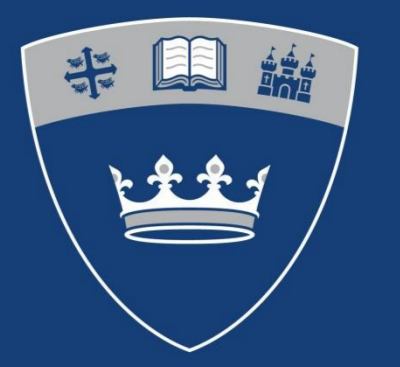


An exploration of the activPAL™ activity monitor in measurement of sedentary and physical activity patterns in people with mild to moderate Parkinson's Disease: A validation study



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PARKINSON'S^{UK}
CHANGE ATTITUDES.
FIND A CURE.
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Background

Parkinson's Disease (PD) is a neurodegenerative disorder that affects approximately 127,000 people in the UK¹. Because of the symptoms of the condition, people with PD (pwPD) are often more sedentary than age-matched healthy adults. Being physically active has neuroprotective properties² and can modify the progression of symptoms. Accurate measurement of Physical Activity (PA) and Sedentary Behaviour (SB) is important for the development of relevant, individually-tailored interventions which may impact on PD symptoms. Accelerometry has been suggested as a practical and objective measurement tool but its utility has not been fully established with pwPD.

Study Aims

This study investigated the criterion validity of the activPAL accelerometer in measuring PA and SB in people with PD in a simulated structured and free-living environment. Video observational analysis was used as a criterion measure.

This study was part of a larger piece of work exploring measurement of PA and SB in pwPD. Ethical approval for this study was obtained from the Queen Margaret University, Divisional Research Ethics Committee.



Figure 1: activPAL placement on the right thigh



Methods

Eight men and two women (mean age 69 ± 7.3) with mild to moderate PD (median Hoehn and Yahr 1.5, IQR 1-2) were recruited from a local Parkinson's UK group. All subjects were videoed while they undertook a series of structured and "free-living" activities while wearing an activPAL accelerometer on their thigh (figure 1).

Different postures were identified using the video analysis and the activPAL data. Sitting and lying were classified as time spent in SB, while time spent standing and walking classified as PA. Correlational analysis and Bland and Altman³ (BA) Plots with 95% limits of agreement (LOA) were used to explore agreement between observational data, as the criterion method, and the activPAL estimate.

Prior to data collection

Information and consent
Height, weight and Hoehn and Yahr
Attachment of activPAL to thigh

Module 1 – structured activities

Lie, sit, stand (3 mins each posture),
Timed Up and Go

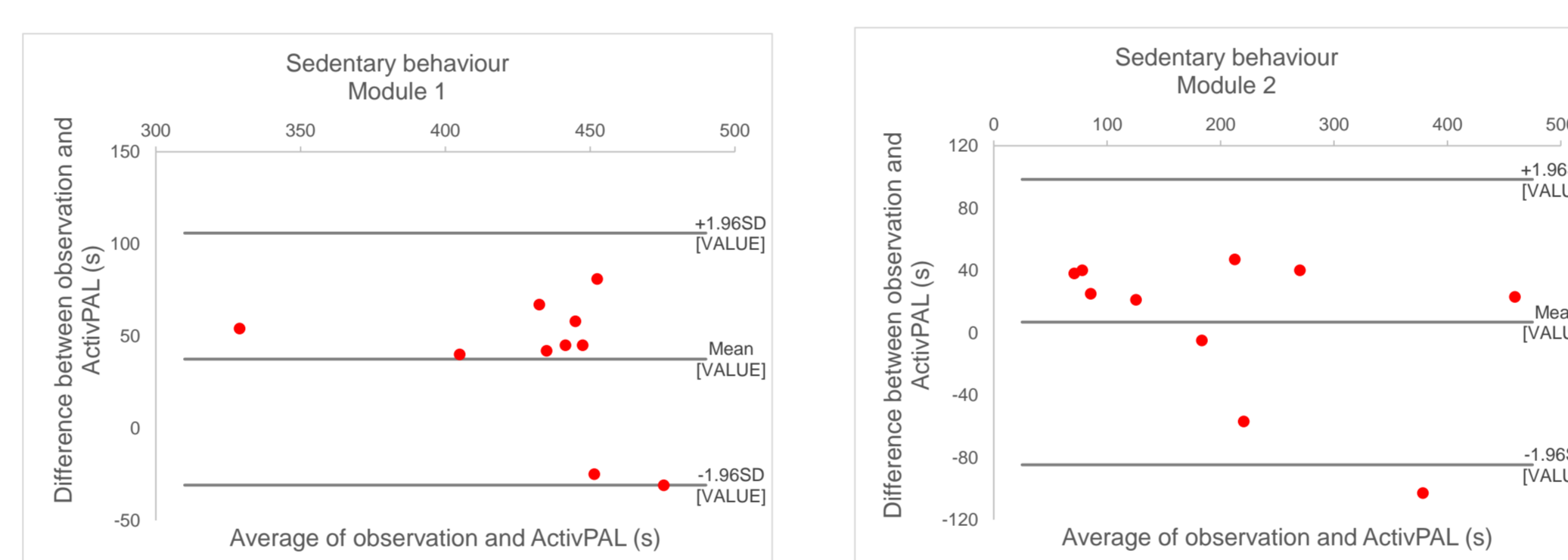
Module 2 – "free-living" activities

4 randomly selected ADLs

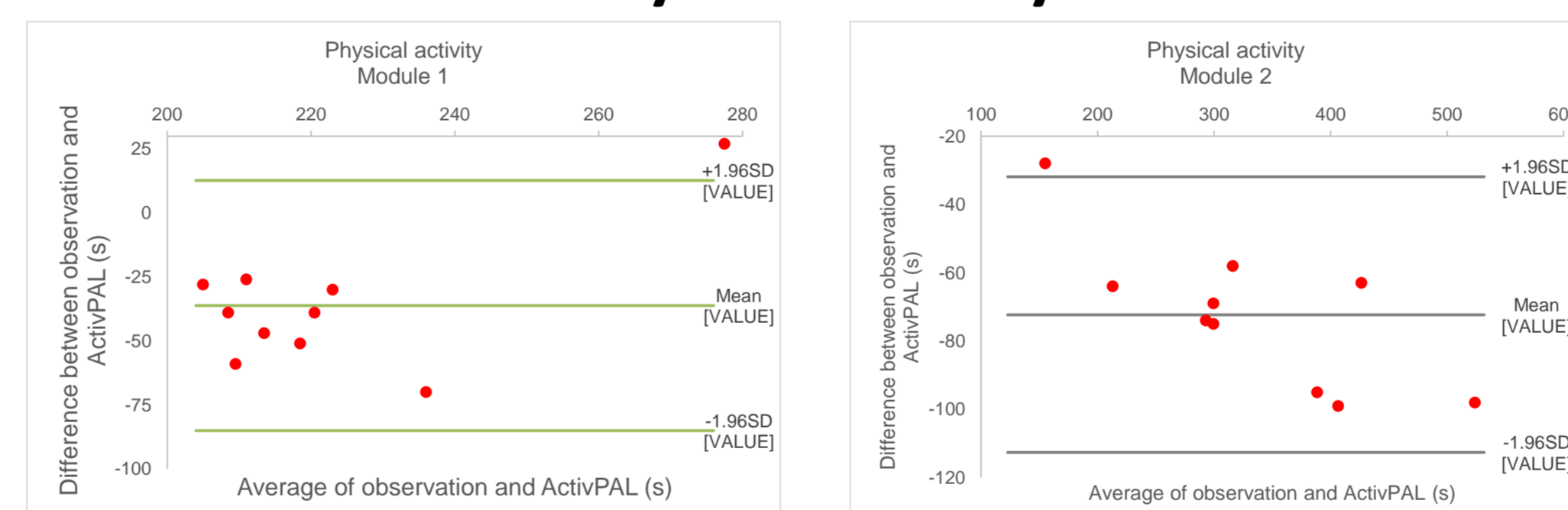
Data analysis

Figure 2: flow diagram of study design

Sedentary Behaviour



Physical Activity



Results

A Pearson's correlation showed no statistically significant correlation between the activPAL and video data during structured activities (SB: $r=0.68$, $p=0.03$ and PA: $r=0.55$, $p=0.098$), however, a strong correlation was found for "free-living" activities (SB: $r=0.94$, $p>0.001$ and PA: $r=0.99$, $p>0.001$).

In order to assess agreement between the two sets of data, BA plots were used.

Discussion

The results suggest that while there was a strong correlation between activPAL estimate and video observation during "free-living" activities, the BA plots revealed large mean differences with wide LOA between the activPAL estimate for time spent in PA and the criterion method of video observation. The activPAL was found to underestimate time spent in PA by between 15 - 20%. The mean difference for time spent in SB between activPAL and observation was less marked (6.9s) however there were wide limits of agreement and the activPAL underestimated time spent in SB by between 3 - 9%.

Clinical Implication and Recommendations

The results of this study suggest that while the activPAL may be underestimating time spent in PA and SB, it may provide a reasonable estimate for time spent in SB. However, given the small sample size, the short time period for data collection and the laboratory setting not reflecting true "free-living" these findings should be viewed cautiously and further research in a larger study and over a longer time period is warranted to investigate the validity of the activPAL to estimate PA and SB in pwPD.

Parkinson's UK is the operating name of the Parkinson's Disease Society of the United Kingdom. A registered charity in England and Wales (258197) and in Scotland (SC037554).

Acknowledgements

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