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Reliability and validity of the activPAL for measuring stepping and reclining in unilateral lower limb amputees

David Rowe¹, Sarah Deans¹, Alison Kirk¹, Anthony McGarry¹, Hayley Mitchell¹, Lauren Sloan¹, Andrew Walker¹

¹University of Strathclyde

Introduction: Valid, reliable measurement of physical behaviours in adults with limb absence is essential to accurately describe physical behaviour patterns and intervention effects.

Purpose: To assess parallel forms reliability and criterion-related validity of the activPAL for measuring steps and reclining time in simulated lifestyle activities in adults with unilateral lower limb absence. Methods: 15 adults completed three circuits of simulated kitchen work, sitting, lying and purposeful walking on level ground and stairs. Three trained raters independently analysed video recorded trials for incidental stepping, purposeful stepping and reclining. Simultaneous data were obtained from two activPAL monitors placed on the sound and prosthetic side. Data were analysed using oneway intraclass correlation coefficients (ICC; parallel forms reliability), and with Pearson correlations, oneway repeated ANOVAs, and Cohen's d (criterion-related validity).

Results: Parallel forms reliability (prosthetic side vs. sound side) was poor for incidental steps (ICC = .05, d = 0.41) but acceptable for all other measures (ICC = .69-.98; d = 0.02-0.17). Correlations between direct observation and activPAL ranged from $r = .65-.98$ (activPAL on sound side) and from $r = .30-.99$ (activPAL on prosthetic side). Mean differences between observed measures and activPAL measures were generally large for all stepping variables (d = 0.56-4.22); observed mean scores were systematically higher than from the activPAL. Correlations were higher for reclining time ($r = .98-.99$), and differences were smaller (d = 0.25-0.28), although the pattern was similar (observed scores were higher).

Conclusions: activPAL data from the sound side and prosthetic side are similar for adults with unilateral lower limb absence. Validity of the activPAL in this population seems poor in simulated lifestyle activities. These results may be at least partly due to the brief sampling period or the simulated activity protocol.