Title: Predictive relationships between kinetic wheeling parameters and wheelchair skills.

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ABSTRACT.

Objective: To determine the relationship between wheelchair skills measured by the Wheelchair Skills Test 4.1 (WST) and kinetic wheeling parameters measured by the SmartWheel Clinical Protocol (SCP).

Design: Cross-sectional

Setting: Biomechanics Laboratory

Participants: Adult (N=20) and paediatric (N=7) manual wheelchair users were tested with a variety of injury diagnoses. Mean age ± SD was 31.6 ±12.8 and 12.4 ± 1.9 years for adult and paediatric groups, respectively. Injury diagnoses included spinal cord injury (N=20), spina bifida (N=6), and stroke (N=1).

Interventions: Not applicable

Main Outcome Measures: The WST total score was used. SCP parameters included peak force, speed, push frequency, push length, weight normalized force, average distance per push and mechanical effectiveness. Relationships between WST and SCP were determined using Pearson Product Moment Correlation (PPMC).

Results: Adult (N= 20) self-selected ramp speed (r= 0.80), self-selected carpet speed (r= 0.68), and ramp average distance per push (r= 0.69) were statistically significantly correlated (p <0.002) with total WST skill. For the paediatric population (N=7), similar correlations were found: ramp speed (r= 0.78), carpet speed (r= 0.81) and ramp average distance per push (r= 0.86) correlating to total WST score, however these were not considered to be statistically significant.

Conclusions: Self-selected wheeling speed on carpet and ramp and average distance per push on ramp are significantly related to wheelchair skills in adults. These relationships could be used by clinicians as a primary predictor of skill in adult populations. Further research is needed in paediatric participants.

Key Words: Wheelchairs, Rehabilitation, Motor skills, Paediatrics