

Using Curb and Figure-Eight Skills Tests to Compare Maneuverability of the user assistant team in the Motivation *Rough Terrain* Wheelchair and the Whirlwind *RoughRider* Wheelchair

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ABSTRACT

Some wheelchair users who cannot self-propel use powered chairs. In less-resourced settings powered chairs may not be available and users may rely on assistants to push them. In these environments, obstacles similar to curbs are common and living spaces are small. Efficiency and maneuverability are two key aspects of wheelchair performance in such settings¹. Validated skills tests for measuring wheelchair performance over obstacles and in tight spaces include timed exercises involving curbs and figure-eight patterns. We hypothesized that some chairs designed for less-resourced settings would be easier than others for assistants to push in tight spaces and over curbs. College-aged participants (n=29) serving as assistants completed two three minute skills tests with two models of wheelchairs designed for less-resourced settings, the Motivation *Rough Terrain* and the Whirlwind *RoughRider* chair. The two skills tests consisted of three minute timed walk tests (TWT) with each chair on two short tracks, one encompassing a curb and the other in a figure eight around chairs. *PolarPro* heart rate monitors were used to collect heart rates. Distance traveled was measured and physiological cost index (PCI) was calculated. Subject feedback was obtained through visual analogue scale (VAS) questions and written comments for each exercise. Two-way within subject ANOVA analysis and post hoc paired t-tests were used to evaluate data. Within subject ANOVA indicated that the Motivation chair significantly outperformed the Whirlwind chair in PCI, TWT, and VAS responses. Post hoc paired t-tests of PCI values and VAS responses indicated that the differences between the Motivation and the Whirlwind were significant for both tracks. This data was normal and showed interaction but no crossover. The post hoc t-test analysis of TWT data, however, showed significant difference for the curb but only nearly significant difference for the figure-eight. In the written comments, subjects indicated a preference for the design of the Motivation chair mentioning certain features such as the single front castor wheel and the position of the handle bars. Our data indicates that the Motivation *Rough Terrain* chair may provide superior mobility to assistants serving people with disabilities in less-resourced settings specifically while maneuvering through tight spaces and over obstacles. Through this research, we hope wheelchair manufacturers will be encouraged to make improvements in wheelchair functionality for assistant pushers in less-resourced settings.

