

## **A Comparative Study on the Energy Cost of Pushing The Hope Haven KidChair and Free Wheelchair Mission Gen 2 Wheelchair**

Hamm E, Jonah B, and Rispin K

Wheels Project; Department of Biology; LeTourneau University; Longview, TX

---

*Category: Undergraduate*

*Advisor / Mentor: Rispin, Karen (KarenRipsin@letu.edu)*

### ABSTRACT

**Introduction:** Wheelchair skills tests can be used to assess the mobility provided by different types of wheelchairs. A repeated measures study design in which participants complete skills in one type of wheelchair and then another minimizes individual variation. Free Wheelchair Mission Generation 2 (FWM-2) and Hope Haven KidChair (H-KC) offer two pediatric-sized wheelchairs designed for use in low-resource settings. We hypothesize that four simple skills tests will be able to distinguish some strengths and weaknesses of the mobility provided by these two wheelchairs. **Methods:** This study was done in partnership with a host organization at a school for children with disabilities in a low-resourced setting. Study protocol was approved by ethics committees of all pertinent organizations. Wheelchair users who were identified by clinicians as safely able to use study wheelchair types and able to self-propel strongly on rough surfaces were invited to join the study. Participants completed consent and assent forms and were free to withdraw or to opt out of any aspect of the study. All skills tests were completed in one wheelchair type and then the other. The order of the tests and chairs were randomized and participants rested between tests. The following skills were included: rolling for 6 minutes on a rough ground track and 6 minutes on a smooth ground track; rolling for 3 minutes on a track in tight spaces; and timed transferring to the ground and back 3 times. We also collected participant feedback using a visual analogue scale question for each test. **Results:** Statistically significant differences indicated that participants performed better in the F-G2 than in the H-KC wheelchair in all skills tests except for the transfer test, which significantly favored the H-KC wheelchar. **Discussion:** The apparent poorer mobility provided by the H-KC may be due to its short wheelbase and anterior center of gravity, both of which are known to increase rolling resistance. These tests did not assess the appropriateness of the seating system. Wheelchair manufacturers have expressed that these findings are of interest to them and will impact future wheelchair design changes.