Introduction

Clinical outcomes measures on the function of assistive devices allow effective targeting of limited funds1. In low income countries, because of fewer resources and the low frequency of visits to clinics, outcomes measures are even more necessary 2. Without such feedback, even with the best of intentions, providers can only design pediatric wheelchairs for these settings based on educated guesses.

The goal of the Wheels project is to provide independent studies on the functionality of wheelchairs designed for less resourced settings. Long-term comparative field studies are being done in Kenya; each field study includes a parallel study done in the US using able bodied subjects to investigate the energy cost and maneuverability for subjects who push the wheelchairs. This particular US based study involves the Regency pediatric wheelchair, and a pediatric wheelchair made by the Association of the Physically Disabled of Kenya (APDK).

Methods

A comparative study was performed on two supportive pediatric wheelchairs with 12” wide seats: the Regency chair and an APDK chair. The Regency chair is manufactured in the US and distributed around the world by Joni and Friends International Disability Center. The APDK chair is manufactured and distributed in Kenya. (Figures 1,2,3). Subjects were pairs of able-bodied students: high school students pushing elementary school students. Analysis using paired t tests highlights the strengths and weaknesses of each device. Each subject pair completed outcomes measures for one wheelchair, and then the other. Energy cost was assessed by a six minute timed walk test (TWT) with a concurrent Physiological Cost Index (PCI) completed on a sidewalk (smooth ground) and on a gravel driveway (rough ground) (Figure 1,2). Maneuverability was assessed with three skills tests taken from the Wheelchair Skills Test1. The Wheelchair pusher completed a visual analogue scale question for subjective input on each of the five exercises. Informed consent, assent, and ethics approvals by all concerned organizations were obtained.

Results

Paired t tests indicated significant differences between the two wheelchairs for the PCI taken while rolling on rough ground and while rolling on smooth ground (table 1). Question results echoed PCI findings for the energy cost of rolling on rough and smooth ground. Question results were also significantly different for maneuvering in tight spaces (a figure eight around two chairs) (table 3). In all of the above, the Regency wheelchair outperformed the APDK wheelchair.

Discussion

The skills tests for tight spaces curb and ramp consisted of timing eight iterations of each skill. This may have been too few iterations to enable sufficient sensitivity to differentiate between the two wheelchairs. Subjects comments indicated that the smaller wheel and the often misaligned and smaller frame made the APDK wheelchairs significantly more difficult to push. In addition, the pneumatic tires of the APDK chair went flat multiple times over the short period of the study. Findings in the larger field study done in Kenya echo these results. APDK is responding to these findings and has expressed eagerness to improve their service to people receiving their wheelchairs in Kenya.