Scootering for Children and Youth is More Than Fun: An Appealing Approach to Improve Function and Fitness

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Background

Pediatric rehabilitation focuses on fun, fitness, function, friends, and family while acknowledging and addressing environmental facilitators and barriers. Functional goals for children with cerebral palsy GCMAS levels I and II often focus on the activities of walking and running. Scootering is a fun activity that has the potential to address impairments, improve function, and promote participation. It involves the stretching and strengthening of many muscle groups and has been identified as having energy expenditure levels similar to bicycling (Ridely K et al. 2008).

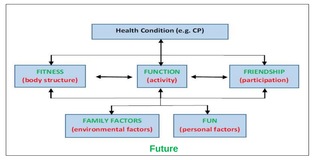
Objectives

To describe scootering through motion analysis and the International Classification of Functioning, Disability, and Health (ICF).

Methods

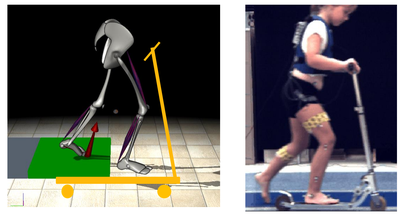
Kinematic, kinetic, electromyographic, and video analyses were used to examine walking and scootering in children and adolescents; five typically developing, five with walking limitations due to cerebral palsy GMFCS levels I and II, and four with chemotherapy induced peripheral neuropathy.

Perspectives were collected through surveys and child/family reports. Scootering was analysed within the "F Words" framework which is based on the ICF (Rosenbaum & Gorter, 2012).

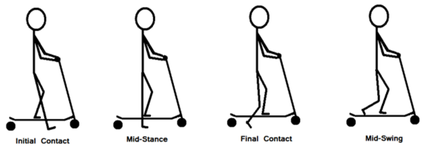


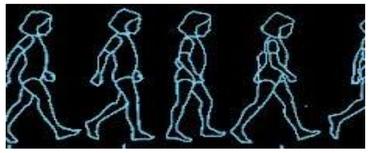
Rosenbaum & Gorter. (2012) The 'F-words' in childhood disability: I swear this is how we should think! Child Care Health Dev. 38:457-63.

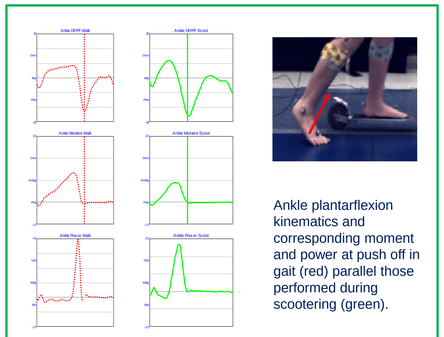
Ridely K., Ainsworth B.E., Olds T.S. (2008) Development of a compendium of energy expenditures for youth. International Journal of Behavioural Nutrition and Physical Activity. 5:45. doi10.1186/1479-5868-5-45.



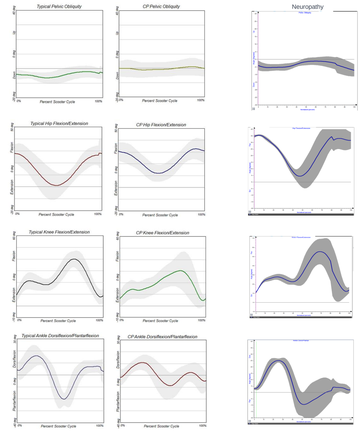
The knee flexion/extension motion curve of the propelling leg (red) is similar to the kinematics during gait. The curve and EMG of the leg on the scooter (green) reflects eccentric/concentric quadriceps control.







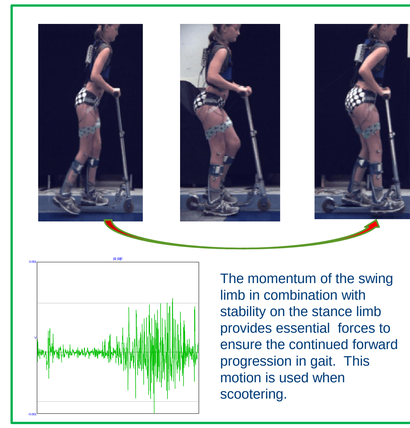
Ankle plantarflexion kinematics and corresponding moment and power at push off in gait (red) parallel those performed during scootering (green).



The participants with cerebral palsy had less sagittal excursion of their hip, knee, and ankle movements on the pushing limb throughout the scooter cycle; they had less hip extension for propulsion, less knee flexion in swing, less dorsiflexion in mid-stance, and less plantarflexion for push-off. They also held their pelvises more rigidly in the transverse plane. The children with neuropathy had less plantarflexion push off excursion. The percent of cycle for initiation of swing was similar between groups.

Results

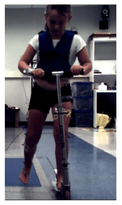
Many of the movement characteristics identified in the activity of scootering reflected desirable gait attributes that are addressed in gait training for children/youth with motor problems. These included shock absorption through eccentric quadriceps activity, propulsion and push-off, clearance in swing phase, balance, stance/ swing limb coordination, the muscle activity associated with pelvic stability, and endurance/ fitness.



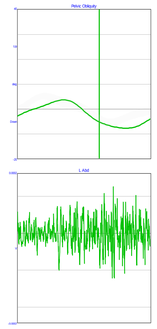
The momentum of the swing limb in combination with stability on the stance limb provides essential forces to ensure the continued forward progression in gait. This motion is used when scootering.

Fitness

Function



The onset of single stance in gait demands strong action of the hip abductors to stabilize the pelvis and maintain balance. Coronal plane pelvic motion while scootering (green line) mimics the normal curve (grey) during the gait cycle with corresponding strong EMG activity of the hip abductors.



Friends

Family

Fun

Future

Conclusions

These findings suggest that scootering has the potential to address many body function and structure impairments associated with the activities of walking and running. It is a fun activity that is relatively easy to learn and is inexpensive. or with friends and family, providing opportunities for participation and boosting of confidence and self-esteem. There are opportunities for further investigation of this activity, in a systematic manner in children with and without disabilities. Safety must be considered. Scootering can be done indoors or outdoors; individually or in a group.

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