

Explorer Mini: Young Children's First Driving Experience

Sam Logan, PhD
Assistant Professor, Kinesiology,
Oregon State University

Teresa Plummer, PhD, OTR/L,
ATP, CEAS, CAPS
Associate Professor, Belmont
University

Claire Morress, PhD, OTR/L, ATP,
Faculty, Xavier University,
Research Coordinator, Perlman
Center at Cincinnati Children's
Hospital and Medical Center

Acknowledgements

The authors would like to recognize the input, reviews and guidance of Karin Leire, MS, Vice President of Research and Innovation, Permobil. Additionally, gratitude is extended to the families, clinics and therapists of the children who participated in this study.

Financial disclosure: This study was funded by Permobil.

Movement Drives Development

Lobo et al., 2013

Movement Drives Development

Held & Hein, 1963

What is the Gold Standard?

- Self-directed mobility as a fundamental human right (Feldner, Logan, & Galloway, 2016)
 - United Nations
- Whatever is standard for children without disabilities
- Independence
 - Activities of daily living
 - Play
 - Trouble-making

On-Time Powered Mobility

Systematic Reviews (Bray et al., 2014; Livingstone, 2010; Livingstone & Field, 2014)

- Young children can learn to drive
- Mobility skills
- Overall development
- Participation with peers and family
- Play and social skills
- Greater interest in motor activities
- Decreased caregiver assistance
- Improved sleeping and eating
- Latest RESNA Position Paper integrates and supports evidence of systematic reviews (Rosen et al., 2017)

On-Time Powered Mobility

Devices (Feldner, Logan, & Galloway, 2016)

- Motorized wheelchairs
- GoBot
- Cooper Car
- Mobile robots (UD1, Weebot)
- Whizzybug
- Modified ride-on cars

On-Time Powered Mobility

Explorer Mini

- 12-36 months
- Functionality, safety, and battery life of a motorized wheelchair
- Toy-like design
- Lightweight
- Joystick control with 360 degree turning
- Proportional speed control with multiple speed options
- Can be used in seated or standing
- FDA 510k Cleared Device

Purpose

- To describe (1) the driving experience and (2) the emotional responses of young children who experience mobility limitations during initial use of the Explorer Mini.

Method

- Descriptive cross-sectional study utilized a mixed- method approach to describe the initial responses of children, caregivers and therapists to the Explorer Mini.
- Part of a larger Human Factors Validation study that examined the user errors of caregivers and clinicians in operating the Explorer Mini.

Method

Participants

- N = 33 (17 females) who experience mobility-related disability
- Age
 - Mean = 20 months
 - SD = 7.9 months
 - Range = 6-35* months
- Engaged in up to two, 15-minute driving sessions

*initial study included infants as young as six months old although the Explorer Mini has subsequently been approved for use of 12-36 month olds.

Method & Results

Observation Form

- Driving Experiences
 - Does the child visually notice the joystick or seek to explore with other sensory systems (eyes, mouth)?
 - 94%
 - Does the child reach for the joystick when prompted?
 - 88%
 - Does the child reach for the joystick without prompting?
 - 79%

Method & Results

Observation Form

- Driving Experiences

- Does the child move the device in any direction? Response options included “yes, forward”, “yes, right”, “yes, left”, “yes, backwards”, “yes, in circles”, and “no”

- At least one direction 94%
 - Forward 82%
 - Backward 61%
 - In circles 61%
 - Right 61%
 - Left 48%

- Does the child recognize that the device is in motion (i.e. start, demonstrate cause and effect, grasp and release)?

- 88%

Method & Results

Observation Form

- Emotional Response
 - Does the child exhibit any emotional response?
 - 94%
 - Does the child demonstrate a vocal or verbal response?
 - 64%

Discussion

- A small, toy-like early mobility device with sit-to-stand seating and a midline joystick was instrumental in promoting exploratory behaviors, emotional expression and self-initiated movement in very young children who experience mobility-related disability
- Advantage of Explorer Mini compared to other devices...
- Future research...

References

Bray, N., Noyes, J., Edwards, R.T., & Harris, N. (2014). Wheelchair interventions, services, and provision for disabled children: a mixed-method systematic review and conceptual framework. *BMC Health Services Research*, 14, 309.

Feldner, H.A., Logan, S.W., & Galloway, J.C. (2016). Why the time is right for a radical paradigm shift in early powered mobility: The role of mobility technology devices, policy, and stakeholders. *Disability and Rehabilitation: Assistive Technology*, 11 (2), 89-102.

Held, R., & Hein, A. (1963). Movement-produced stimulation in the development of visually guided behavior. *Journal of Comparative and Physiological Psychology*, 56 (5), 872-876.

Livingstone, R. (2010). A critical review of powered mobility assessment and training for children. *Disability and Rehabilitation: Assistive Technology*, 5(6), 392-400.

Livingstone, R., & Field, D., (2014) Systematic review of power mobility outcomes for infants, children and adolescents with mobility limitations *Clinical Rehabilitation*, 28, 954-964.

Lobo, M., Harbourne, R., Dusing, S. & McCoy, S. W. (2013) Grounding early intervention: Physical therapy cannot just be about motor skills anymore. *Physical Therapy*, 93, 94-103.

Rosen, L., Plummer, T., Sabet, A, Lange, M.L., & Livingstone, R. (2017). RESNA position on the application of power mobility devices for pediatric users. *Assistive Technology*, 1-9.