



# EDUCATION IN MOTION

---

■ W H E R E   T H E O R Y   M E E T S   P R A C T I C E ■

## Handouts for **Considering Mobility Equipment as it Relates to Development- Sunrise Clinical Education Team**

The information from the PowerPoint is in this documents. Photos and drawings are removed to align with Regulatory Guidelines.

### **Objectives:**

1. Participants will be able to list 2 benefits of on-time mobility intervention
2. Participants will compare and contrast reasons to utilize a dependent versus an independent wheelchair base
3. Participants will identify two interventions for power driver training
  - The first few years of life are crucial for brain development and will have a lasting impact on cognitive and social function later in life.
  - Babies brains develop faster in the first few years of life than any other time in our lives. It can create up to **one million** neural connections every second!

### **Cognitive-Behavioral Skills: Supported by Mobility**

- Language skills
- Object permanence



- Awareness of how to get from one place to another, body in space
- Sense of identity, confidence
- Curiosity, initiative
- Persistence in the face of frustration
- Also avoids learned helplessness, apathy, depression, passivity
- Decrease in negative social experiences
- Increased play
- Social interaction and initiation with peers
- Participation in school
- Initiation of movement throughout the environment

### **Dependent Bases**

- Little to no opportunity to push self
- Small wheels or tilt
- Difficult to self-propel
- Chair may be heavy

### **Types of Dependent Bases**

- Umbrella type- over the counter and medically prescribed
- Baby Strollers-over the counter
- Medically Prescribed strollers
  - How much support is needed and where?
  - How much tilt?
  - How much recline?
  - Do angles need to change throughout the day?
  - How does it fold?
  - Forward or rear facing options?



- Hi-Lo base option?
- Transit options?
  - Stroller Options
    - Canopy
    - Modular or Custom Seating
    - Vent Tray
    - IV Feeding Tube Pole
    - Transit Option
    - Grab Bar
    - UE Support Tray
    - Oxygen Cylinder Holder
    - Cup Holder
  - Tilt or Rotation in Space Systems
    - Considerations for Tilt
      - Support Needed
      - Folding
      - Propulsion option
      - Center of gravity
      - Power assist
      - Type of tilt
      - How much tilt
      - How much recline
      - Anterior tilt
      - Power tilt
    - Pivot Style Tilt
      - 45 degrees
      - Folding
    - Rotational Tilt in Space (Intelligent Rotation in Space (IRIS))



## **Self-Initiated Movement**

- Moving self in space
- Evidence demonstrates that several areas of development can benefit from self-initiated movement
  - Gross motor
  - Fine motor
  - Sensory
  - Visual Perceptual
  - Personal/Social
  - Communication/Language

## **On-time Mobility Framework**

- Timing: Recognizing the onset of mobility is within the first year of life rather than equating delayed or absent mobility with the delay or absence of walking
  - Urgency: Promotes urgency as self-initiated mobility is a catalyst for all domains of development
  - Multi-Modal: Encourages a variety of mobility opportunities to close the gap upon learning and play
  - Frequency: Necessitates equality in the frequency of mobility opportunities for all children regardless of mode of mobility.
  - Sociability: Supports the necessity of self-initiated mobility within socially enriched environments as a means for developing and sustaining meaningful relationships
- Sabet et al. 2022

## **On-Time Manual: Bella's Bumbas**

- Four types of systems



- Free or donations accepted- pay for shipping \$75.00
- Over 2600 distributed!
- Bellasbumbas.com
- Leckey Scoot
  - May be easy to crawl into independently
  - Commercially available

## **MANUAL WHEELCHAIR**

- With independence comes confidence
- Easier to propel and control
- Gives child freedom to explore

## **CONSIDERATIONS**

- Folding or Rigid
- Postural Support Needs
- Pressure Distribution Needs
- Propulsion Skills

## **MANUEVERABILITY**

- Propulsion Skills
- Center of gravity and arm placement
- Safety is important
  - Anti-tippers while moving rear wheels forward
- Weight of back packs? Consider placing items under seat
- Armrests?
  - What is needed for function
  - What is needed for self-initiated movement
- Tray?



- Is it needed for school or other activity?
- Can it be removed during self-propulsion
- What are the limitations?
  
- Wheels?
- Caster size?
- Transfers?
- Reaching objects and items on the floor?

### **Pediatric Wheelchair Skills Story Book**

**Paula W Rushton, OT PhD presented at ESS 2024**

[https://wheelchairskillsprogram.ca/wp-content/uploads/Storybook\\_Tool\\_Set\\_1.pdf](https://wheelchairskillsprogram.ca/wp-content/uploads/Storybook_Tool_Set_1.pdf)

### **On-Time Mobility: Power**

**Driving to Learn- Nilsson & Durkin**

**Go Baby Go: Cole Galloway**

**Modified Ride-On Devices**

**Hays Functional Groups Inclusion of Power**

- Children who may never ambulate
- Children with inefficient mobility
- Children who lose the ability to walk or to walk efficiently
- Children who need mobility assistance in early childhood

**Considerations for Power**

- Size
- Transportation
- Turning Radius
- Tilt, Recline, Seat Elevation
- How to control



- Safety (LUCI)

## **Determining Control Options**

### **Are they ready?**

#### **How do you know?**

- Phases of Learning
- “Driving to Learn”
- Assessments
- Training

#### **“Driving to Learn”**

- Use the experience of powered mobility to enhance alertness and development.
- Unintentional activation may lead to intentional activation to purposefully move
- Self-activated mobility stimulates most sensory channels
- Evidence with very young as well as those with dementia or severe cognitive impairments.

#### **Three Stages of Learners**

- Exploratory Learner
- Operational Learner
- Functional Learner

#### **Power Mobility Program (PMP)**

- One of the first pediatric based assessments for power mobility
- Furumasa’s research contributed heavily to the evidence of on-time mobility
- PMP
  - 3 level of skills



- 34 wheelchair skills
- 5 Level rating scale
- High cognitive functioning required to successfully follow directions.
- Not recommended for very young children

### **Assessment of Learning Powered Mobility Use (ALP)**

- Nilsson and Durkin

### **Power Mobility Training Tool (PMTT)**

- Kenyon
- Identifies basic power mobility skills in children who have multiple severe disabilities
  - Cause and Effect Concepts
  - Visual Skills
  - Activation Method
  - Stop and Go Abilities
  - Driving Functions

### **Power Wheelchair Skills Test**

- Kirby and Smith
- Wheelchair Skills Test Questionnaire (WST-Q) Version 5.3 Form Powered Wheelchairs
- Assesses Performance, Confidence, and Frequency
- Verbal or Written Directions for 27 Power Wheelchair Skills Including use of controller, changing modes, speeds and seat functions
- Not designed for younger children or on-time mobility
- Adolph, K. E., & Hoch, J. E. (2020). The Importance of Motor Skills for Development. Building Future Health and Well-Being of Thriving Toddlers and Young Children, 95, 136-144.





- Anderson, D. I., Campos, J. J., Witherington, D. C., Dahl, A., Rivera, M., He, M., ... & Barbu-Roth, M. (2013). The role of locomotion in psychological development. *Frontiers in psychology*, 4, 440
- Casey. (2013). Facilitating child participation through power mobility. *Journal of the Association of Occupational Therapists*, 76(3), 158–159. <https://doi.org/info:doi/>
- Casey J, Paleg G, & Livingstone R. Facilitating child participation through power mobility. *British Journal of Occupational Therapy*. 2013;76(3):158-160.
- Feldman, H. (2017). Go Baby Go? Stakeholder perceptions of powered mobility provision. Proceedings 33<sup>rd</sup> International Seating Symposium, Memphis, TN retrieved from [www.iss.pitt.edu/ISS2017](http://www.iss.pitt.edu/ISS2017)
- Field DA, Livingstone RW. Power mobility skill progression for children and adolescents: a systematic review of measures and their clinical application. *Dev Med Child Neuro* 2018; DOI: 10.1111/dmcn.13709
- Field DA, Miller WC, Jams T, Ryan SE, & Roxborough L. Important elements of measuring participation for children who need or use power mobility: A modified Delphi survey. *Developmental Medicine & Child Neurology*. 2015; 57(6):556-563.
- Furumasu, J., Wiens, C., Russel, I., Requejo, P. S., McNitt-Gray, J.L. (2022). Effect of personalized wheelchair configuration on upper extremity mechanics during wheelchair propulsion. In Proceedings of 37th International Seating Symposium: Showing our Value, University of Pittsburgh
- Gefen, N., Rigbi. A., & Weiss P.L. (2022) Reliability and validity of pediatric powered mobility outcome measures, *Disability and Rehabilitation: Assistive Technology*, 17:8, 882-887, DOI: [10.1080/17483107.2020.1819449](https://doi.org/10.1080/17483107.2020.1819449)
- Gefen N., & Rosenberg L. (2022) Development of a new tool: progression of paediatric powered mobility- 3PM, *Disability and Rehabilitation: Assistive Technology*, DOI: [10.1080/17483107.2022.2099020](https://doi.org/10.1080/17483107.2022.2099020)



- Gefen, N., Rigbi, A., & Weiss, P. L. (2019). Predictive model of proficiency in powered mobility of children and young adults with motor impairments. *Developmental Medicine and Child Neurology*, 61(12), 1416–1422. <https://doi.org/10.1111/dmcn.14264>
- Kaye H, Kang T, LaPlante M. Mobility Device use in the United States. National Institute on Disability and Rehabilitation Research. Washington, DC. Retrieved from <http://www.disabled-world.com/pdf/mobility-report.pdf>
- Kenyon LK, Mortenson WB, Miller WC. ‘Power in Mobility’: parent and therapist perspectives of the experiences of children learning to use powered mobility. *Dev Med Child Neurol* 2018; 60: 1012–7.
- Kenyon, L. K., Farris, J., Brockway, K., Hannum, N., & Proctor, K. (2015). Promoting self-exploration and function through an individualized power mobility training program. *Pediatric Physical Therapy*, 27(2), 200-206.
- Kenyon LK, Farris JP, Gallagher C, Hammond L, Webster LM, Aldrich NJ. Power mobility training for young children with multiple, severe impairments: a case series. *Phys Occup Ther Pediatr* 2017; 37: 19-34.
- Kenyon, L. K., Farris, J. P., Gallagher, C., Hammond, L., Webster, L. M., & Aldrich, N. J. (2015). Power Mobility Training for Young Children with Multiple, Severe Impairments: A Case Series. *Physical & occupational therapy in pediatrics*, 1-16.
- Kenyon LK, Jones M, Livingstone R, Breaux B, Tsotsoros J, Williams KM. Power mobility for children: a survey study of American and Canadian therapists' perspectives and practices. *Dev Med and Child Neuro* 2018 DOI: 10.1111/dmcn.13960
- Kenyon, L.K., Blank, K., Meengs, J., Schultz, A.M. (2020) “Make it fun”: a qualitative study exploring key aspects of power mobility interventions for children. *Disability and Rehabilitation: Assistive Technology*, In press. Available in advance on-line at: <https://www.tandfonline.com/doi/abs/10.1080/17483107.2020.1849431?journalCode=iidt20>.



- Kenyon LK, Hosmik L, McElroy R, Peterson C, Farris JP. Power mobility training methods for children: a systematic review. *Pediatr Phys Ther* 2018; 30: 2-8
- Lange, M. L., & Minkel, J. (2018). *Seating and wheeled mobility: A clinical resource guide*. Thorofare, NJ: Slack Incorporated
- Livingstone R, Field D. Systematic review of power mobility outcomes for infants, children and adolescents with mobility impairments. *Clin Rehabil* 2014; 28:254-64
- Nilsson, L. M., & Nyberg, P. J. (2003). Case report—Driving to learn: A new concept for training children with profound cognitive disabilities in a powered wheelchair. *American Journal of Occupational Therapy*, 57, 229–2
- Nilsson L, Durkin J., Powered mobility intervention: understanding the ALP tool. *Disabil Rehabil Assist Technol* 2017; 12: 730-9.
- Pellichero, Kenyon, L. K., Best, K. L., Lamontagne, M.-E., Lavoie, M. D., Sorita, É., & Routhier, F. (2021). Relationships between Cognitive Functioning and Powered Mobility Device Use: A Scoping Review. *International Journal of Environmental Research and Public Health*, 18(23), 12467–. <https://doi.org/10.3390/ijerph182312467>
- Rosen L, Plummer T, Sabet A, Lange M, Livingstone R. The Resna position on the Application of power mobility devices for pediatric users-Update. RESNA 2017 retrieved RESNA.org
- Sabet, A., Feldner, H., Tucker J., Logan, S. (2022). ON Time Mobility: Why Advocating for Movement Experiences for Children with Disabilities Must Move Beyond “Early”, *Proceeding International Seating Symposium 2022*.
- Staincliffe S. (2003). Wheelchair services and providers: discriminating against disabled children? *Brit J Ther Rehab* 2003; 10: 151–9.
- Svensson, & Nilsson, L. (2021). Inter-rater reliability of the assessment of learning powered mobility use, version 2.0, when applied with children and adults engaged in Driving to Learn in a powered wheelchair. *Australian Occupational Therapy Journal*, 68(2), 115–123. <https://doi.org/10.1111/1440-1630.12709>



- Thyberg, M., Gerdle, B., Samuelsson, K., & Larsson, H. (2001) Wheelchair seating intervention. Results from a client-centered approach, *Disability and Rehabilitation*, 23:15, 677-682, DOI: 10.1080/09638280110049900
- World Health Organization. (2007). International classification of functioning, disability and health: children and youth version: ICF-CY. World Health Organization.
-