The Developmental Importance of Self-Produced Mobility

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ASSISTANT PROFESSOR SCHOOL OF OCCUPATIONAL

Objectives

By the end of the session, participants will be able to:

Articulate the developmental milestones that are influenced by self-initiated mobility

List 3 strategies for providing early mobility experiences in the birth to 3 population.

Discuss the parent or child's experience in the provision of a ride-on-toy for alternative self-produced mobility

Demographics

15.3 % of the world's population has a moderate to severe disability

93 million of whom are children

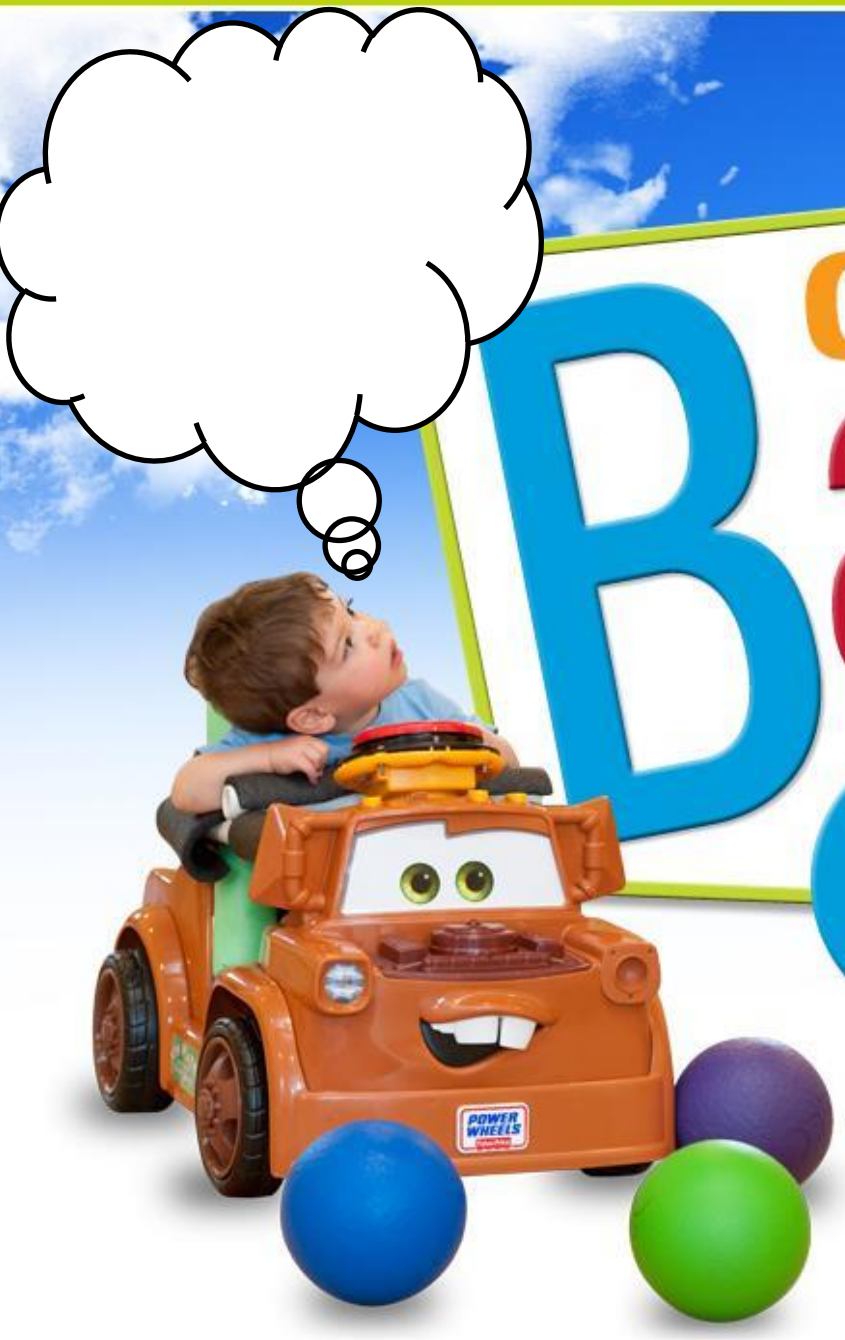
5.1% of all children ages 0-14 have a moderate to severe disability (WHO, 2011)

In the US 145,000 children under the age of 18 years use some form of mobility device (Kaye, Kang, & LaPlante, 2000)

Go Baby Go ™ University of Delaware

Dr. James Cole Galloway

"GoBabyGo"



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The importance of self initiated mobility for children with mobility impairments

Neurodevelopment

"Early postnatal experience can play a significant role in shaping cortical connectivity and function", (Pallas, 2005, p.1)

Preponderance of evidence suggests that activity-dependent mechanisms can influence cortical development, particularly at critical periods of development after genetic "blueprints" have had their main impact (Pallas, 2005)

Neurodevelopment cont.

"multi-modal" neurons respond to stimulation from more than one sensory modality; the extrastriate body area in visual cortex is modulated when the individual makes goal directed motor actions towards targets).

Fiehler, Reuschel, & Rosler, 2009 found that proprioceptive-spatial acuity of congenitally blind participants significantly covaried with the age that participants attended an orientation and mobility training: the earlier the training. the more accurate was their space perception. Proprioceptive spatial acuity is augmented by non-visual spatial experience.

Play

Play is a right for all children (United Nations, 1989)

Play is the main occupation of children (AOTA, 2011; Rigby & Gaik, 2007)

Mobility impairments can be a barrier to play (Welsh & Bailey, 2010)

Self-intiated power mobility provides children the opportunity to engage in play activities (Guerette, Furumasu, & Tefft, 2013)

Cognition

Infants begin to develop motor skills such as crawling, within the first year of life, providing them consistent opportunities to engage with their environment. The acquisition of crawling provides a new level of exploration, initiating various changes in cognition. (Anderson et al., 2013)

Infants possessing advanced motor skills were more able to access opportunities contributing to further development, including situations leading to cognitive, communicative, and social stimulation. (Bornstein, Hahn, & Suwalsky, 2013)

Crawling provides opportunity to learn about the environment and social relationships, as well as developing their own self-awareness. (Butler, 1991)

Cognition Cont.

The infants with walker and/or locomotion experience performed significantly better than those who were only pre-locomotor. These findings illustrate the acquisition of object permanence, a cognitive skill, are not due to maturation alone, but also require locomotor skill and experience. (Kermoian & Campos, 1988)

Found evidence that further supports that mobility and access to opportunities contribute to development and cognitive skills. (Lynch, Ryu, Agrawal & Galloway, 2009)

Vision

Children who are independently mobile develop vision skills related to spatial relations directly through exploration of their environment. Children whose locomotion is limited to passive movements are in a state of “visual idle” (Anderson et al., 2013).

Language

The powered wheelchairs exposed them to new objects for their parents to name, increasing parental interactions. Therefore, the use of power mobility played an important role on the development of early language skills of these children, as well as their environmental interactions. (Jones, McEwen, & Neas, 2012)

The use of powered mobility affected the child's development, leading to a significant increase in age-equivalent communication scores. (Jones, McEwen, & Hansen, 2003)

Language Cont.

Found that the use of powered mobility device does have a positive influence on language development in young children. This evidence supports that communication, both expressive and receptive language skills, are influenced by mobility (Lynch et al., 2009).

In each specific case, the development of language skills, environmental interactions, and overall communication within these studies has been shown to increase due to the implementation of power mobility (Butler, 1986).

Social Participation

Children with mobility impairments have limitations that prevent engagement within their environment and participation in activities with peers such as communication and play (Staincliffe, 2003).

Once mobility became available, an increase in quality of life and decrease in negative social experiences were reported (Bottos et al., 2001).

Provision of a mobility device in children less than 12 years of age resulted in improved participation in interpersonal relationships (Rousseau-Harrison & Rochette, 2013)

Benedict et al. (1999), found that caregivers reported improved social interactions with siblings and peers when their child used some type of assistive device, including mobility devices.

Independence

Bottos et al. (2011), examined how a powered wheelchair affected children's scores on the Canadian Occupational Performance Measure and found a rise in COPM scores, providing evidence that newly acquired mobility allows the child to have more self-sufficiency in their daily activities. Twenty-four out of 25 caregivers also reported an improvement in their child's level of independence. (Bottos, Bolcati, Sciuto, Ruggeri, & Feliciangeli, 2001)

Bray et al. (2014) state that delivering powered mobility to a child provides them with the opportunity to experience developmentally appropriate independence. (Bray, Noyes, Edwards, & Harris, 2014)

Independence Cont.

Decrease in communication with caregiver was attributed to the increase in independence and subsequent diminished inclination to control their environment through communication. (Butler, 1986)

Deitz, et al. 2002, found that the introduction of a mobility device to two children with complex developmental delays and severe neurodevelopmental impairments increased the children's initiation of movement throughout the environment and contact with adults and peers. This is important because children with impairments at this level of severity would not typically be considered a candidate for powered mobility. (Deitz, Swinth, & White, 2002)

Barriers to Receiving a PMD

Parental or therapist concerns regarding gross motor development

(Bottos et al., 2001; Butler, Okamoto, & McKay, 1983; Dugan,Campbell, & Wilcox, 2006)

Parental attitudes

(Wiart & May, 2004; Wiart & Darrah, 2002)

Safety concerns

(Bottos et al., 2001; Jones et al., 2003; Jones et al., 2012; Larin, Dennis, & Stansfield, 2012; Nisbet et al., 1996)

Concerns Regarding Gross Motor

The use of powered mobility does not relate to the deterioration of gross motor skills (Bottos et al., 2001).

Powered mobility augments the success and motivation towards all methods of mobility (Butler, Okamoto, & McKay, 1983).

Rarely will therapist choose a powered mobility device for children with motor development delays. Therapist will instead work on skill development, attempting to teach the child to crawl or walk, or if the child is 12 to 24-months-old, may choose a low-tech strategy such as a gait trainer or tricycle (Dugan, Campbell, & Wilcox, 2006).

Parental Attitudes

Caregivers shared that they initially experienced feelings of sadness and despair when they became aware of their child's physical deficit and the use of a powered mobility device served as a salient, unwanted symbol of their child's deficit (Wiart & May, 2004).

To caregivers the wheelchair "may signify a loss of hope" (Wiart & Darrah, 2002).

Safety Concerns

"Young children using power mobility need to be supervised just like their nondisabled peers. These, concerns, however, should not stop a clinician or parent from allowing and encouraging a child to drive, but rather, serve as a reminder to pay special attention to safety" (Rosen et al., 2009).

"Physical therapists often do not consider power mobility as an option to assist young children. Advocates for power mobility consider it an essential component of a child early intervention program and have demonstrate that young children are capable of successfully using power mobility" (Jones et al., 2003).

Safety Concerns Continued

Parents of children who had physical disabilities that were using power mobility explained that when their child first received the PMD they had difficulties with environmental barriers. Over time, parents view on their child using PMD changed when they noticed an increase in their child's ability to independently participate in meaningful occupations (Wiart, Darrah, Hollis, Cook and May, 2004).

Summary of Need

Children with ambulatory disabilities are not experiencing independent mobility necessary for development during the critical period of growth.

A RESNA position paper regarding application of power mobility for children indicates that “independent mobility in children with disabilities has been shown to improve cognitive and perceptual skills, reduce learned helplessness, increase confidence, and increase participation with their peers in everyday activities” (Rosen et al., 2009, p. 218). – currently 2nd edition is in final revsion

There is currently no standardized protocol for the provision of powered mobility for children.

Healthcare providers are unaware or under utilizing the evidence that exists recommending the use of powered mobility for children.

Customizing

i. Hips
    1.Comfort
    2.Stability

ii.Trunk
    1.Back Support
    2.Three point / four point restraint

iii.Head
    1.Neck Support
    2.Hip Angle
    3.Allow rotation for visual exploration

iv. Limbs
    1.Type of Switch
    2.Switch Position

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Organizing for a Successful GBG Build Team

Engineers and Clinicians

Provisioning the team

Partnering in the Community

Laying out the Work

- Research and Education Leaders
- Student volunteers
- Local Pediatric Practices & Clinics
- Location for Meetings & Builds

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