POWER UP!

Ginny Paleg, PT, DScPT, MSPT

- Early Intervention
- Ginny@paleg.com
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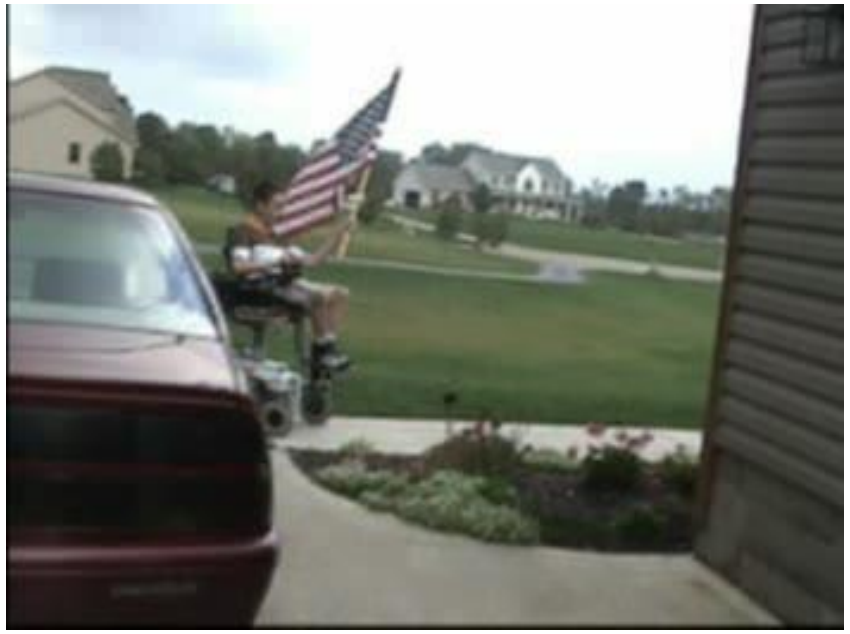
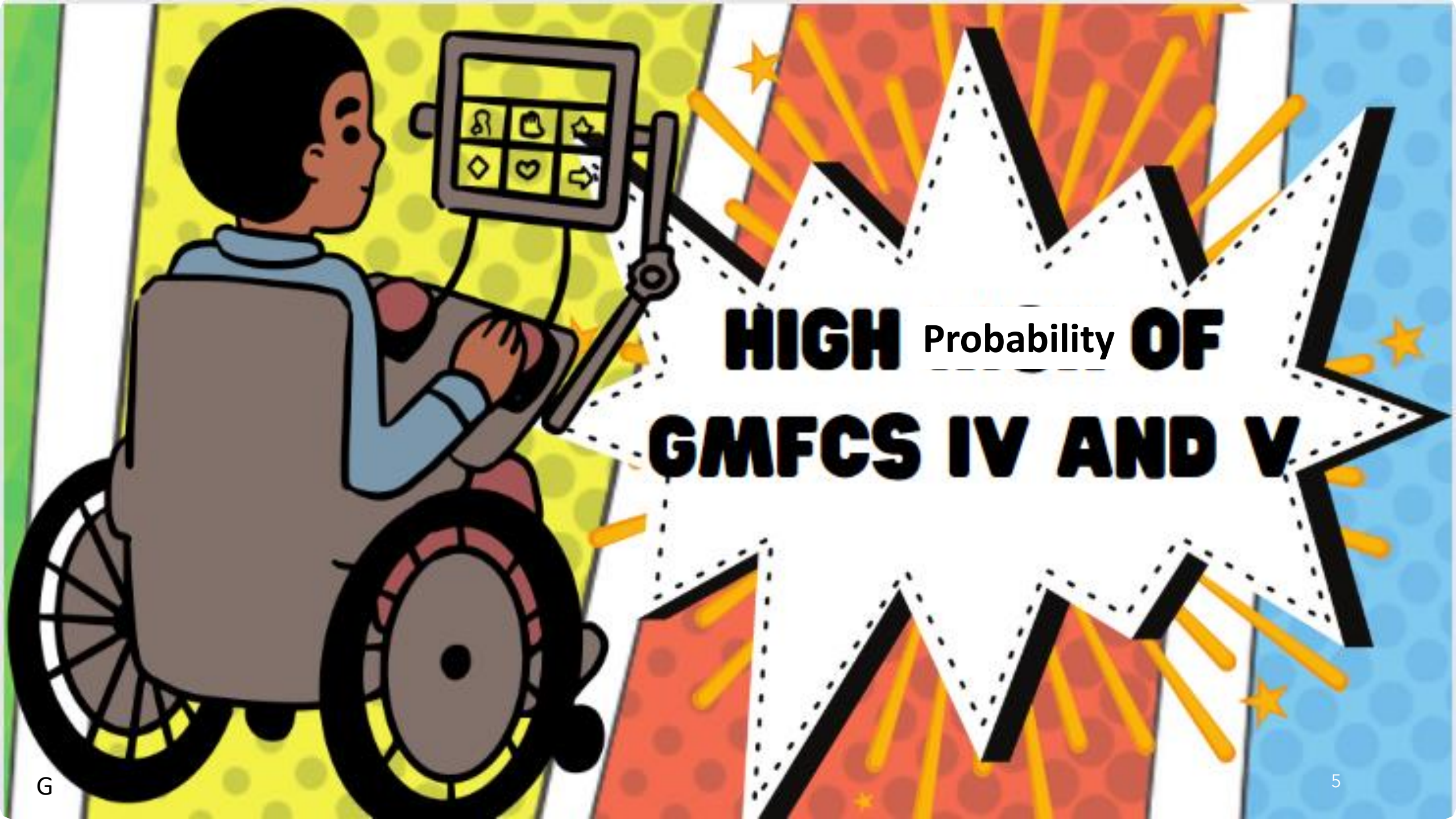
- YouTube: Ginny Paleg
- Facebook: Evidence-Based Pediatric OTs and PTs

ROS LIVINGSTONE

Learning Objectives



1. Describe profiles of children with CP who can benefit from power mobility in early childhood
2. Discuss research evidence supporting use of power mobility for children with non-ambulant CP
3. Describe environmental factors influencing use of power mobility with young children with non-ambulant CP



G

GMA MOS <8 3-5 MONTHS

HINE <40 4-24 MONTHS

Highest Risk of being non-ambulant (GMFCS IV and V)

G

Why augment mobility?

- Independent mobility is vital for overall development
- Children begin to move around independently and
- Explore from 8-12 months
- Allows children with mobility limitations to enjoy movement and learn from these experiences

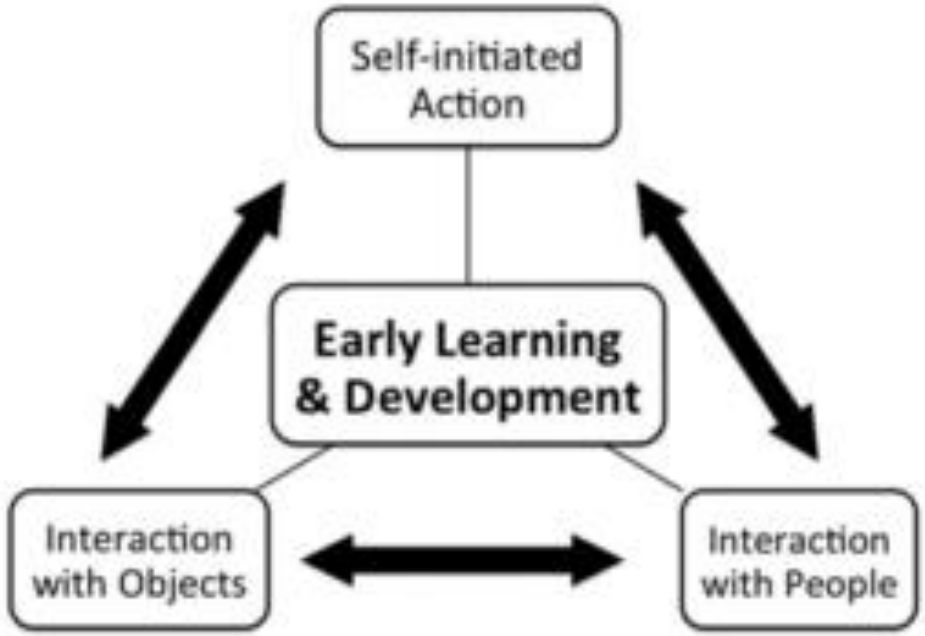
Toddler activity

- 23 typical toddlers
- 2 CP - GMFCS IV & GMFCS I

- TD 3-4 hours a day
  - physical activity, play & object-relate behaviors
- CP
  - more time sitting
  - much less time engaged in peer interaction or object-related behaviors

Real-World Performance: Physical Activity, Play, and Object-Related Behaviors of Toddlers With and Without Disabilities

Samuel W. Logan, PhD; Melynda Schreiber, MS; Michele Lobo, PT, PhD; Breanna Pritchard, BS; Lisa George, BS; James Cole Galloway, PT, PhD



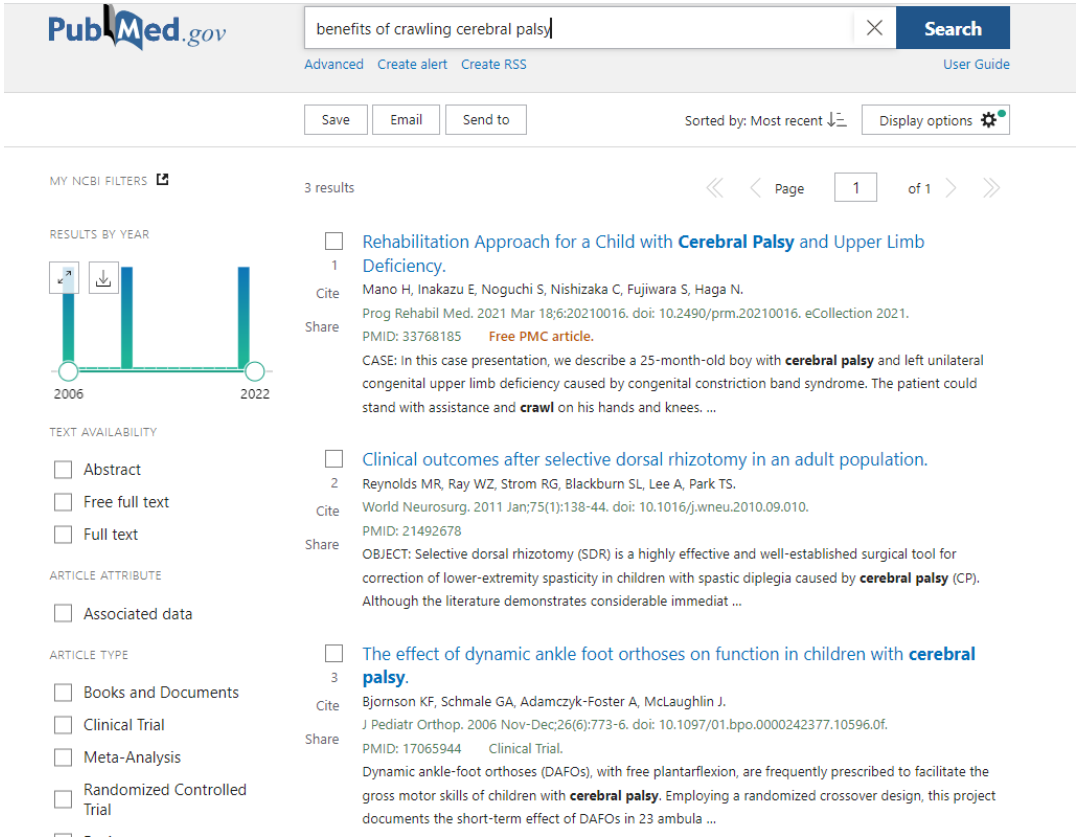
Why not crawling?

LEVELS IV AND V DON'T CRAWL

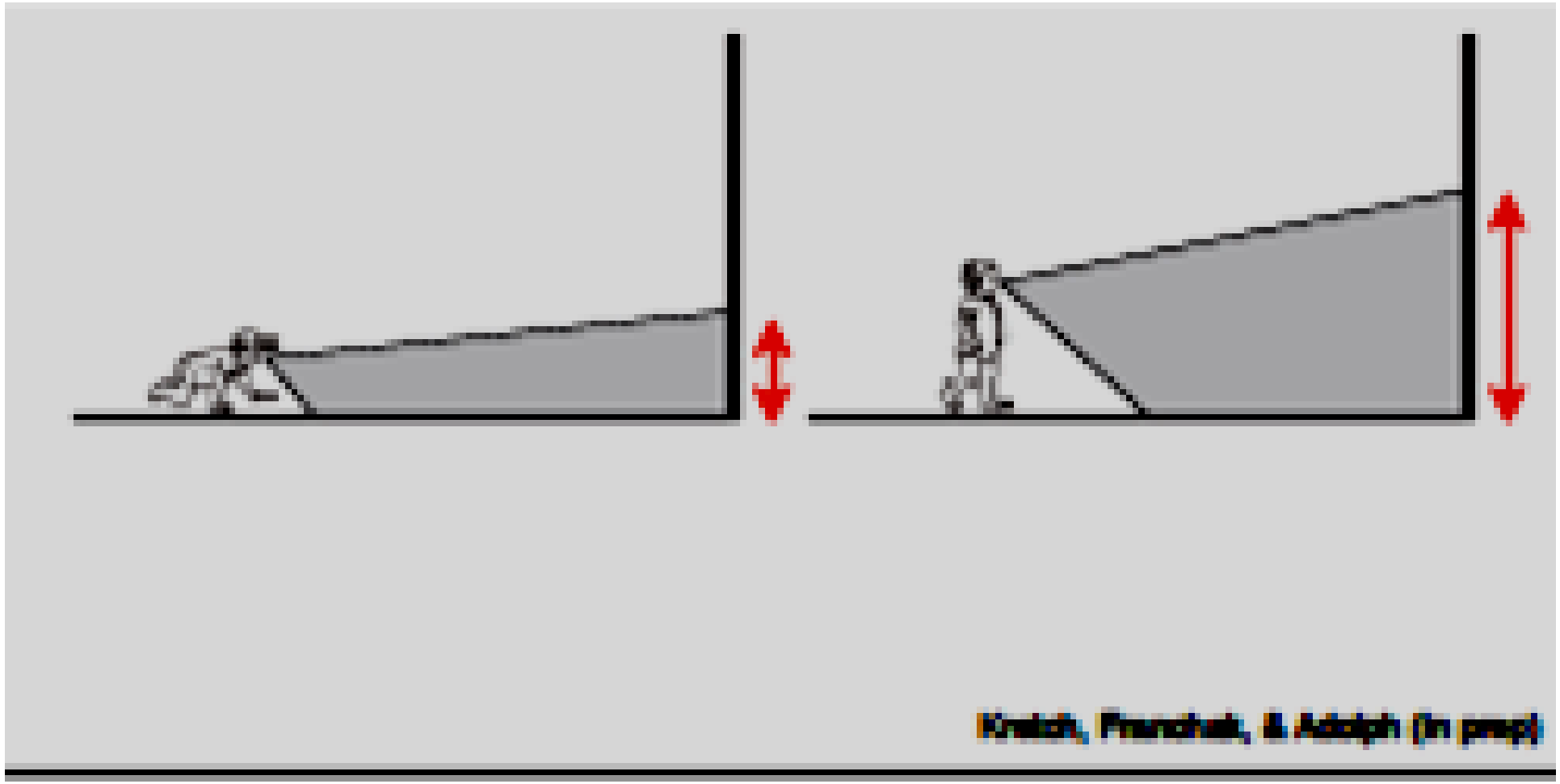
From GMFM training guide

You may not believe it but…

- There are no published studies on the benefits of crawling.
- No proof it strengthens
- No evidence that "reciprocal movements" should be a goal

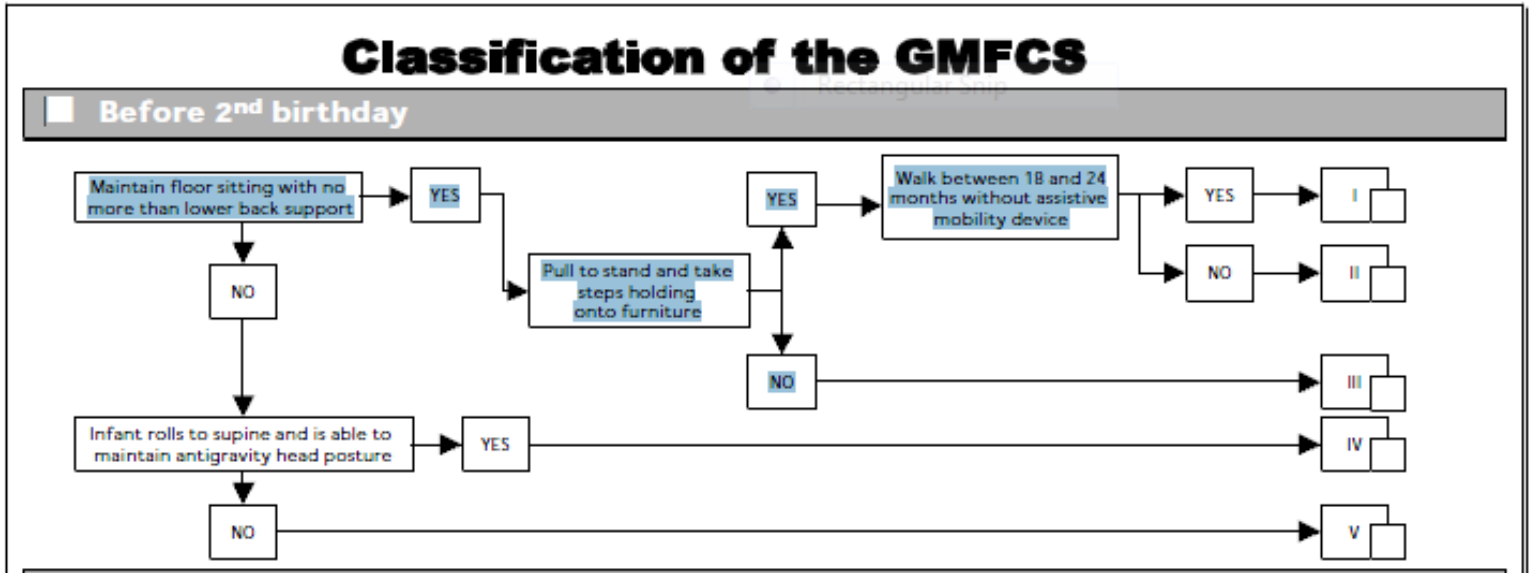


Vision and interaction



Belly crawling is not helping vision or cognition

Children who learn to belly crawl or roll to get a toy/person before age two
(as their highest motor skill) are most likely GMFCS level IV (Gorter)



Received: 23 February 2023 | Accepted: 25 July 2023

DOI: 10.1111/dmcn.15731

ORIGINAL ARTICLE

Probability of independent walking and wheeled mobility in individuals with cerebral palsy

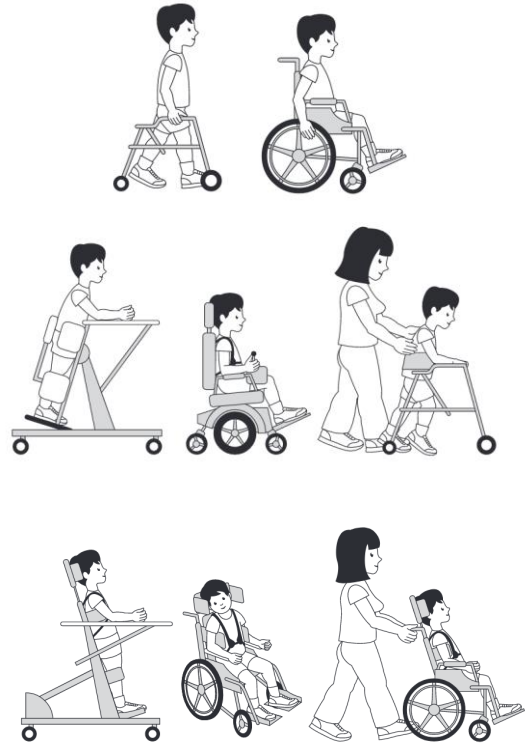
Suzie Noten[1] | Katina Pettersson[1,2] | Tomasz Czuba[2,3] | Erika Cloodt[2,4] | Jackie Casey[5] | Elisabet Rodby-Bousquet[1,2]

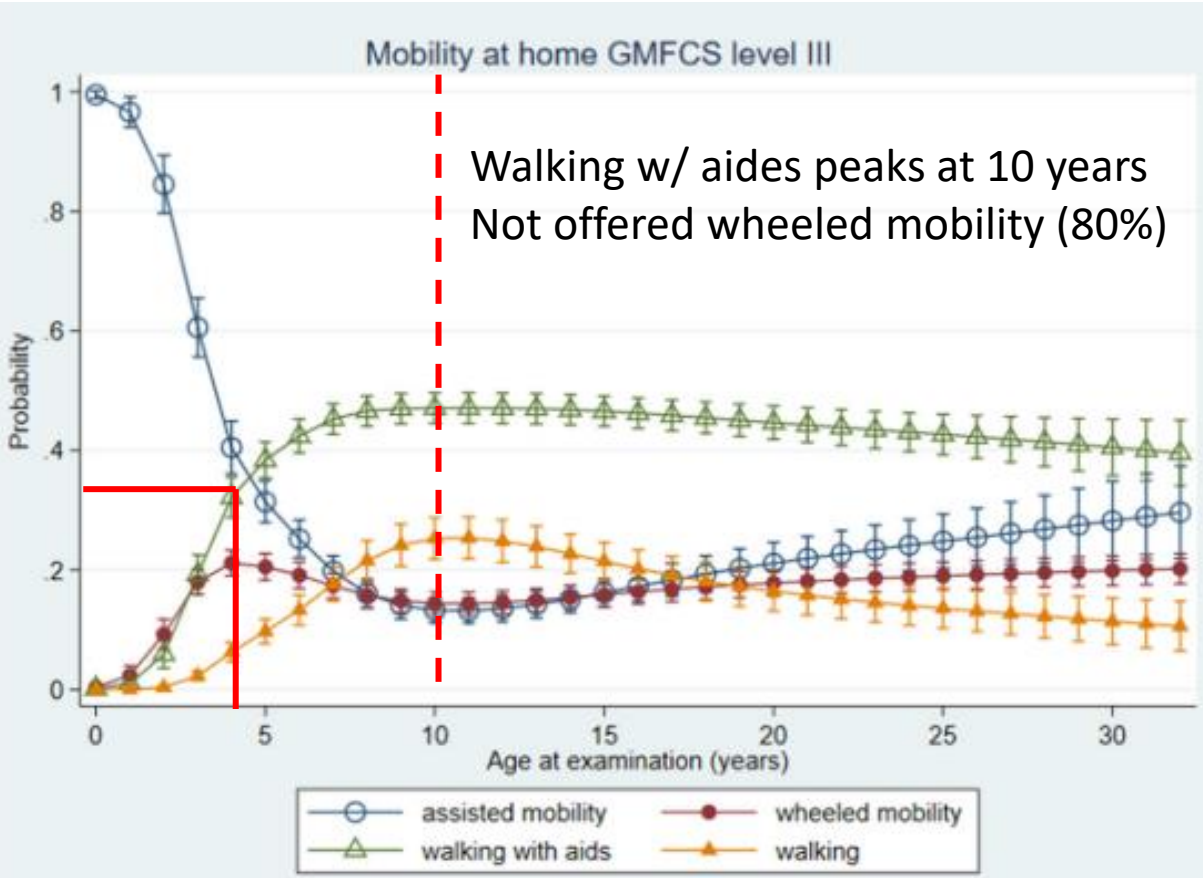
What this paper adds

- There is a high probability of independent walking in Gross Motor Function Classification System (GMFCS) levels I to II.
- Mobility options vary most at home and in the community in GMFCS level III.
- Being dependent on others for mobility is likely in GMFCS levels III to V.

Ages 0-32 years

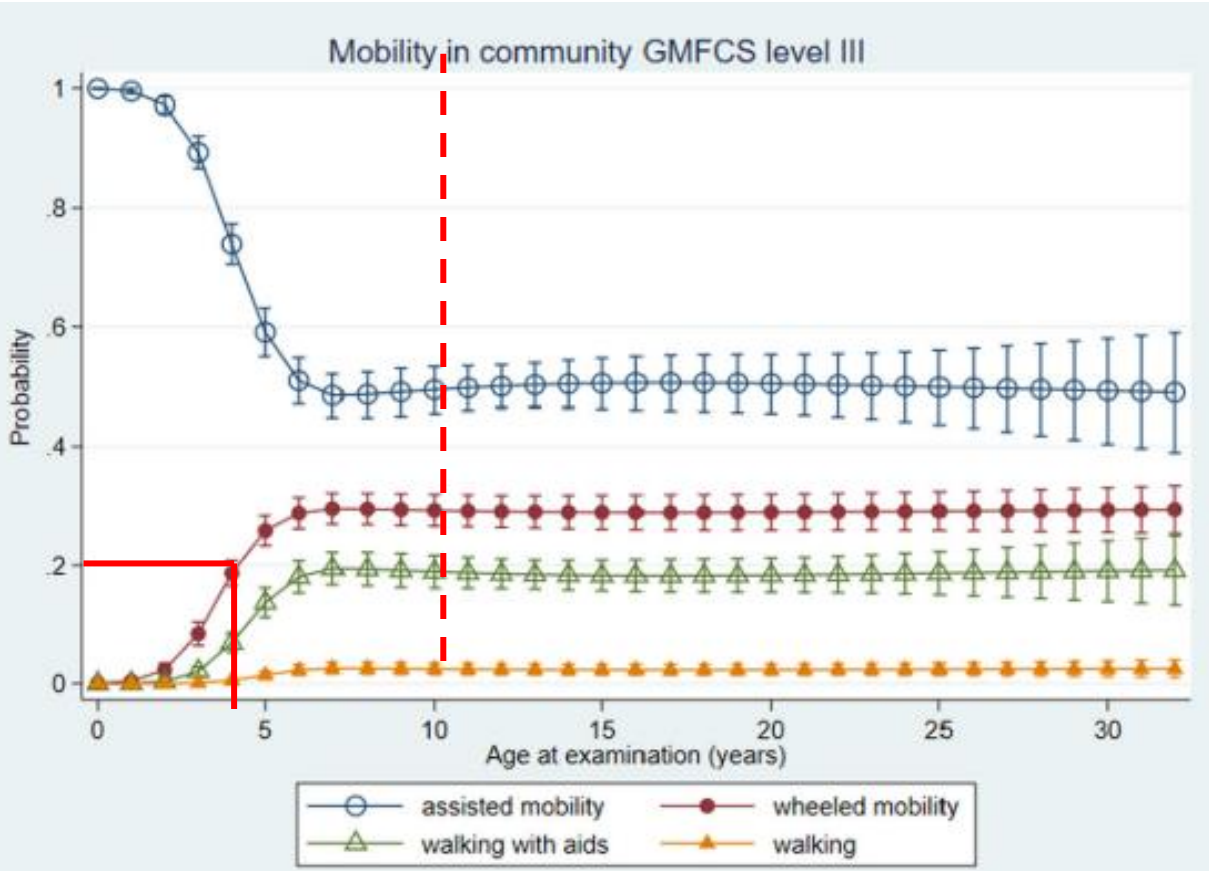
III	671	10.1%
IV	958	14.4%
V	1085	16.3%

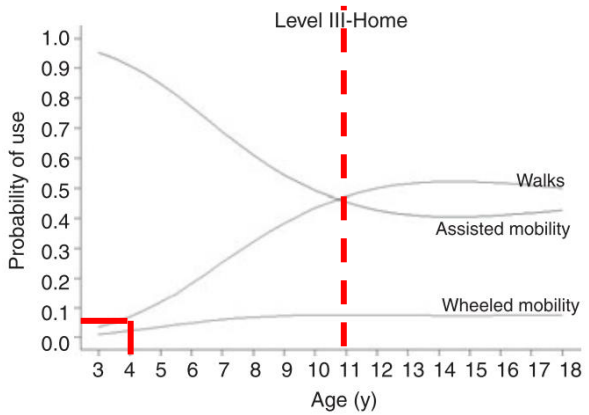


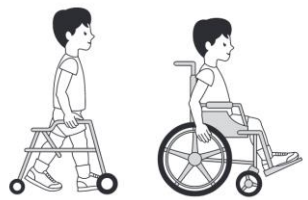


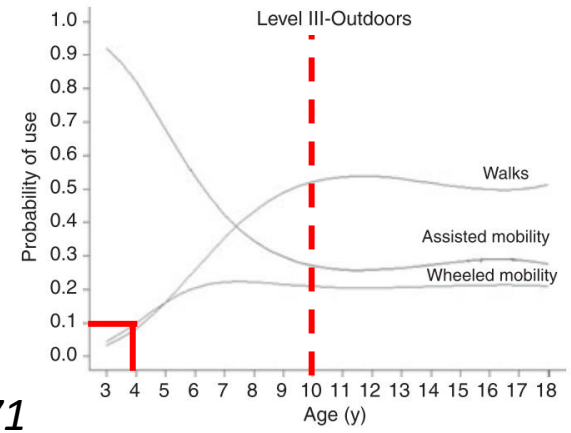
Walking w/ aides peaks at 10 years

Not offered wheeled mobility (80%)

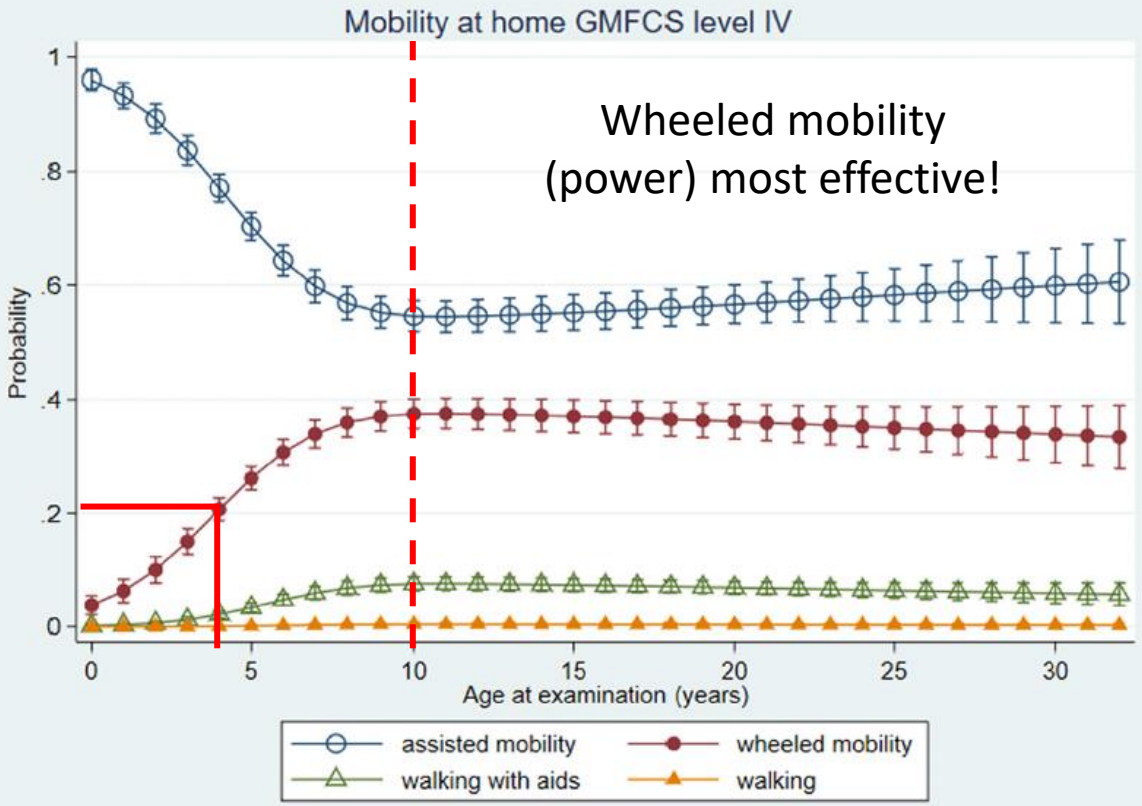


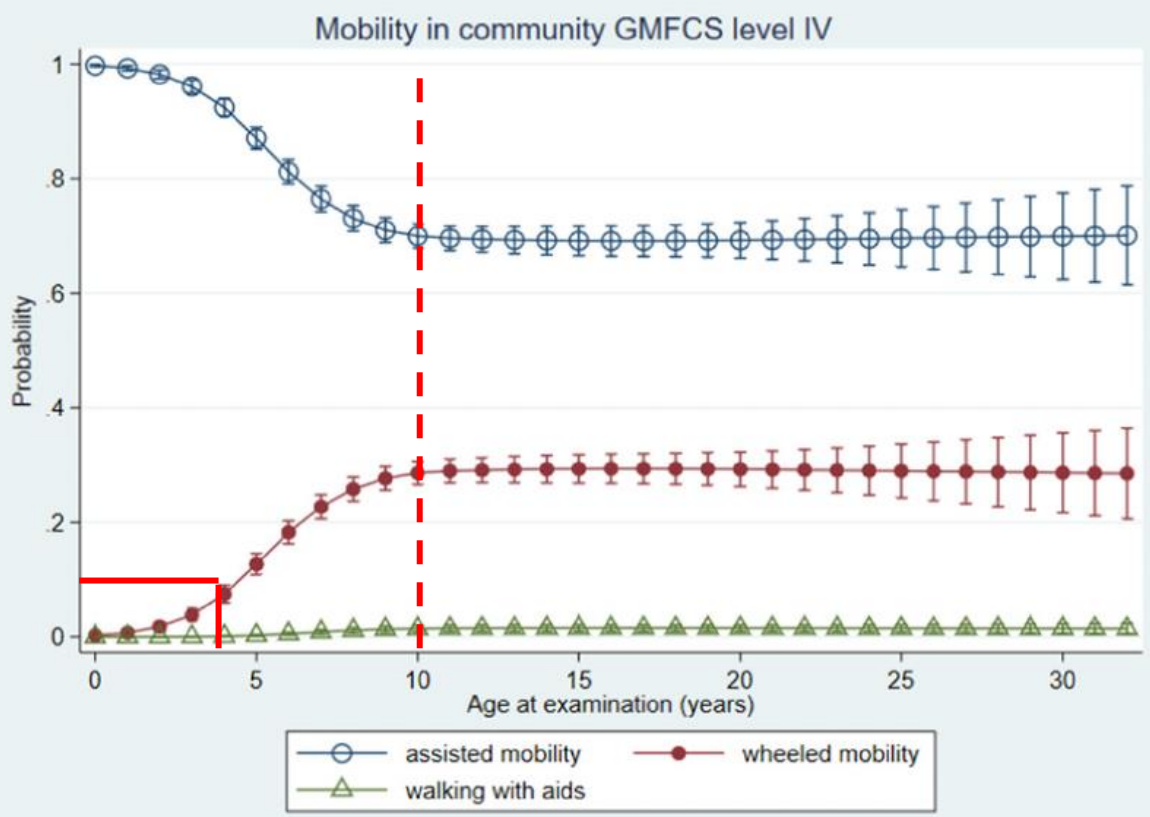


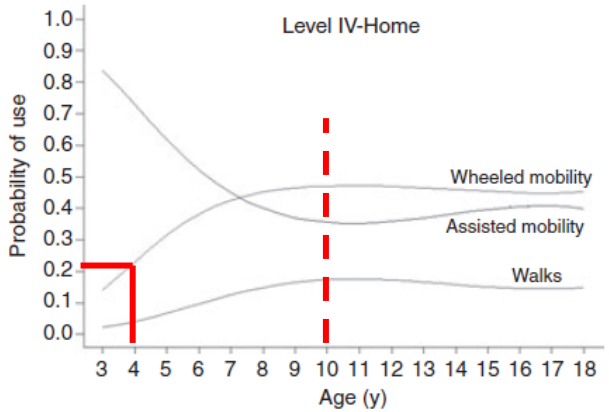


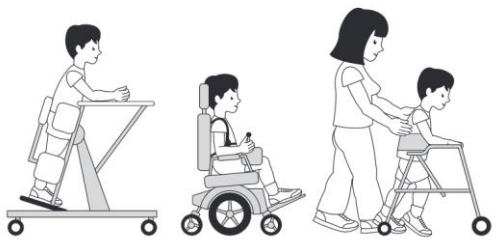


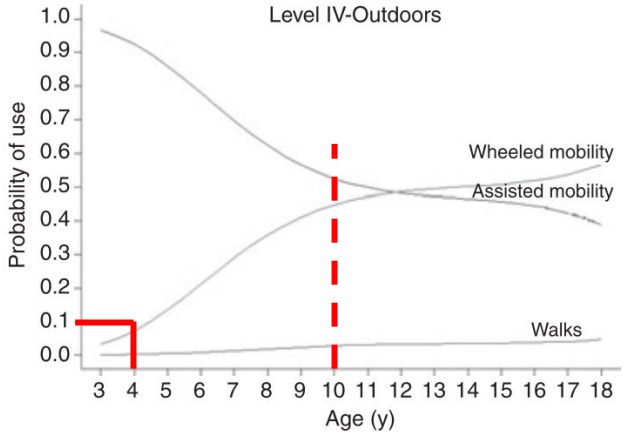
Palisano DMCN 2010, 52: 66–71





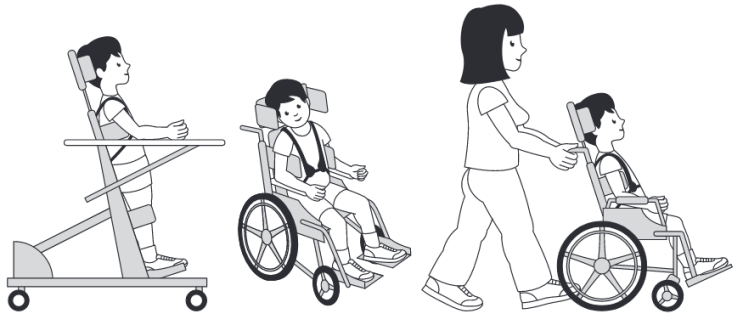


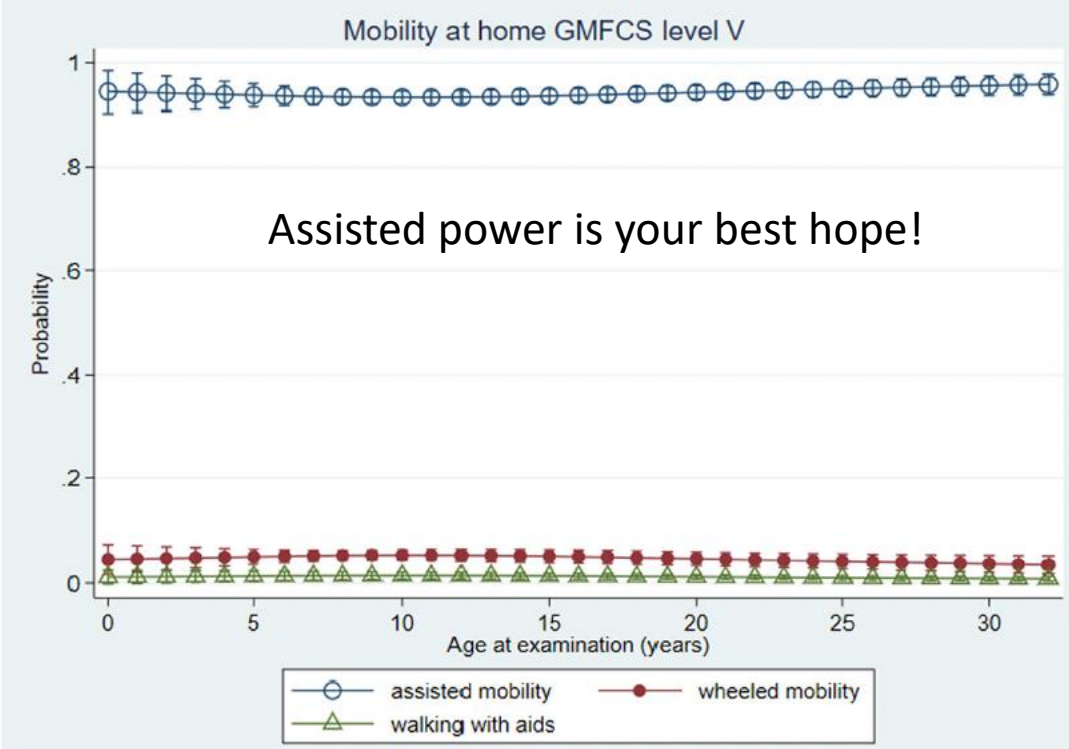


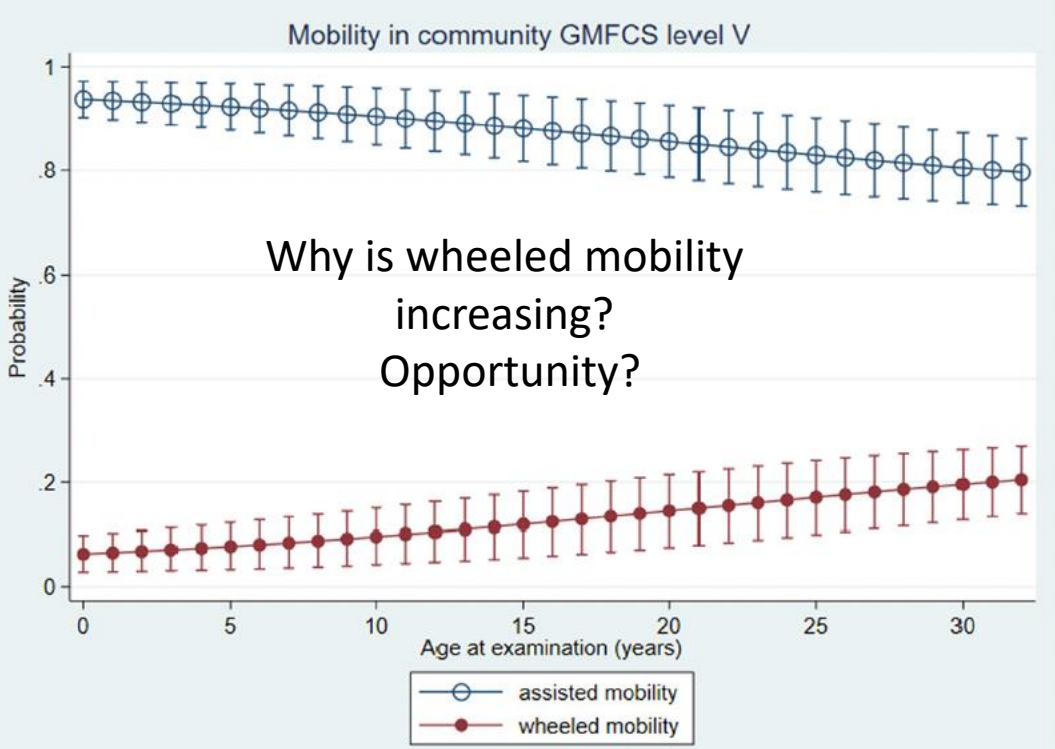


Palisano DMCN 2010, 52: 66–71

GMFCS V

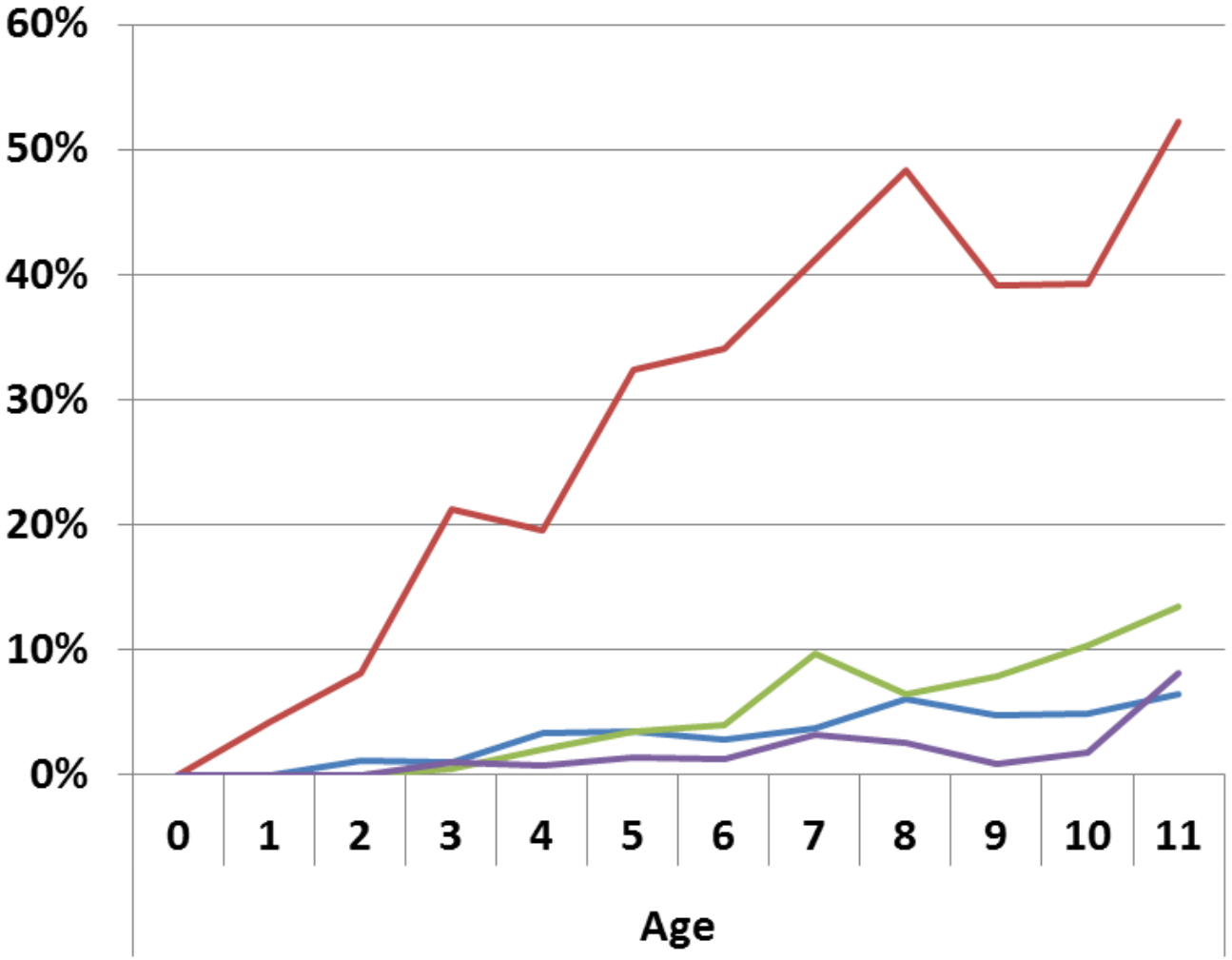


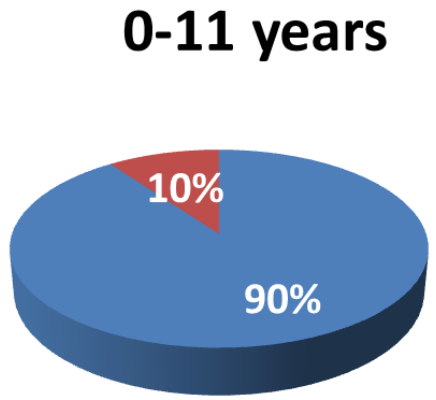

Mobility at home GMFCS level V
Assisted power is your best hope!
Probability
1
.8
.6
.4
.2
0
0
5
10
15
20
25
30
Age at examination (years)
assisted mobility
wheeled mobility
walking with aids


Mobility in community GMFCS level V
Why is wheeled mobility increasing?
Opportunity?
Probability
1
.8
.6
.4
.2
0
0
5
10
15
20
25
30
Age at examination (years)
assisted mobility
wheeled mobility

Why not manual mobility?

Wheeled mobility 0-11 years





Manual Self-propels
Manual Pushed
Powered Self-propels
Powered Pushed

Self-propulsion is a myth

Rodby-Bousquet et al, 2016

1 of 10 self-propels: 0-11 yr

Rodby-Bousquet et al, 2016

3 of 4 drives independently: 0-11 yr

Rodby-Bousquet et al, 2016

DEVELOPMENTAL MEDICINE & CHILD NEUROLOGY REVIEW

Practice considerations for the introduction and use of power mobility for children

ROSLYN LIVINGSTONE[1] | GINNY PALEG[2]

- Children who will never walk
- Children with inefficient mobility
- Children who lose mobility
- Children who require mobility
- assistance in early childhood

(Hays, 1987, Livingstone & Paleg 2014)

Children who will never walk

- GMFCS IV
  - Rolling, creeping or crawling without leg movement within a room
  - Children may achieve self-mobility with a power wheelchair

- GMFCS V
  - Some children may achieve self-mobility using power mobility with extensive modifications


CEREBRAL
PALSY
FOUNDATION
Our traditional approach to children in level 4 and 5

Children with inefficient mobility

- GMFCS levels IV
  - When positioned, children may use a body support walker at home or school.
  - At school, outdoors, and in the community, children are transported in a manual wheelchair or use powered mobility.

ICF Framework and the F-words

Body Structure and Function

Positive developmental change

- Alertness and motivation
  - Qualitative
- Sleep-wake cycle – Level V

Fitness

Activity

- Independence
  - Level IV
- Self-initiated movement
  - Level III
- Cause-effect

Level IV

Functioning

Participation

- Social and play skills
  - Level IV
- Personal-social communication
  - Level V
- Peer relationships
  - Level V

Friends

Environmental Factors

- Parents
- Therapists
- Peer relationships
- Societal attitudes
- Device features
- Physical environment and transportation

Family

Personal Factors

- ✓ I like to move
- ✓ I like to explore
- ✓ I like to play games
- ✓ I like to have fun with my family and friends
- ✓ I like to be with other children

Fun

Future

I will grow up one day, so please find ways for me to develop independence and be included in my community.

For more information visit the F-words Knowledge Hub:
www.canchild.ca/f-words

CanChild

1) World Health Organization. (2001) *International Classification of Functioning, Disability and Health (ICF)*
2) Rosenbaum P & Gorter JW. (2012). The 'F-words' in childhood disability: I swear this is how we should think! *Child Care Health Dev*; 38.

Positive impact on development
Level II – Randomized Crossover Logan et al., 2023

- 14/24 GMFCS IV/V Age 12-36 months
- Mini Explorer vs Ride-on toy car – 8 weeks

- >1 hour/week = positive developmental change
- Low use = no change

- Mini Explorer:
  - Increased receptive and expressive language
  - Increased gross motor skill
- Ride-on toy car:
  - No significant difference low vs high use

- GMFCS I-III vs IV/V - both demonstrated change

37 YEARS AGO!!!

In 1986 Charlene Butler (AACPDM first woman president) published that all children with inefficient mobility should be provided with power mobility

Charlene Butler, 40 years ago….

POWERED MOBILITY FOR VERY YOUNG DISABLED CHILDREN

Charlene Butler
Gary A. Okamoto
Tammy M. McKay

- Independent mobility with power wheelchairs in children as young as 24-39 months
- Increased interest in other mobility options once the children experienced independent mobility
- Recommend that we should find alternative mobility options for children without efficient mobility at the age of 1 year

Butler DMCN 1983; 25: 472–474

11 years ago!

Positive impact on development

Level II – RCT Jones et al., 2012

STOP

MEASURE

GO

- Increased receptive language
- Increased overall development
- Increased functional mobility
- Decreased need for caregiver assistance
- No negative impact on motor development

28 children (GMFCS IV or V) 14.8 to 30 months

9 years ago!

Practice considerations for the introduction and use of power mobility for children

R Livingstone and G Paleg

Dev Med Child Neurol

2014 Mar;56(3):210-21

Intervention ingredients and F-words in early intervention for children with cerebral palsy who are non-ambulant: a scoping review

2024

de Campos AC, Hidalgo-Robles A, Longo E, Shrader C, Paleg G.

Functioning (n=33)

Goal-directed, task oriented training, self-initiated movements/ speech, problem solving.

Fitness (n=59)

Self-initiated movement, postural management, spasticity management, orthosis, muscle strengthening, bowel function, pain, sleep, motor control.

Family (n=46)

Home programs, coaching, family-centered services, family / caregiver-delivered care, parental training, environmental enrichment.

METHOD

Scoping review

87 / 2.543 studies included

Interventions for children with CP 0-5y at high risk to be non-ambulant

Ingredients identified and mapped to F-words

Fun (n=6)

Child - directed play, child showing choice / preferences; assistive devices.

Friends (n=5)

Social interactions.

other Factors (n=55)

Environmental aspects (service / equipment provision, professional training etc).

Future (n=14)

Prevention; interventions with potential to change attitudes.

CONCLUSION

The least amount of evidence was found for Fun, Friends, and Future. Formal parent training and assistive technology (power mobility, supported sitting / standing / stepping) should be explored as strategies to promote F-words in interventions for non-ambulant children.

Intervention ingredients and F - words in early intervention for children with cerebral palsy who are non-ambulant: a scoping review

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NIHR | National Institute for Health Research

2020

Health Technology Assessment
Volume 24 • Issue 50 • October 2020
ISSN 1366-5278

Powered mobility interventions for very young children with mobility limitations to aid participation and positive development: the EMPoWER evidence synthesis

Nathan Bray, Niina Kolehmainen, Jennifer McAnuff, Louise Tanner, Lorna Tuersley, Fiona Beyer, Aimee Grayston, Dor Wilson, Rhiannon Tudor Edwards, Jane Noyes and Dawn Craig

+++ Movement and Mobility

+ + Participation, Play

Social interaction

1. Movement for movement's sake
2. Destination-focused mobility

You can have it all!

2023

Supported standing and stepping device use in young children with cerebral palsy, gross motor function classification system III, IV and V: a descriptive study.

Livingstone RW, Paleg GS, Field DA.

Assist Technol. 2023 Nov 21. doi: 10.1080/10400435.2023.2283461. Online ahead of print.

A key finding was that introduction of power mobility did not reduce use of supported-stepping devices at any GMFCS level.

disabilities

MDPI

2023

Case Report

Power Mobility, Supported Standing and Stepping Device Use in the First Two Years of Life: A Case Report of Twins Functioning at GMFCS V

Roslyn W. Livingstone [1,2,*], Angela J. Chin [1,2] and Ginny S. Paleg [3]

Kenyon DMCN 2018, 60(10): 1018-1025

DEVELOPMENTAL MEDICINE & CHILD NEUROLOGY ORIGINAL ARTICLE

Power mobility for children: a survey study of American and Canadian therapists' perspectives and practices

LISA K KENYON[1] | MARIA JONES[2] | ROSLYN LIVINGSTONE[3] | BECKY BREAUX[4] | JESSICA TSOTSOROS[5] | KELLY M WILLIAMS[2]

1 Grand Valley State University, Grand Rapids, MI; 2 Oklahoma City University, Oklahoma City, OK, USA. 3 Sunny Hill Health Centre for Children, Vancouver, BC, Canada. 4 University of Colorado Denver, Denver, CO; 5 University of Oklahoma Health Sciences Center, Oklahoma City, OK, USA.

Correspondence to Lisa K Kenyon, Department of Physical Therapy, Grand Valley State University, 301 Michigan St. NE, Grand Rapids, MI 49503, USA. E-mail: kenyonli@gvsu.edu

This article is commented on by Rodby-Bousquet on pages 969–970 of this issue.

- 1000 OTs and PTs in Canada and USA
- Over 80% of therapists agree with statements about the impact of power mobility on the overall development of children
- Around 50% never provide power mobility experience to children in their practice or refer their children to specialists in power mobility


LET'S
GO
SHOPPING

Permobil Mini-Explorer

AKKA

Platform

- Nossa Casa, Brazil

Car Seat on a Platform (Lisa Kenyon)

Bugzi (UK) 3,500-5,000 British Pounds

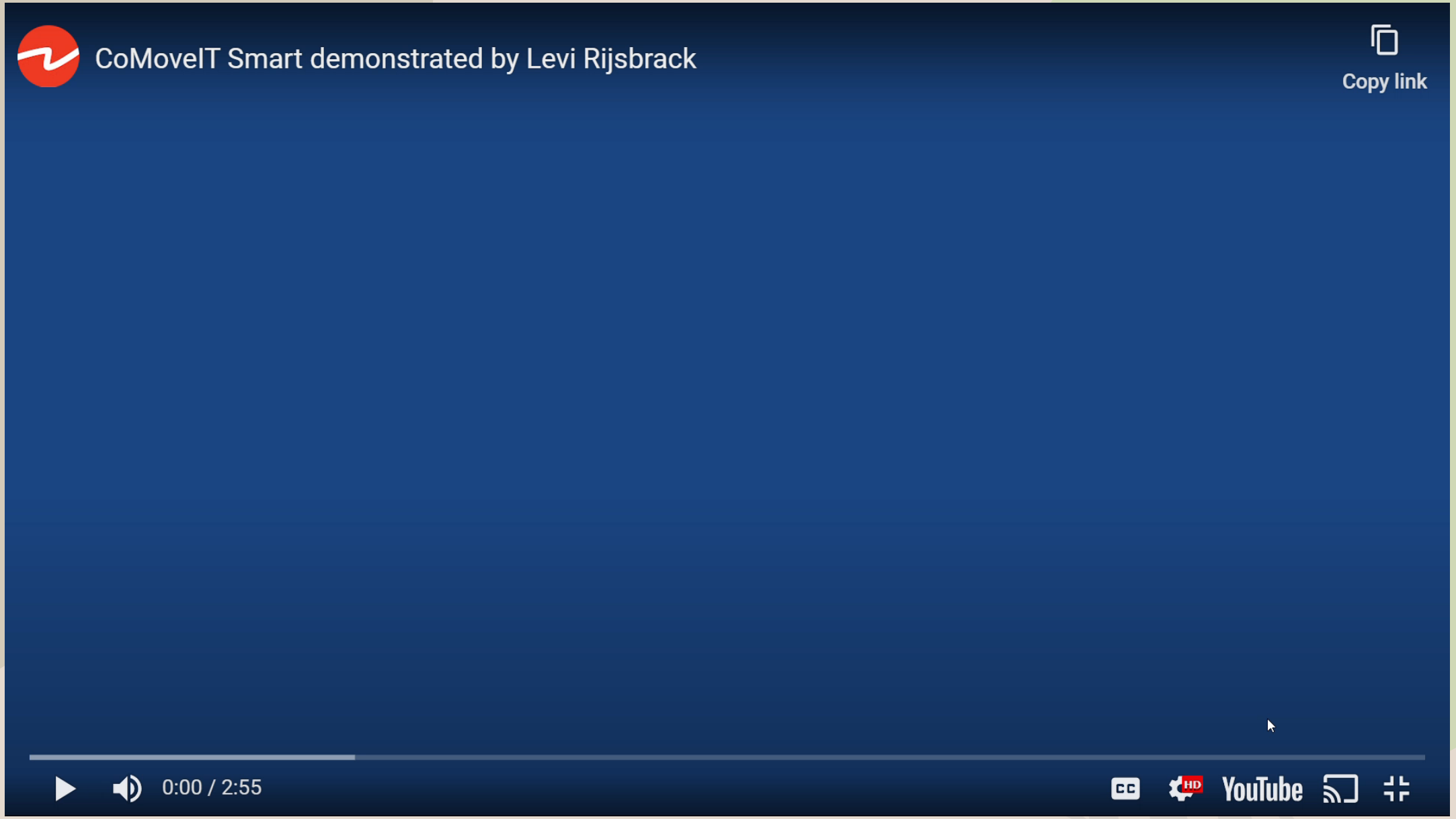
https://www.merushop.org/product/bugzi-powered-wheelchair-for-children/

Wizzy Bug (https://designability.org.uk/meet-wizzybug/)

LUCI


Introducing LUCI
Watch later
Share
Drop-Off Protection
0:20 / 0:56
YouTube

CoMoveIt


CoMoveIT Smart demonstrated by Levi Rijsbrack
Copy link
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YouTube

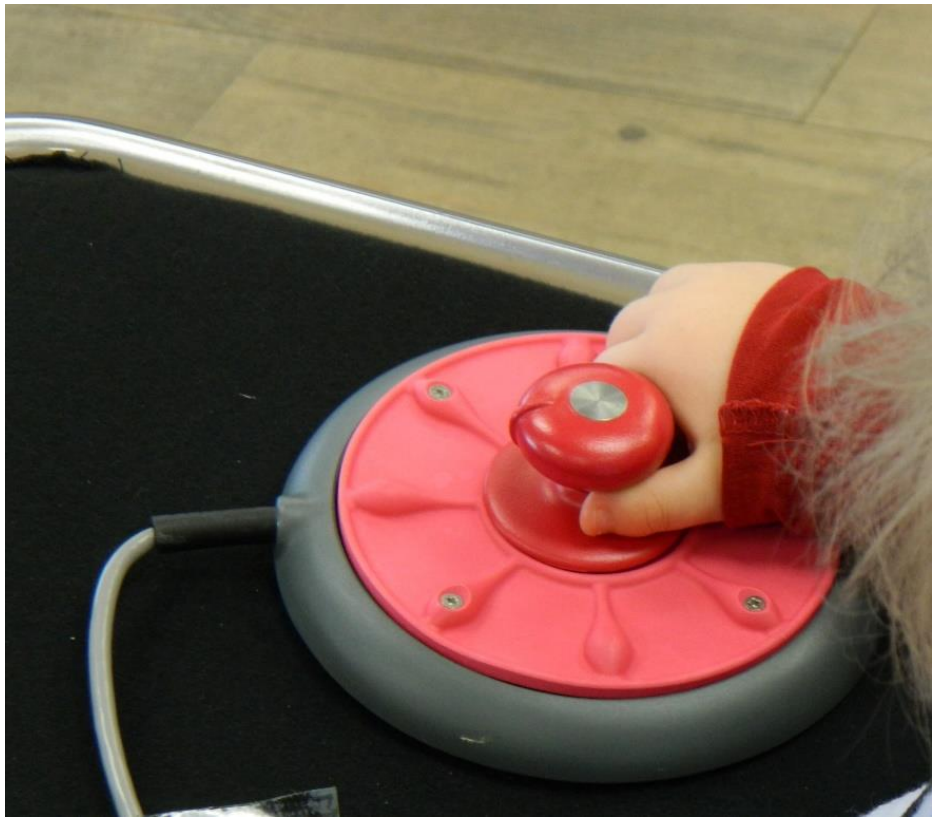
And... Not Or... (you still get to “walk)

How?

- How best to provide power mobility experience for children at GMFCS IV and V?

Start with good postural support

And a successful access method…



Access Assessment flow chart for power mobility

WHICH PART OF THE BODY CAN THE USER VOLUNTARILY MOVE IN VARYING DIRECTIONS AND WITH CONTROL?

1. HAND
Can user sustain contact to move their hand or fingers in all directions in a controlled manner and release or centre to stop?

- Yes → **Proportional Joystick or touch pad** → **Digital Joystick**
- No → Can user target, sustain contact with and voluntarily release 2-5 switches?
  - Yes → *Is proportional control possible with another body part?* → **Switch array or single switches**
  - No → Can user target, sustain contact with and release 1 switch? – ***consider scanning or, preferably, a more efficient access method with another body part***

2. HEAD/FACE
Can user move head or jaw in all directions and release/centre to stop?

- Yes → **Chin joystick Peach-tree or magitek**
- No → Can user sustain head movement in three directions with head/neck support?
  - Yes → **RIM Control** → **Switch Head Control**
  - No → Can user voluntarily target and release one switch? – ***consider scanning or, preferably, a more efficient access method with another body part***

3. MOUTH
Can user increase intra-oral pressure sufficiently to perform hard and soft sip and puff?

- Yes → **Sip & Puff**
- No → Can user differentiate sip and puff, or access two switches with mouth, tongue or jaw?
  - Yes → **2 switch Sip & Puff or 2 switch access**
  - No → Can user move mouth, tongue or jaw in one direction? – ***consider scanning or, preferably, a more efficient access method with another body part***

4. FOOT
Can user voluntarily move foot in all directions and release/centre to stop?

- Yes → **Proportional Joystick** → **Digital Joystick**
- No → Can user target, sustain contact with and voluntarily release 2-5 switches?
  - Yes → *Is proportional control possible with another body part?* → **Switch array or single switches**
  - No → Can user voluntarily target and release one switch? ***Consider scanning or, preferably, a more efficient access method with another body part***

5. OTHER
e.g. arm, leg, combination of methods etc.

Created 2006, updated 2008
Roslyn Livingstone,
Kathie Marina
And Nicole Wilkins
Sunny Hill Health Centre

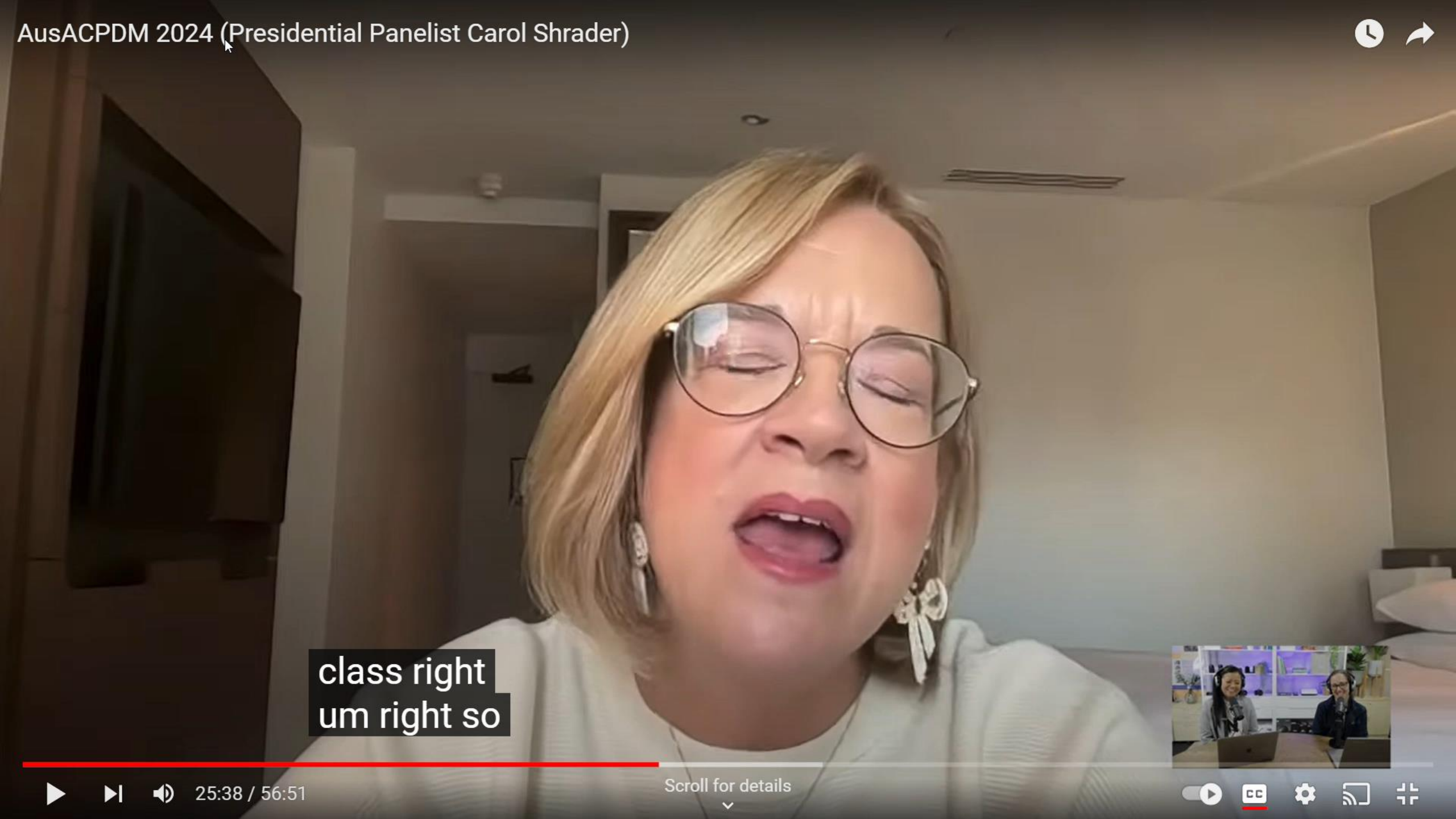
And suitable environmental support

Training suggestions

- Play activities and context - small areas or big and open
- Familiar/ natural environment
- Responsive partners – parent, caregiver, therapist
- Simple language
- Immediate success and independent control
- Time and practice

CAROL SHRADER

From Dayna Pool's Research Works Podcast


AusACPDM 2024 (Presidential Panelist Carol Shrader)
class right
um right so
25:38 / 56:51
Scroll for details

ON-TIME MOBILITY IS A HUMAN RIGHT


CASE
STORY
TIME

Meet Wyatt

- Born full term
- Normal uncomplicated pregnancy
- Mom was followed by MD appropriately
- APGARS 0 and 0
- Resuscitated for 35 minutes

SUPPORTED SITTING, STANDING AND STEPPING

GoBot at 9 months


Wyatt

MEET ELVIS

WHY
WAIT?

YOUR EXPERIENCES

YOUR CHALLENGES

POWER UP!

Ginny Paleg, PT, DScPT, MSPT

- Early Intervention
- Ginny@paleg.com
- Instagram: Ginny Paleg
- YouTube: Ginny Paleg
- Facebook: Evidence-Based Pediatric OTs and PTs