



**UPRIGHT AND
ACTIVE:
SUPPORTED
STANDING AND
STEPPING FOR
CHILDREN WITH CP**



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- ❖ Insta:ginnypaleg



**PUT IT
TOGETHER**



**MEET
LUCY**

10 INGREDIENTS FOR INTERVENTIONS



- 1. Goal Directed**
- 2. Child Active and Child Directed**
- 3. Whole Task (Routines Based)**
- 4. Natural Environments (Participation)**
- 5. Repetition with Problem Solving**
- 6. Future/Prevention (Postural Management)**
- 7. Environmental Enrichment**
- 8. Coaching**
- 9. Caregiver Delivered (with formal training)**
- 10. ON-Time use of Assistive Technology (Sabat)**



She's 3 $\frac{1}{2}$
now





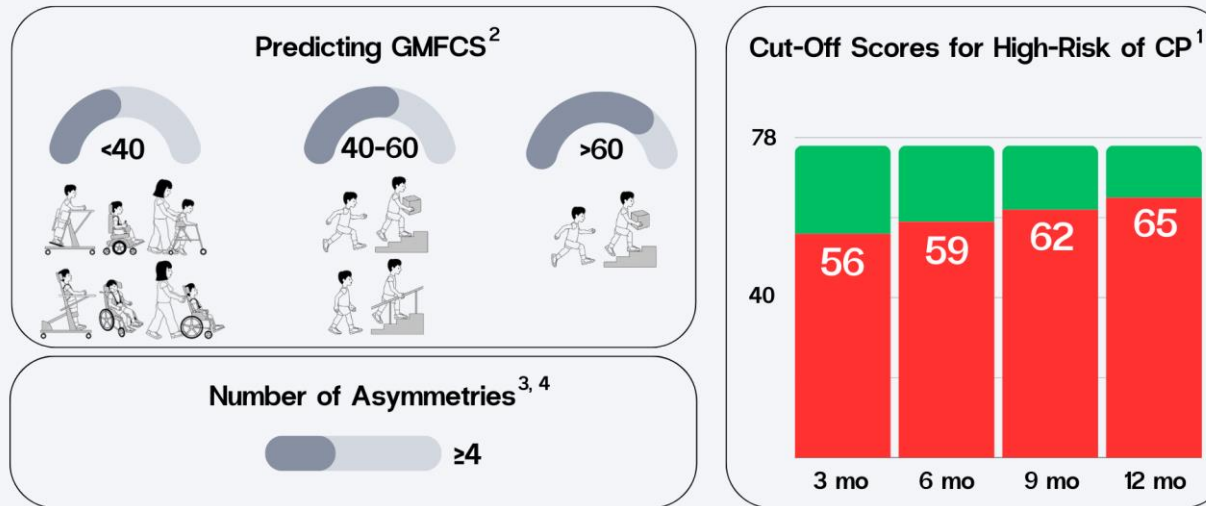
- ❖ Full term healthy pregnancy
- ❖ Diagnosed with leukodystrophy at birth, referred to hospice
- ❖ Subsequently determined to be HIE
- ❖ No cooling
- ❖ Tetraplegic CP

HINE

(Hammersmith Infant Neurological Exam)

Hammersmith Infant Neurological Examination

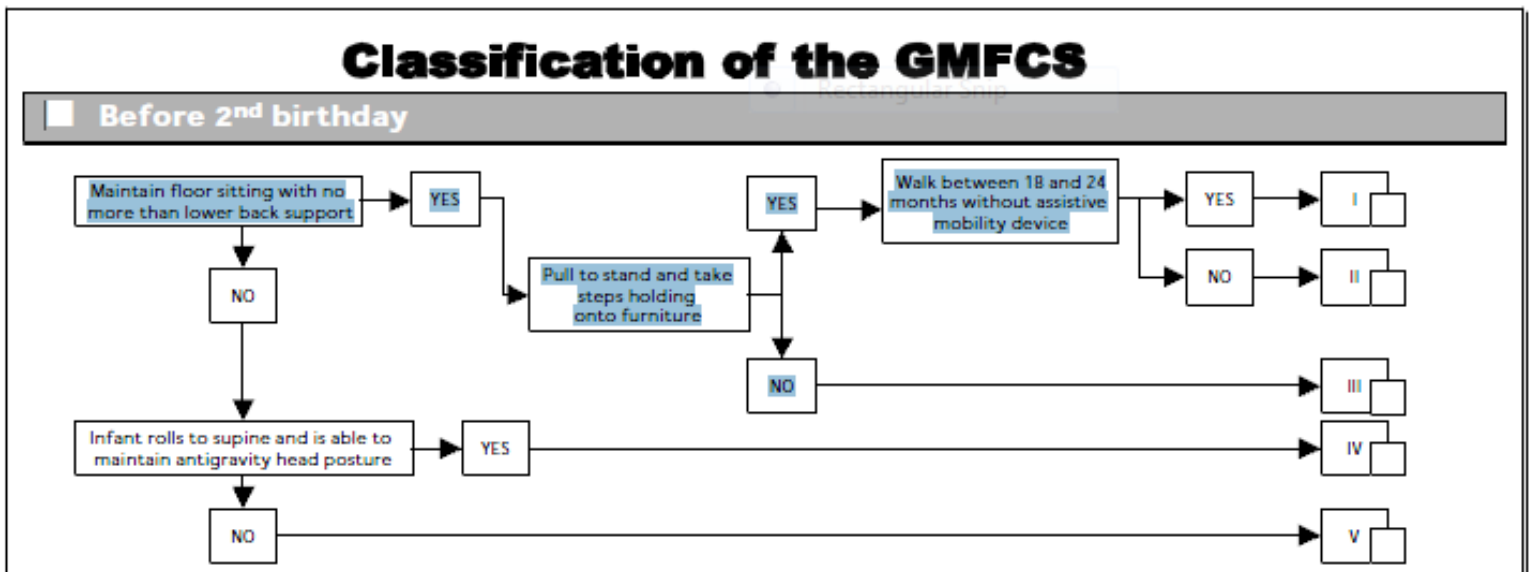
Interpretation Aid Paleg, G., Livingstone, R., Hidalgo-Robles, Á. (2024)



- References**
1. Romeo, D. M. et al., (2013). Neurological assessment in infants discharged from a neonatal intensive care unit. *European Journal of Paediatric Neurology*, 17(2), 192-198.
 2. Romeo, D. M. et al., (2008). Neuromotor development in infants with cerebral palsy investigated by the Hammersmith Infant Neurological Examination during the first year of age. *European Journal of Paediatric Neurology*, 12(1), 24-31.
 3. Hay, K. et al., (2018). Hammersmith Infant Neurological Examination Asymmetry Score Distinguishes Hemiplegic Cerebral Palsy From Typical Development. *Pediatric Neurology*, 87, 70-74.
 4. Pietruszewski, L. et al., (2021). Hammersmith Infant Neurological Examination Clinical Use to Recommend Therapist Assessment of Functional Hand Asymmetries. *Pediatric Physical Therapy*, 33(4), 200-206.



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)





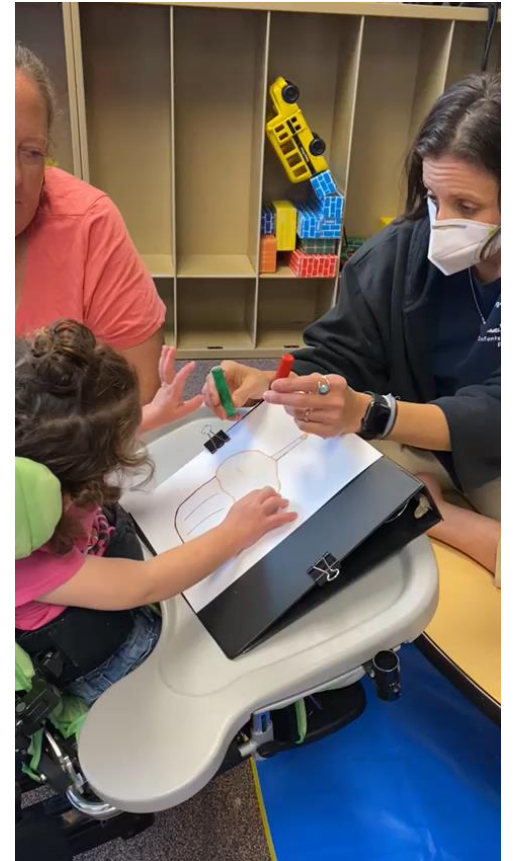
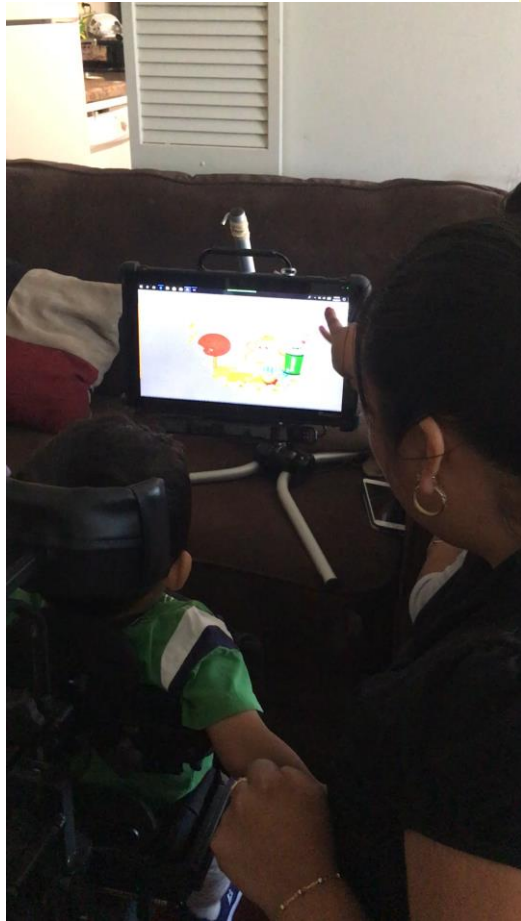




**PAIN,
SLEEP,
NUTRITION**



SPEECH, LANGUAGE AND COMMUNICATION

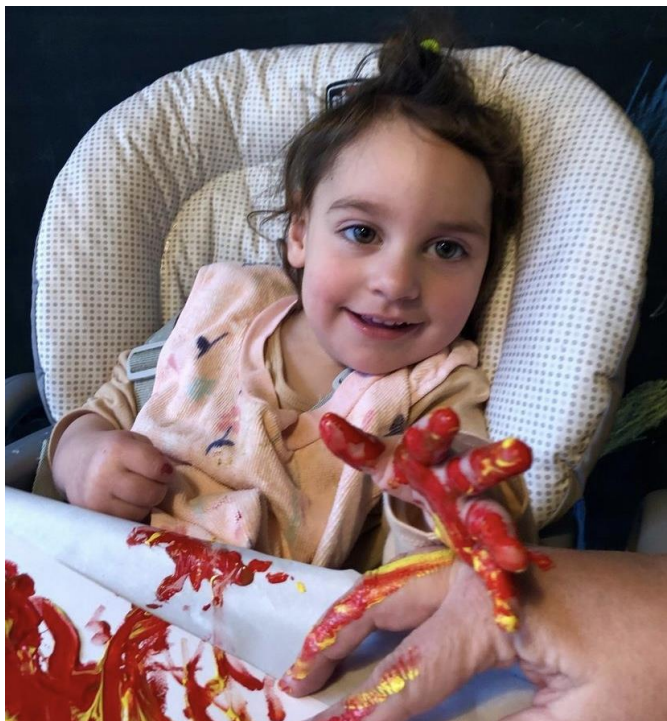




Fun: Pretend Play



Supportive seating at 3 months (tilted) now upright at 6 months!



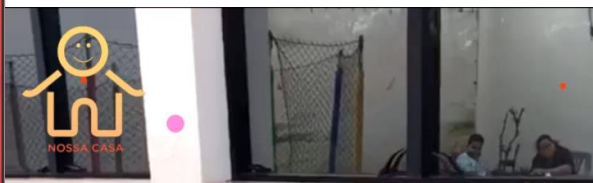


Standing at
9 months
with 20
degrees
total
abduction
(Discuss?)

| Age in months | 1-3 | 3-6 | 9 | 12 | 18 | 24 | 36 | 48 | 60 | 72 | To age 21 years |
|------------------------------|-----|-----|---|----|----|----|----|----|----|----|-----------------|
| Postural Management in Lying | | | | | | | | | | | |
| Individualized Seating | | | | | | | | | | | |
| Supported Standing | | | | | | | | | | | |
| Stepping Devices | | | | | | | | | | | |
| Power Mobility | | | | | | | | | | | |
| Bathing/Toileting | | | | | | | | | | | |
| Lift Systems | | | | | | | | | | | |



Lucy Needs Power



**Luci &
CoMovelt**



**When I Move Like
This I Feel Like
Freedom
-Jon Batiste**











Swim ring



Fabric swing adapter



Kickboard and strap for shopping

PARTICIPATION







HIGH Probability **OF**
GMFCS IV AND V

GMA MOS < 8 3-5 MONTHS

HINE < 40 4-24 MONTHS



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



Looking for pediatric standers 

STANDERS

- Protection vs Prevention

Supported-standing interventions for children and young adults with non-ambulant cerebral palsy: A scoping review

Lynore J. McLean ✉, Ginny S. Paleg, Roslyn W. Livingstone

First published: 03 December 2022 | <https://doi.org/10.1111/dmcn.15435>



RESULTS

| Study type | Primary research | Qualitative studies | Cross-sectional & survey studies |
|------------------------------------|---------------------|---------------------|----------------------------------|
| Total # of children in study | 499 | 17 | 585 |
| Age range | 7.2 months-18 years | 5-18 years | ≤ 25 years |
| GMFCS level IV | 197 | 14 | 235 |
| GMFCS level V | 235 | 3 | 231 |
| GMFCS level IV or V | 72 | - | 119 |
| TOTAL # of children in all studies | | 1,101 | |

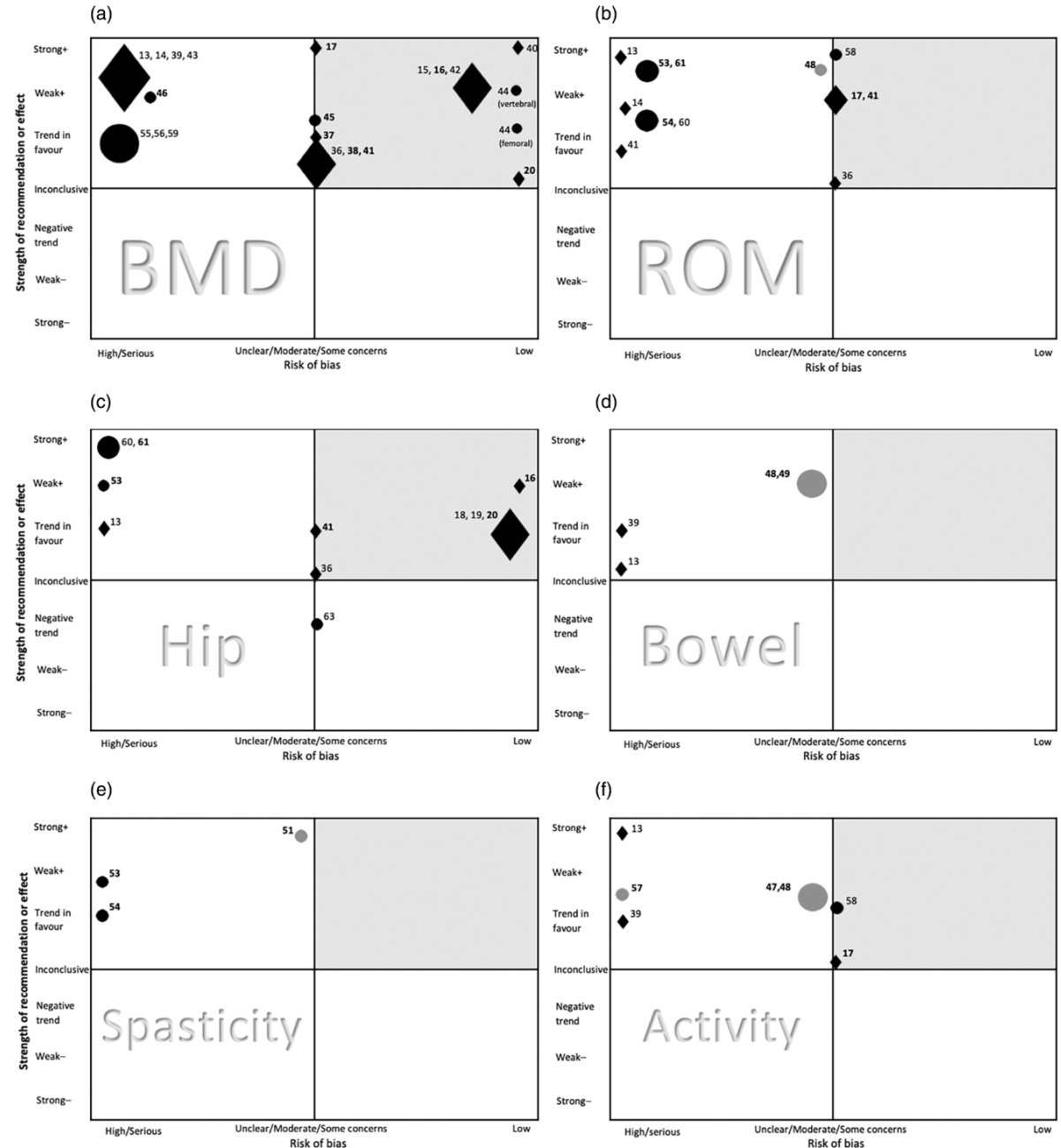
Effectiveness of supported standing

(36 Quantitative studies & 16 Systematic reviews)



- ◆ Systematic reviews
- Primary experimental evidence
- Primary descriptive evidence

Shaded box: positive recommendation & moderate to high quality evidence (“worth it box”)



F-WORDS FOR

SUPPORTED- STEPPING

FITNESS

Physical activity, exercise and decreased fatigue. Muscle stretch and strengthening, improved bowel function, bone mineral density, hip stability and alignment. Decreasing sedentary behavior for non-ambulant CP.



FUNCTIONING

Stepping may be more effective than wheeling and promotes upright exploration. Improved trunk and head control and increased weight-bearing, help with transfers, activities of daily living and ease caregiving. Upright positioning improves communication, attention, hand use and independence.

FRIENDS



Inclusion and participation with peers. Eye to eye for increased sense of equality, sense of belonging and confidence in social interaction. Able to move easily between activities with others. Increased participation in school/daycare and in age-appropriate activities.

FAMILY

Parent satisfaction with device and reduced caregiver burden. Promoting participation in family life and with siblings. Consider physical environment and transfer challenges. Caregiver support needed at home and school/daycare for functional use.



FUN

The joy of independent movement, happiness, autonomy and self-efficacy for those who have no other way to move. Play with family and at school/daycare. Opportunities for typical childhood experiences, to be naughty, run away and play jokes.

Psychological importance of the upright position on self-esteem, confidence, autonomy and the perception of others. Provides a new view on the world - others see the person rather than the disability. Maintenance of physical health and promotion of developmental progress and age-appropriate experiences.

Future



Lived Experience of supported standing



- ❖ 5 Qualitative studies
- ❖ 3 Case studies
- ❖ 6 Cross-sectional/Survey studies

Table 4: Qualitative thematic analysis

| | 1. Supported standing can help to maintain or improve body structure and function outcomes and improve physical management | | | | | | | | 2. Successful implementation of supported standing programmes is influenced by attitudes, device and environmental factors as well as child abilities and needs | | | | | | | 3. Supported standing provides an important position change and may enhance function and social participation | | | Intensity ES (%) | |
|---|--|----|---|----|----|----|---|---|---|----|----|----|----|----|----|---|----|----|------------------|-------|
| Qualitative | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | >25 | Total |
| Goodwin ⁷⁴ | | | | | | | | | | | | | | | | | | | 75 | 50 |
| Goodwin ⁷⁵ | | | | | | | | | | | | | | | | | | | 13 | 17 |
| Hughes ⁷⁶ | | | | | | | | | | | | | | | | | | | 50 | 22 |
| Bush ⁷³ | | | | | | | | | | | | | | | | | | | 75 | 44 |
| Cowan ⁷⁷ | | | | | | | | | | | | | | | | | | | 13 | 17 |
| Case studies | | | | | | | | | | | | | | | | | | | | |
| Audu ⁴⁶ | | | | | | | | | | | | | | | | | | | 25 | 17 |
| Capati ⁴⁷ | | | | | | | | | | | | | | | | | | | 50 | 33 |
| Rivi ⁴⁸ | | | | | | | | | | | | | | | | | | | 13 | 17 |
| Cross-sectional and Survey studies | | | | | | | | | | | | | | | | | | | | |
| Daniels ⁶⁸ | | | | | | | | | | | | | | | | | | | 25 | 28 |
| Goodwin ⁶⁹ | | | | | | | | | | | | | | | | | | | 50 | 28 |
| Goodwin ⁷⁸ | | | | | | | | | | | | | | | | | | | 38 | 22 |
| Taylor ⁷⁰ | | | | | | | | | | | | | | | | | | | 63 | 33 |
| Wintergold ⁷¹ | | | | | | | | | | | | | | | | | | | 25 | 22 |
| Roquet ⁷² | | | | | | | | | | | | | | | | | | | 13 | 5 |
| Frequency ES(%) | 29 | 29 | 7 | 21 | 14 | 29 | 7 | 7 | 50 | 21 | 21 | 29 | 21 | 14 | 14 | 64 | 29 | 50 | | |

Key theme #1

Supported standing can help to maintain improve body structure and function (BSF) and assist with physical management



Key theme #2

Successful implementation of supported standing programs is influenced by attitudes, device and environmental factors, as well as child abilities and needs



Key theme #3

Supported standing provides an important position change and may enhance function and social participation



Choosing a Stander

Written by Ginny Pateg, PT, DScPT, MPT
and Laura Money, PT
Created by Carlo Vialu, PT, MBA,
www.SeekFreaks.com



HEAD CONTROL

- User cannot clear airway? → **Supine Stander + try neck collar/support**
- User has intermittent control & this is a goal of standing? → **Prone Stander**
- No concern? → **Any Type of Stander**

ARMS/HANDS

- User has use of upper extremities? → You can strengthen arms, hands & accessory breathing muscles. You can encourage independence, mobility and/or exploration. → **Self-Propelled, Sit-to-Stand with swivel seat, Sling seat**

KNEES

- User has tightness but full range? → Ensure device can attain full hip extension and avoid pressure on kneecaps → **Prone Stander, Self-Propelled, Upright**
- User has loss of knee extension ROM? → A knee contracture bracket is available → **Special order**
- Partially stand person and increase stretch slowly over time → **Sit-to Stand, Sling Seat**
- Knees collapse upon loading? → You can choose to accommodate or gently stretch over time → **Sling or Other Type of Stander**

ADDITIONAL RECOMMENDATIONS

- Make sure feet are fully loaded. If you can move feet or slip a piece of paper under shoe, reposition!
- Be sure the supports are where you want. In some models, as you raise & lower the user, the position of the supports change & you may get undesired results.
- For solid seat sit-to-stand models, consider a swivel seat to increase ease of transfers.
- Power lifts are available in some models.

TRUNK/SPINE

- User has tendency to hyperextend & you wish to block this? → **Prone Stander**
- & back contact exacerbates this? → **Supine Stander**
- User has tendency to flex trunk & you wish to block this? → **Supine Stander**
- & chest/stomach contact exacerbates this? → **Prone Stander**
- User has scoliosis/kyphosis/lordosis? → You can choose to accommodate or gently stretch over time → **Sling or Other Type of Stander**

HIPS

- User has tightness but full range? → Device that can attain full hip extension → **Prone, Upright, or Self-propelled**
- Device that allows hip hyperextension → **Sit-to-Stand or Sling Seat**
- User has loss of flexion or extension → Can't attain full extension & you want to increase hamstrings ROM? → **Supine Stander**
- You want to improve hip extension ROM? → **Prone Stander**
- You want to improve hip flexion ROM? → **Sit-to-Stand or Sling Seat**
- User has tightness/spasticity in adductors, or you want increased loading at the acetabulum/femoral head? → Place legs in 10-60 degrees total abduction → **Stander Model that allows this**
- User has windswept deformity? → You can choose to accommodate this or try to gently de-rotate pelvis over time and stretch hip/knees → **Any type where joints can be adjusted independently**

ANKLES

- Want to stretch the heelcords? → Add dorsiflexion or wedge → **All types**
- User has pronation/supination or internal/external rotational deformity? → Order model with adjustable foot plates → **All types**

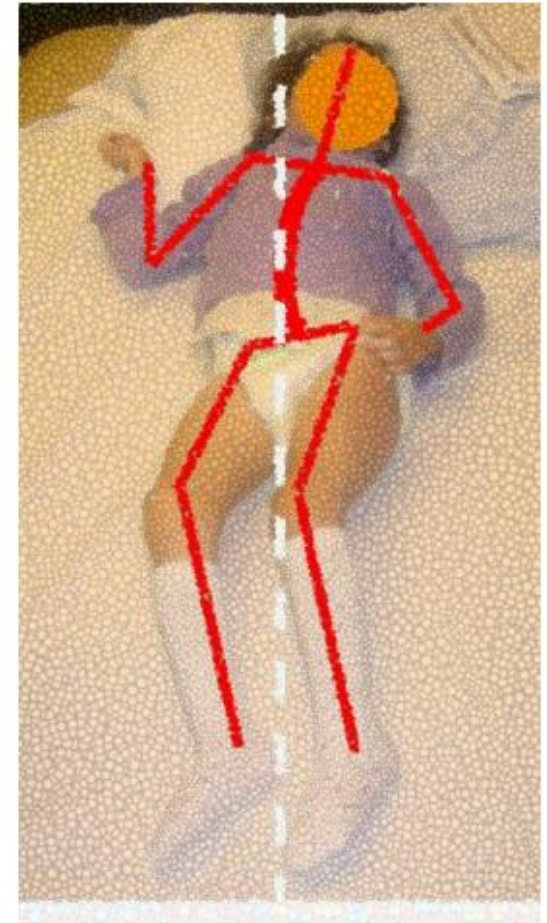
PPAS (Posture and Posture Ability Scale)

free www.scribd.com/document/606429720/Escala-Balance-PPAS

| Quality of Posture | | |
|--|-----|---------|
| View | 0/1 | Comment |
| Frontal | | |
| Head midline | | |
| Trunk symmetrical | | |
| Pelvis neutral | | |
| Legs separated & straight relative to pelvis | | |
| Arms resting by side | | |
| Weight evenly distributed | | |
| FRONTAL SUBTOTAL | | |

Posture and Postural Ability Scale (PPAS)

| Quality, frontal (score 1=yes, 0=no) | |
|--|--|
| Head midline | |
| Trunk symmetrical | |
| Pelvis neutral | |
| Legs separated and straight relative to pelvis | |
| Arms resting by side | |
| Weight evenly distributed | |
| Total score | |



Postural A/symmetry

User reported being most comfortable when therapist reported child was in best alignment





Standers that Rock and Sway

The importance of static and dynamic posture: how making static equipment dynamic may improve movement and function of children with neurological impairment - A retrospective service evaluation.

Frances K George MSc BSc MCSP

Highly Specialist Physiotherapist, Humberston Park School, Grimsby

**Corresponding author: georgef@hpark.org.uk*

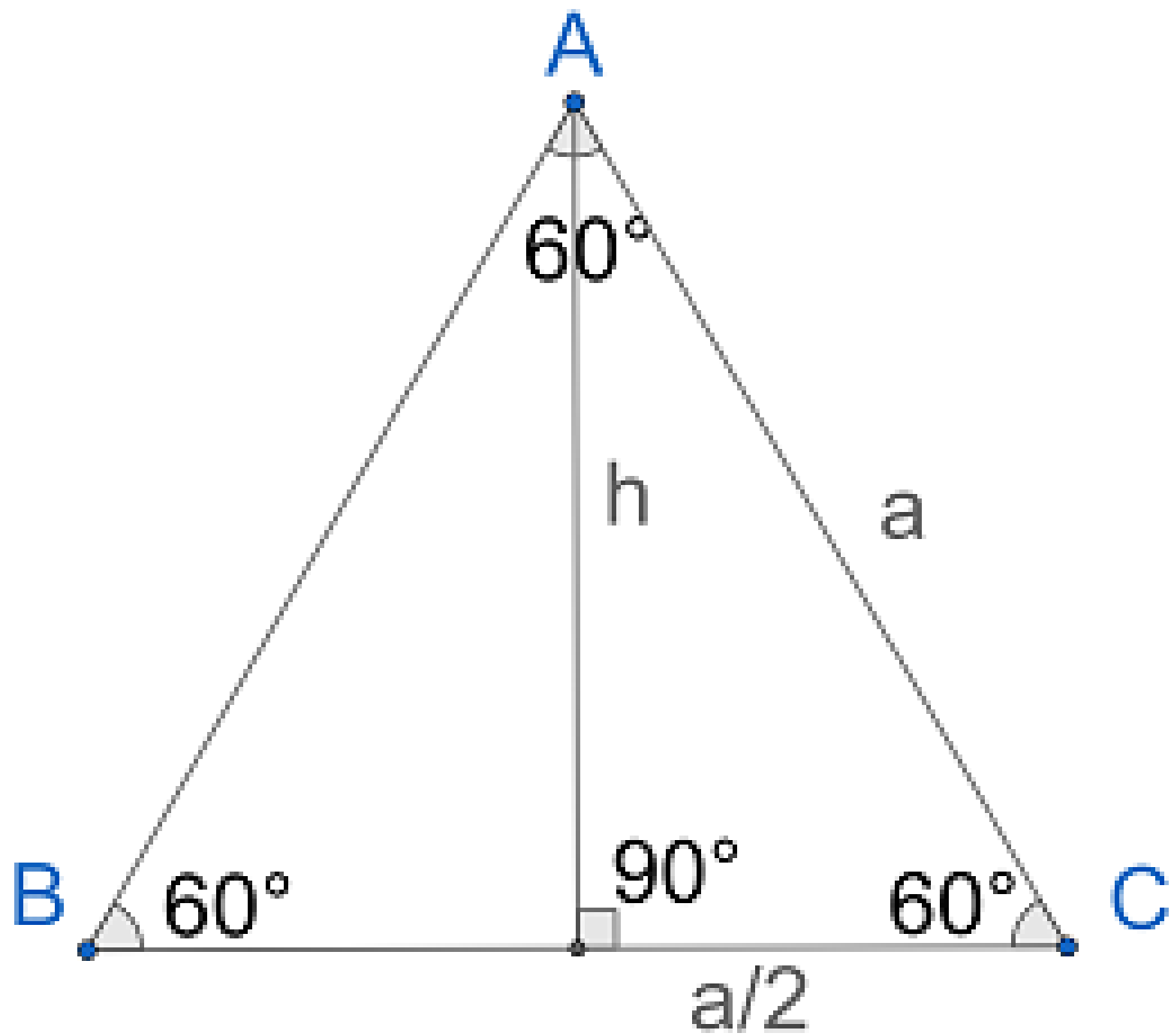
- 3 children (2CP GMFCS IV, 1 DD)
- Mean age 5 yrs 3 months
- Were already standing daily
- TDMMT, Gas Lite (both not outcome measures)
- Child one sat indep in chair at classroom table (Not GMFCS IV)
- Child 3 indep with rollator (Not GMFCS IV)
- All got to Level 2 or 1 of TDMMT (Not GMFCS IV)

An illustration featuring three children on the left and a large, stylized speech bubble on the right. The children, a girl in a red shirt and two boys in blue and green shirts, all have wide-eyed, open-mouthed expressions of surprise or shock. The speech bubble is white with a black outline and contains the text 'ABDUCTION DEBATE' in bold, black, sans-serif capital letters. The bubble is surrounded by red, jagged, starburst-like shapes and smaller white explosion-like icons, giving it a dynamic, comic-book feel. The background consists of a green patterned wall on the left and a blue sky with a green dotted pattern on the right.

**ABDUCTION
DEBATE**



**MACIAS
MARTINSSON**



› [J Pediatr Rehabil Med.](#) 2021 May 28. doi: [10.3233/PRM-190660](#). Online ahead of print.

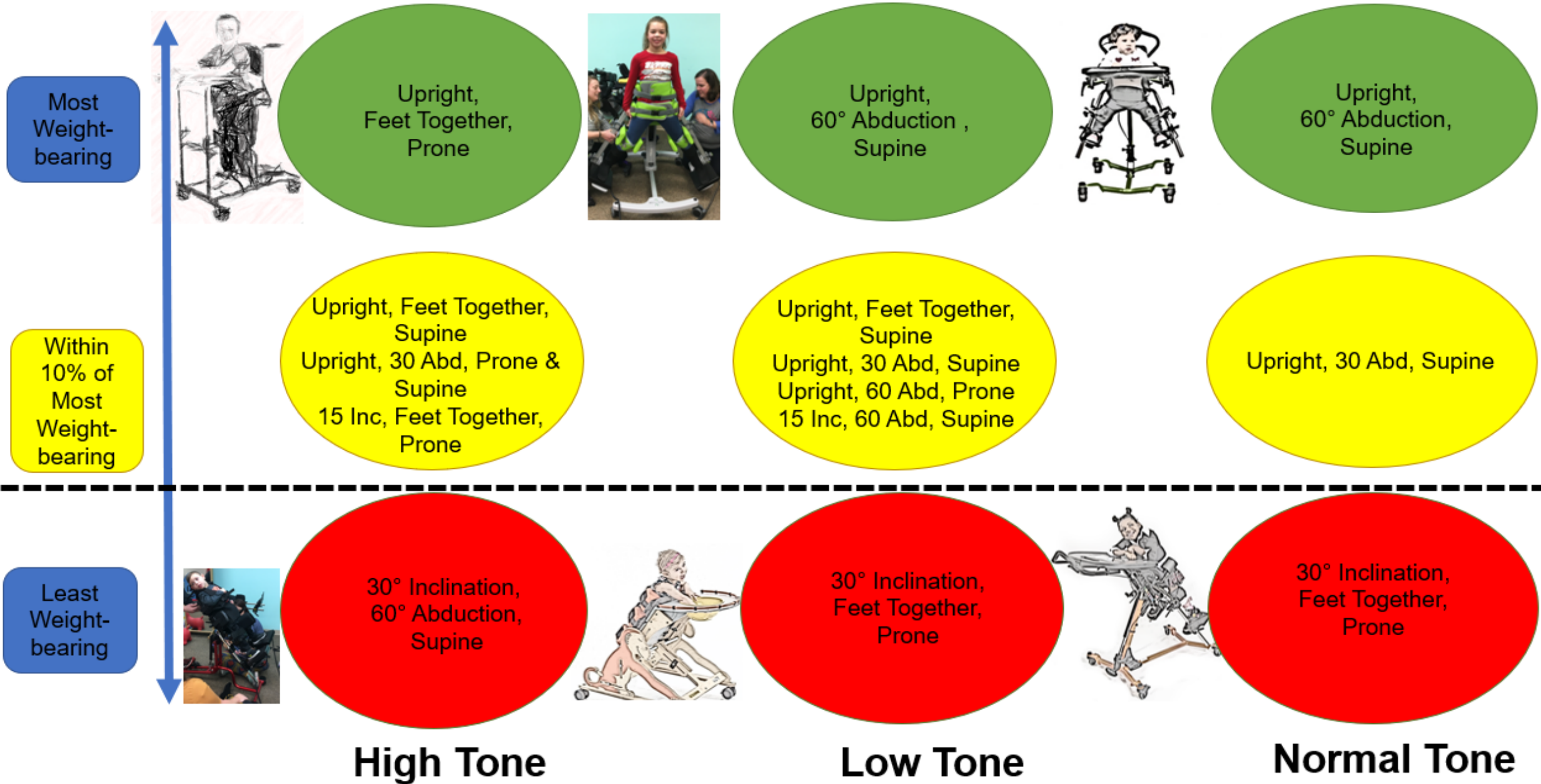
Inclination, hip abduction, orientation, and tone affect weight-bearing in standing devices

[Ginny Paleg](#)¹, [Wendy Altizer](#)², [Rachel Malone](#)², [Katie Ballard](#)², [Alison Kreger](#)³

Affiliations [+](#) expand

PMID: [34057103](#) DOI: [10.3233/PRM-190660](#)

Clinical Recommendations to Maximize Weight-Bearing Through the Feet



MAIN POINTS

- Abduct to:
 - Get femoral head best seated in acetabulum
 - Apply force through the growth plate of the acetabulum
 - Maintain or improve length of adductors
 - Decrease spasticity of Adductors
 - Maybe help with femoral head neck and rotation





Assistive Technology

The Official Journal of RESNA



ISSN: 1040-0435 (Print) 1949-3614 (Online) Journal homepage: <https://www.tandfonline.com/loi/uaty20>

Stander use for an adolescent with cerebral palsy at GMFCS level V with hip and knee contractures

Vicente Capati, Stephanie Yu Covert & Ginny Paleg

IVAN

- 16 year old boy with spastic tetraplegic cerebral palsy GMFCS level V (Gross Motor Function Classification System), MACS V (Manual Ability Classification System), CFCS V (Communication Function Classification System), and EDACS IV (Eating and Drinking Ability Classification System).
- He presented with bilateral knee flexion contractures R 35, L 30. of 40 degrees and hip flexion contractures R 20, L 30, degrees.
- When he was in kindergarten he enjoyed being fed, and watching TV while standing and the family wanted to try to return to this.



**Change in
3 months!**



**Change in
3 months!**

Figure 3: Knee Flexion Contracture Measurements with Standard Error

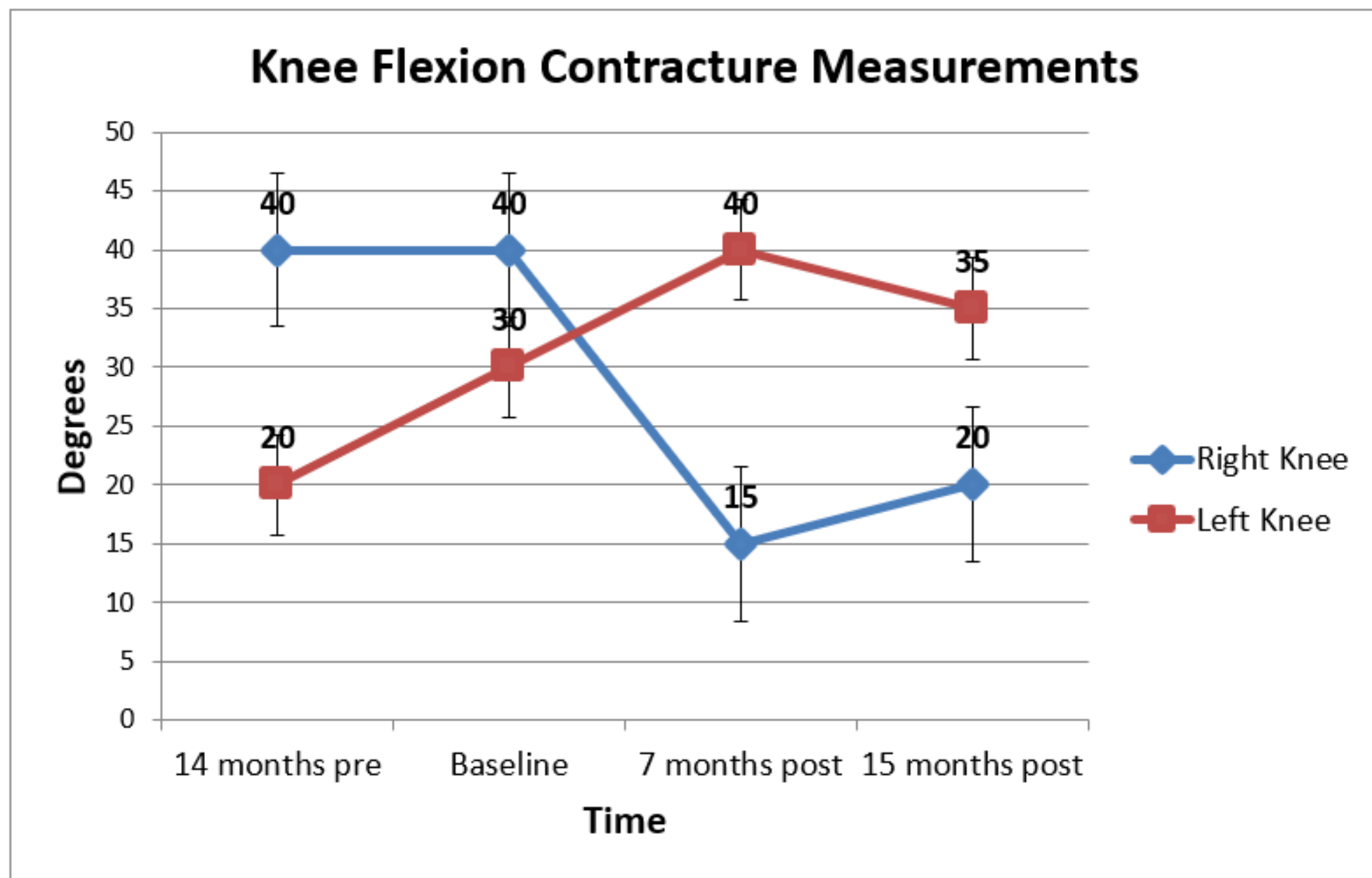
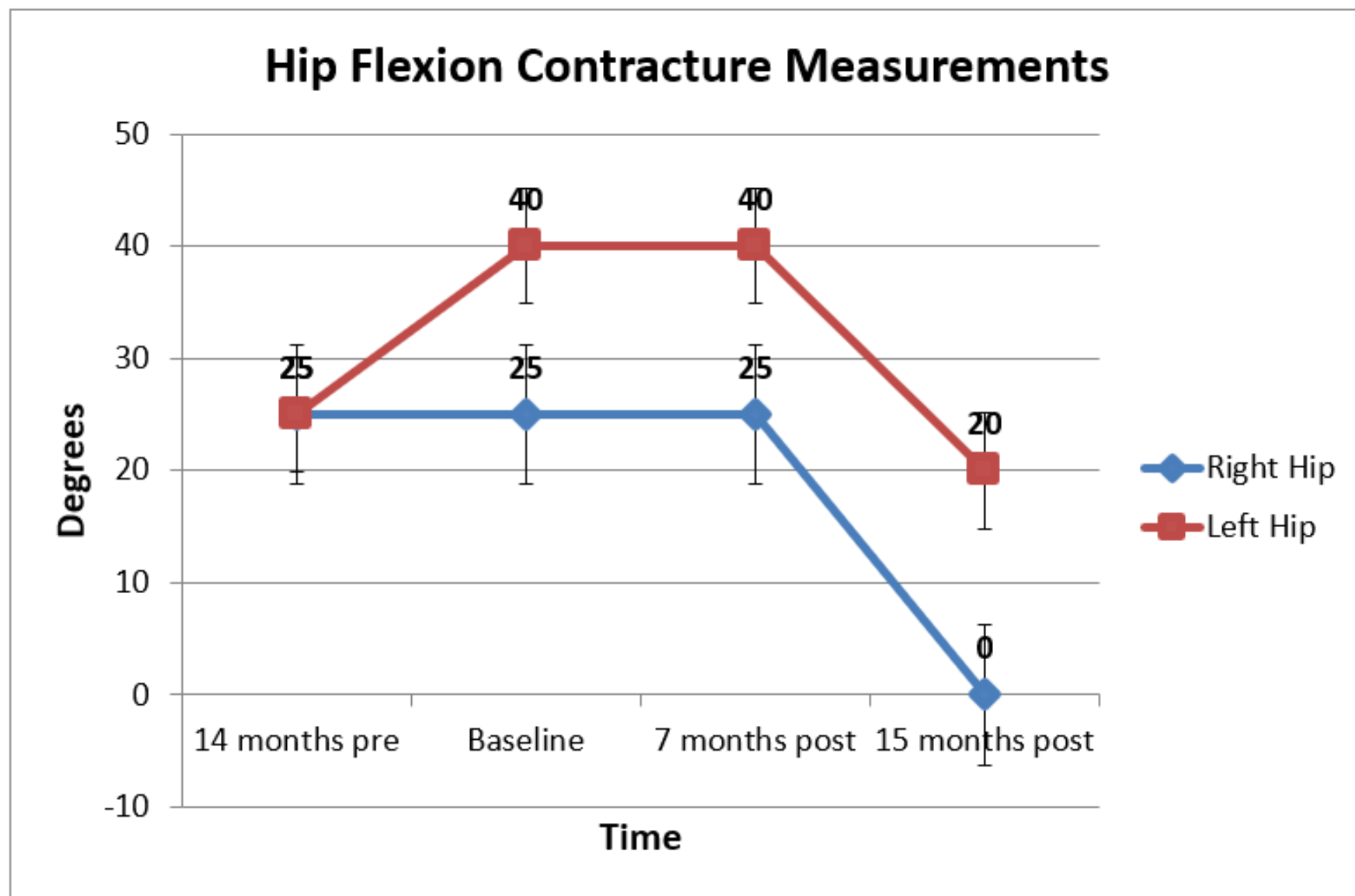


Figure 2: Hip Flexion Contracture Measurements with Standard Error



CPCCHILD

| | | | | |
|--|-----|-----|-----|--|
| toileting activities? | Yes | Yes | Yes | decreased bowel time care (less constipation) on days when child stood |
| changing diapers/underwear? | Yes | Yes | Yes | at 7 and 15 months, this was easier because his knees could move straighter |
| putting on/taking off upper body clothing? | Yes | Yes | Yes | |
| putting on/taking off lower body clothing? | Yes | Yes | Yes | at 7 and 15 months, this was easier because his knees could move straighter |
| putting on/wearing footwear? | Yes | Yes | Yes | |
| hair care | No | No | No | |
| transferring into/out of a wheelchair/chair? | Yes | Yes | Yes | at 7 and 15 months, this was easier because his knees could move straighter |
| sitting in a wheelchair/chair? | Yes | Yes | Yes | at 7 and 15 months, this was easier because his knees could move straighter and his hips were more relaxed |
| standing for exercise/transfers? | Yes | Yes | Yes | at 7 and 15 months, this was easier because his knees could move straighter and his hips were more relaxed |

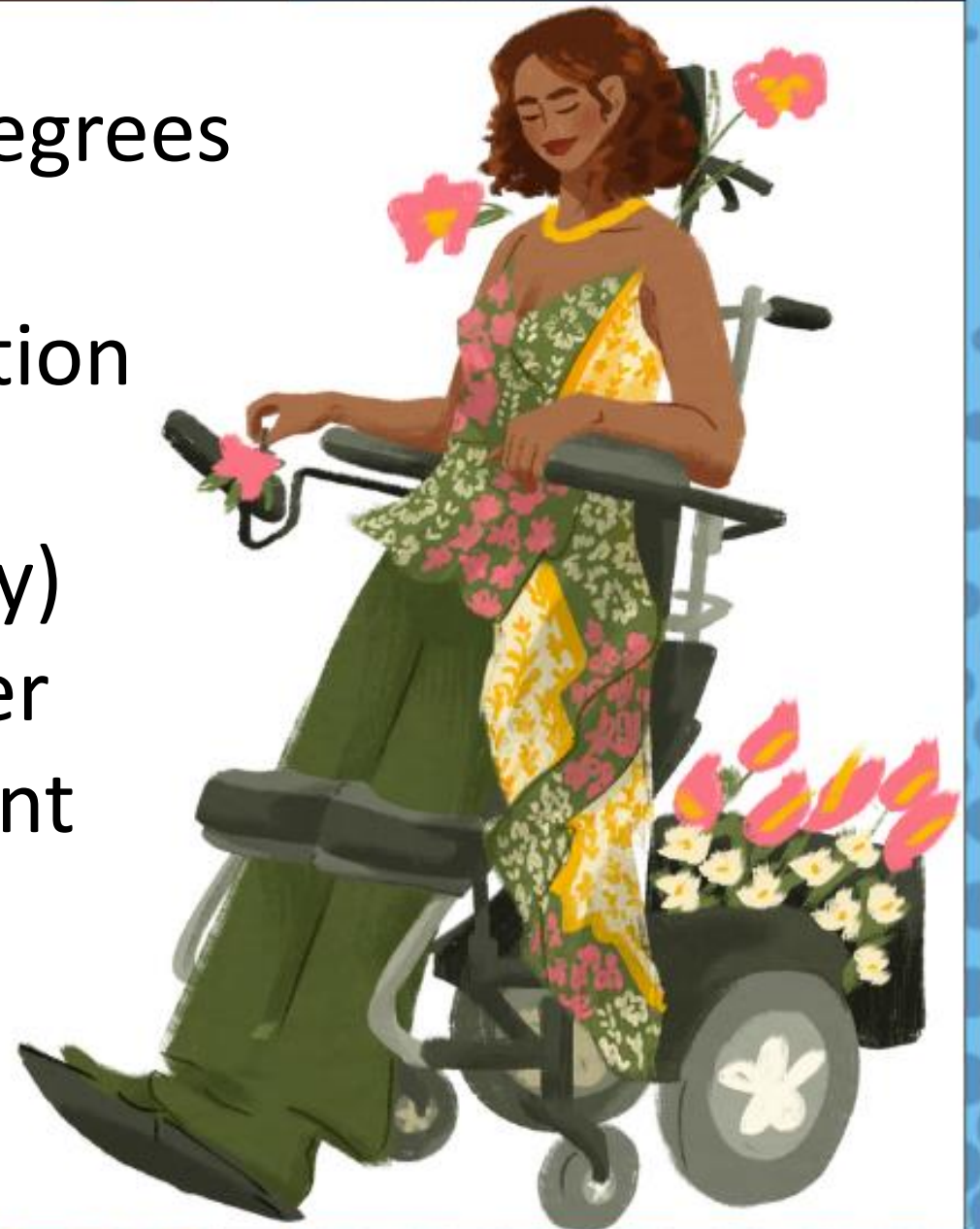
Standing makes
Ivan happy!





STANDING WHEELCHAIRS

- ❖ Permobil data: 45 seconds, 45 degrees
(**NOT** Standing!)
- ❖ Improves function and participation
- ❖ Might help knee and hip flexion contractures (Muscular Dystrophy)
- ❖ No abduction, still need a stander
- ❖ **NOT** independent, need attendant help
- ❖ Where is weight borne?









**SUPPORTED
STEPPING**

Review

Use of Overground Supported-Stepping Devices for Non-Ambulant Children, Adolescents, and Adults with Cerebral Palsy: A Scoping Review

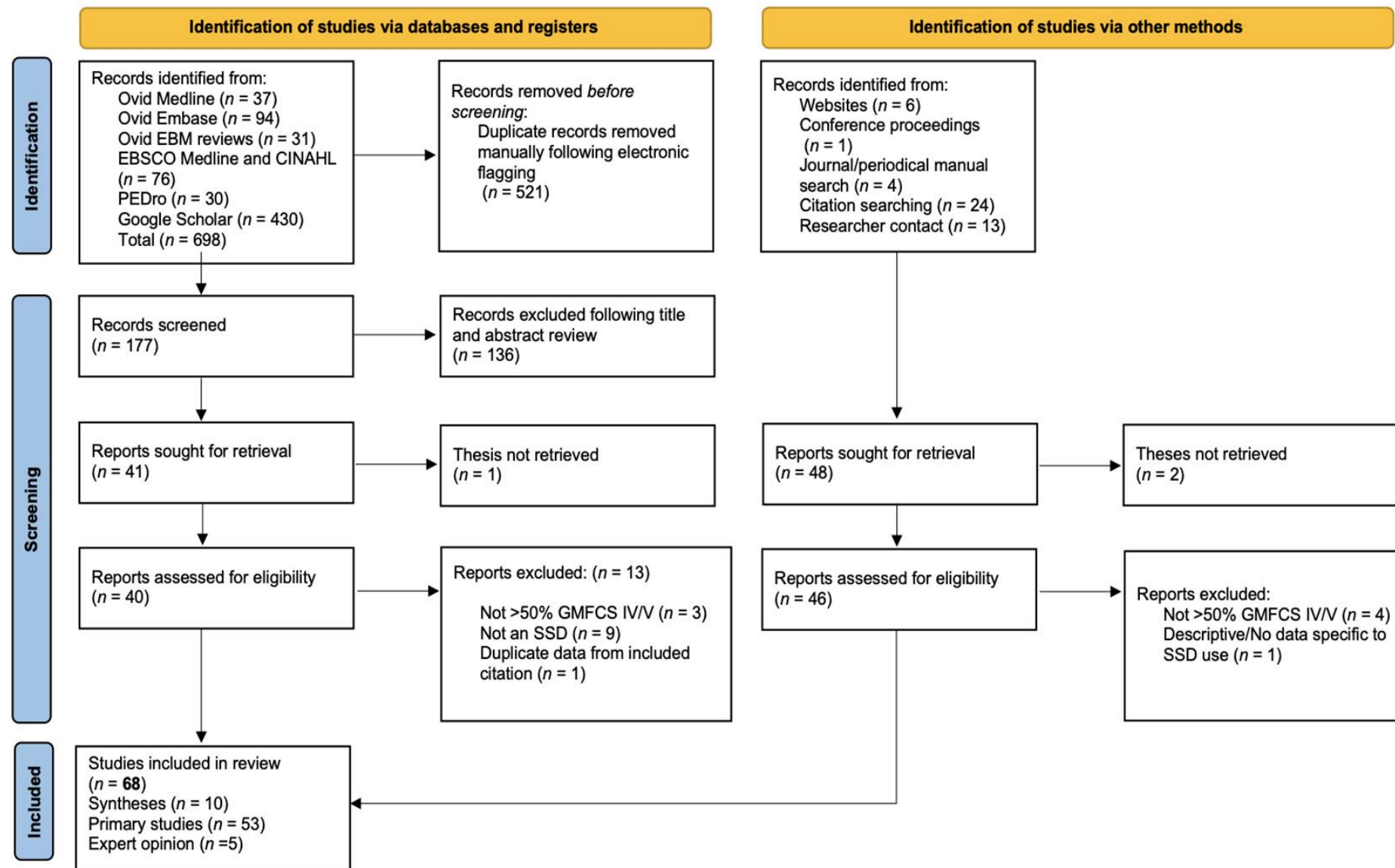
Roslyn W. Livingstone ^{1,*}  and Ginny S. Paleg ² 



Supported-Stepping Devices for Individuals with Non-Ambulant Cerebral Palsy

Volume 3 • Issue 2 | June 2023

Use of Overground Supported-Stepping Devices for Non-Ambulant Children, Adolescents, and Adults with Cerebral Palsy: A Scoping Review

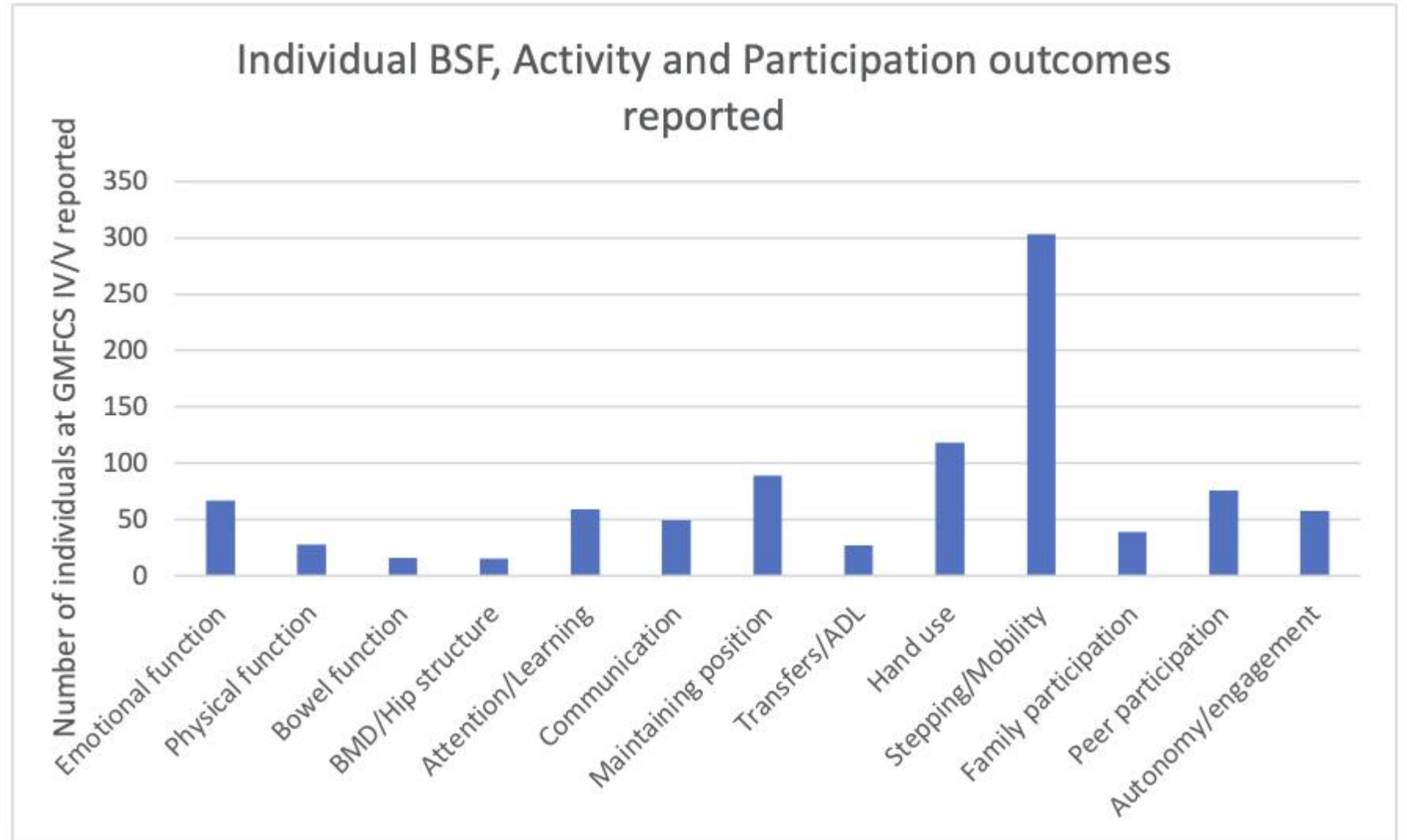


RESULTS

| Study type | Primary research | Qualitative studies | Cross-sectional & survey studies |
|------------------------------------|-------------------------------------|---------------------|----------------------------------|
| Total # of children in study | 354 | 17 | 334 |
| Age range | 9 months-47.7 years | 3-15 years | 2 years to >40 years |
| GMFCS level IV | 125 | 15 (5 unique) | 105 |
| GMFCS level V | 108 | - | 180 |
| GMFCS level IV or V | 121 | 12 | 49 |
| TOTAL # of children in all studies | 705 individuals plus 632 therapists | | |

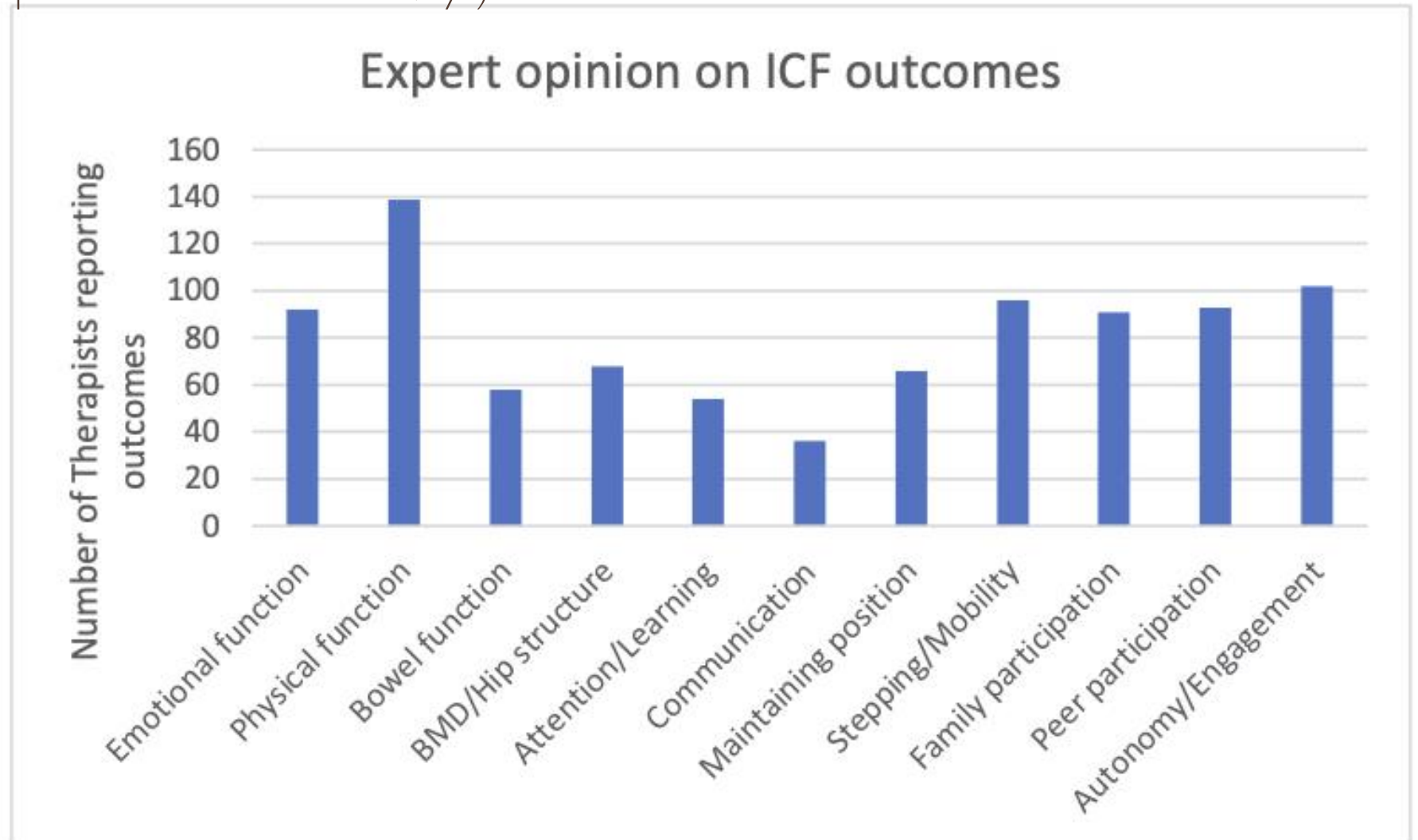
Outcomes of supported stepping interventions

(1 RCT, 2 non-random group designs, 4 pre-post group studies, 8 SSRD's, 1 longitudinal database and 18 case reports)



Expert Opinion on outcomes of supported stepping device interventions

(18 case reports, 6 expert opinion articles and 4 surveys)



Use of Overground Supported-Stepping Devices for Non-Ambulant Children, Adolescents, and Adults with Cerebral Palsy: A Scoping Review

Livingstone and Paleg, 2023



Recommended

Start from 9-15 months corrected age

Decreased Sedentary Behavior

Physical Activity
Exercise

Average Use

30-60 minutes
5-7 days per week



Increased Participation

Eye to Eye
Inclusion
Self-esteem
Confidence

GMFCS IV and V

705 individuals
9 months - 47 years

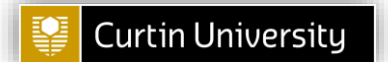




Article

Supported Standing and Supported Stepping Devices for Children with Non-Ambulant Cerebral Palsy: An Interdependence and F-Words Focus

Ginny S. Paleg ^{1,*} , Sian A. Williams ^{2,3}  and Roslyn W. Livingstone ⁴ 



Methodology

- ❖ Compare and contrast evidence based on two scoping reviews.
- ❖ Two theoretical frameworks
 - ❖ F-words
 - ❖ Interdependence
 - Human Activity
 - Assistive Technology
 - framework

SCOPING REVIEW

Supported-standing interventions for children and young adults with non-ambulant cerebral palsy: A scoping review

Lynore J. McLean¹  | Ginny S. Paleg²  | Roslyn W. Livingstone³ 





disabilities

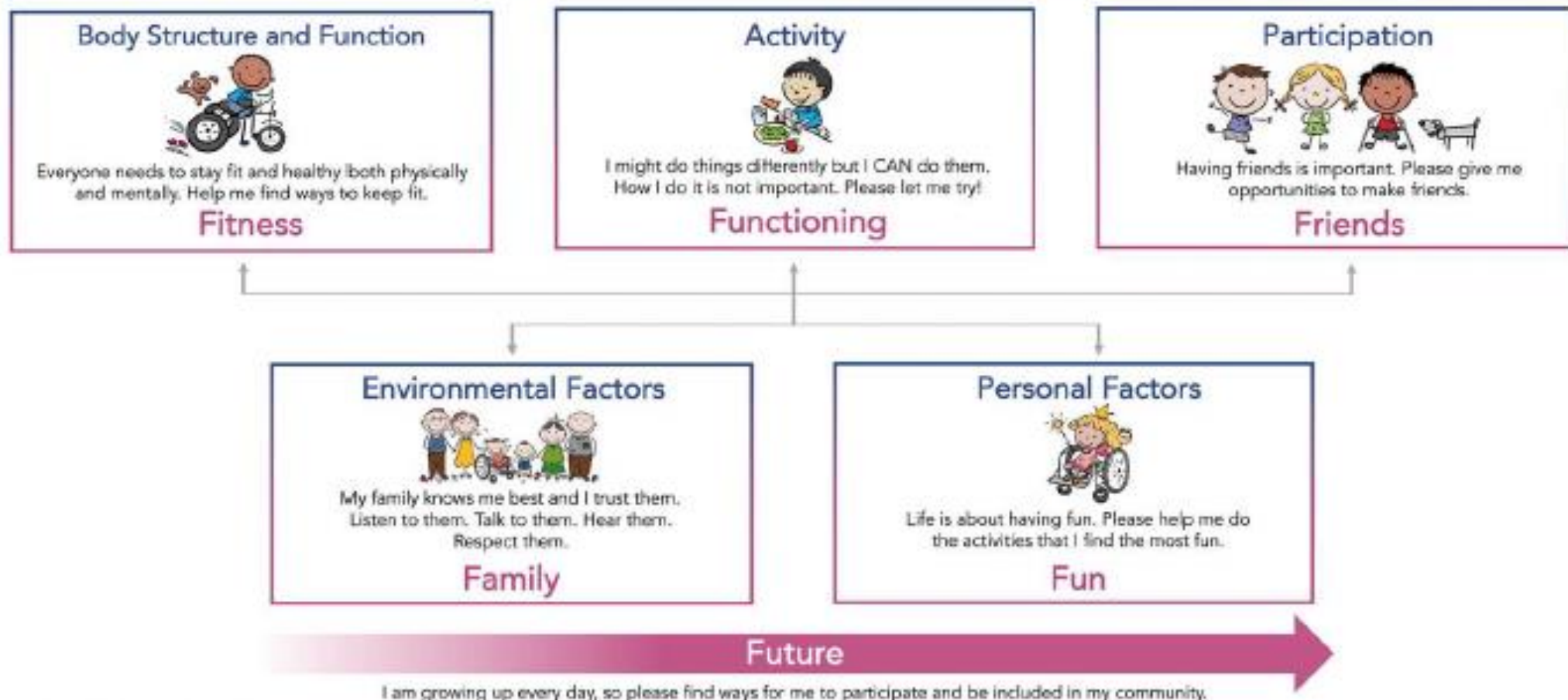


Review

Use of Overground Supported-Stepping Devices for Non-Ambulant Children, Adolescents, and Adults with Cerebral Palsy: A Scoping Review

Roslyn W. Livingstone^{1,*}  and Ginny S. Paleg² 

The ICF Framework¹ and the F-Words²



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



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.

iHAAT:

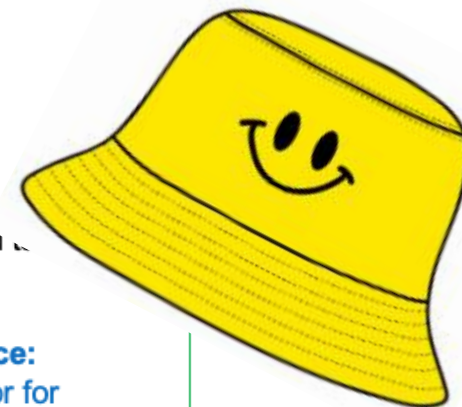
Personal factors

Interdependence:
Interactions between AT and all persons in an AT system



Activity type and demands

Interdependence:
AT as a mediator for participation



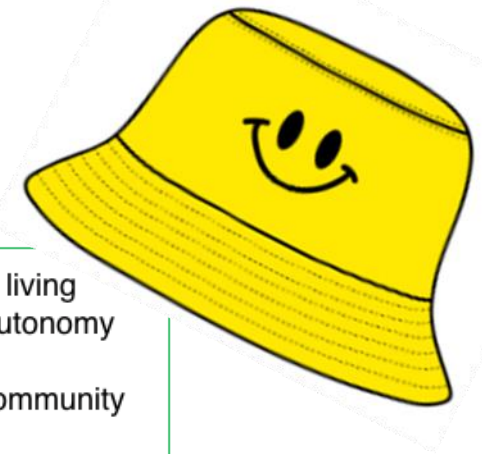
Environmental and sociocultural factors

Interdependence:
AT as representative of sociocultural values and personal identity

Assistive technology type, purpose, and use

Interdependence:
User-led design and utility of the AT device or system

F words and iHAAT:



Age, Preferences, Goals
Functioning:
 gross motor, manual, communication, visual, eating and drinking, and intellectual abilities
Interdependence:
 Interactions between AT and all persons in an AT system



Activities of daily living
 Indoor/outdoor autonomy and mobility
 Home, school, community participation
Interdependence:
 AT as a mediator for participation

Physical: access, transfers, space
 Social and attitudinal: friends, peers, family, caregivers, school, community, society
Interdependence:
 AT as representative of sociocultural values and personal identity

| Stander | Stepping |
|---|--------------|
| Prone | Convertible |
| Supine | Hands-free |
| Sit to stand | Support arms |
| Self-propelled | |
| Interdependence: Child/family/caregiver-led design and utility of AT device or system | |

Future

I am growing up every day, so please find ways for me to participate and be included in my community.

Supported Standing

- ❖ Physical benefits for bone, muscle and hip health
- ❖ Cardiovascular function and physical fitness
- ❖ Psychosocial benefits influence communication and the perception of others

Supported Stepping

- ❖ Maintenance of physical health
- ❖ A new view of the world
- ❖ Others see the person rather than the disability
- ❖ Positive impact on self-esteem, confidence and autonomy
- ❖ Promotion of development

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

Stander

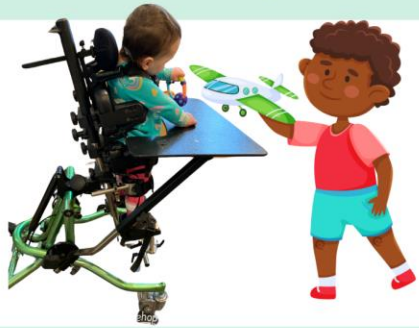
Stepping

Stander

Stepping

FUNCTIONING

- ◆ Improve head and trunk control
- ◆ Improve arm and hand control
- ◆ Increase gross motor abilities
- ◆ Increase participation in ADL



- ✳ Improve arm and hand control
- ✳ Improve gross motor abilities
- ✳ Increase independent mobility
- ◆ Improve head and trunk control
- ◆ Increase participation in ADL
- ♥ Increase participation in transfers
- ♥ More effective than wheeling
- ♥ Increase attention
- ♥ Improve communication

FAMILY

- ♥ Collaboration between child, family, caregivers and others
- ♥ Ease caregiving
- ♥ Decrease parental stress

- ♥ Reduce caregiver burden
- ♥ Increase parent satisfaction
- ♥ Participation in family life
- ♥ Caregiver support is essential

FITNESS

- ✳ Increase Bone Mineral Density
- ✳ Prevent or decrease contractures
- ✳ Improve hip stability
- ◆ Decrease sedentary behavior

- ✳ Improve bowel function
- ◆ Increase stepping, walking distance, speed and endurance
- ✳ Physical activity and exercise
- ♥ Active muscle strengthening

FUN

- ♥ Psychologically important change of position
- ♥ Children need choice in standing -where, when, and which activities



- ♥ Joy of independent movement
- ♥ Happiness, independence, and self-efficacy
- ♥ Opportunities for age-appropriate activities and experiences (being naughty, running away, playing jokes, etc.)

FRIENDS

- ♥ Eye-to-eye with peers
- ♥ Inclusion and participation
- ♥ Increase social interaction
- ♥ Psychosocial importance of the upright position

- ♥ Eye-to-eye with peers
- ♥ Inclusion and participation
- ♥ Sense of equality and belonging
- ♥ Increase confidence in social interaction
- ♥ Easily able to move between activities with others

FUTURE

- ✳ Physical benefits for bone, muscle, and hip health
- ◆ Cardio-vascular function and physical fitness
- ♥ Psychosocial benefits influence communication and the perception of others

- ◆ Maintenance of physical health
- ♥ A new view of the world
- ♥ Others see the person rather than the disability
- ♥ Positive impact on self-esteem, confidence and autonomy
- ♥ Promotion of development

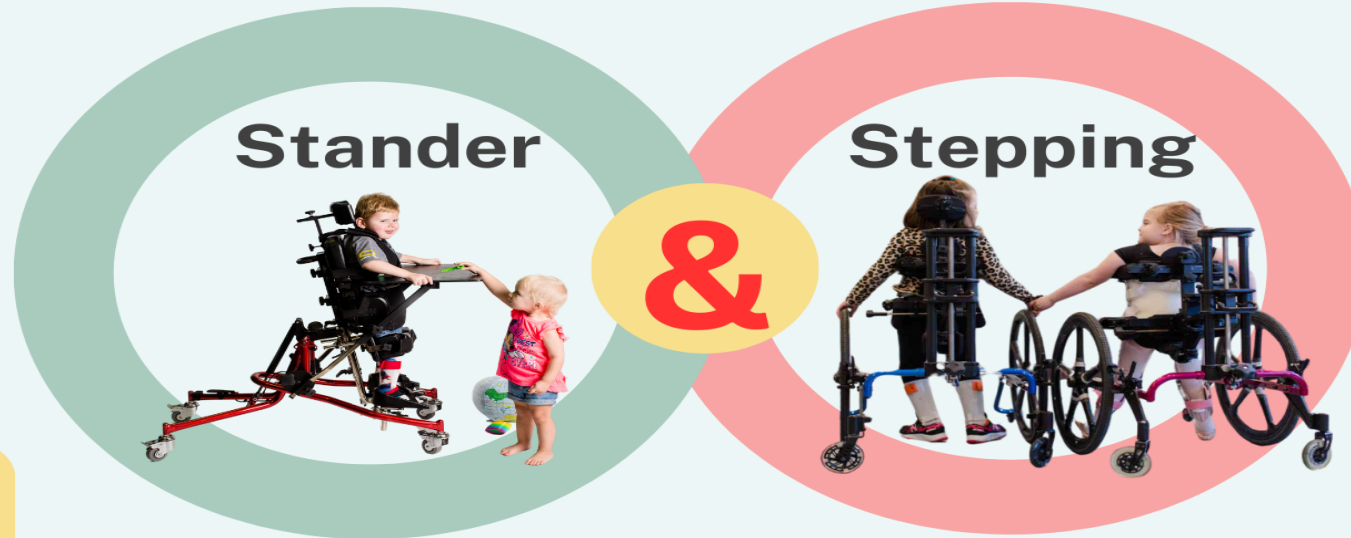
KEY

- ✳ Measured in: Experimental research studies - all studies moderate to high quality except for hip stability studies
- ◆ Measured in: Observational studies, case series or reports - all studies moderate to high quality
- ♥ Described in: Qualitative research, surveys or case reports - all studies moderate to high quality

Children at GMFCS levels IV&V may benefit from supported standing **AND** stepping devices from 9-15 months of age

Evidence from two scoping reviews synthesized through

F-words
and
iHAAT
frameworks



Use is **interdependent** on parents, caregivers, and friends. Being eye-to-eye for social interaction influences perceptions of others

Standing and stepping devices may **BOTH** be medically and developmentally necessary to address **functioning, family fitness, fun, friends** and **future goals**

Multiple positioning and mobility devices daily in natural routines:
↑ Intervention dosage
More equitable
= developmental opportunities

Standers to promote:

- bone mineral density
- contracture prevention
- hip stability

Stepping devices to enhance:

- independent mobility
- muscle development
- cardio-respiratory fitness

ON-Time positioning and mobility:

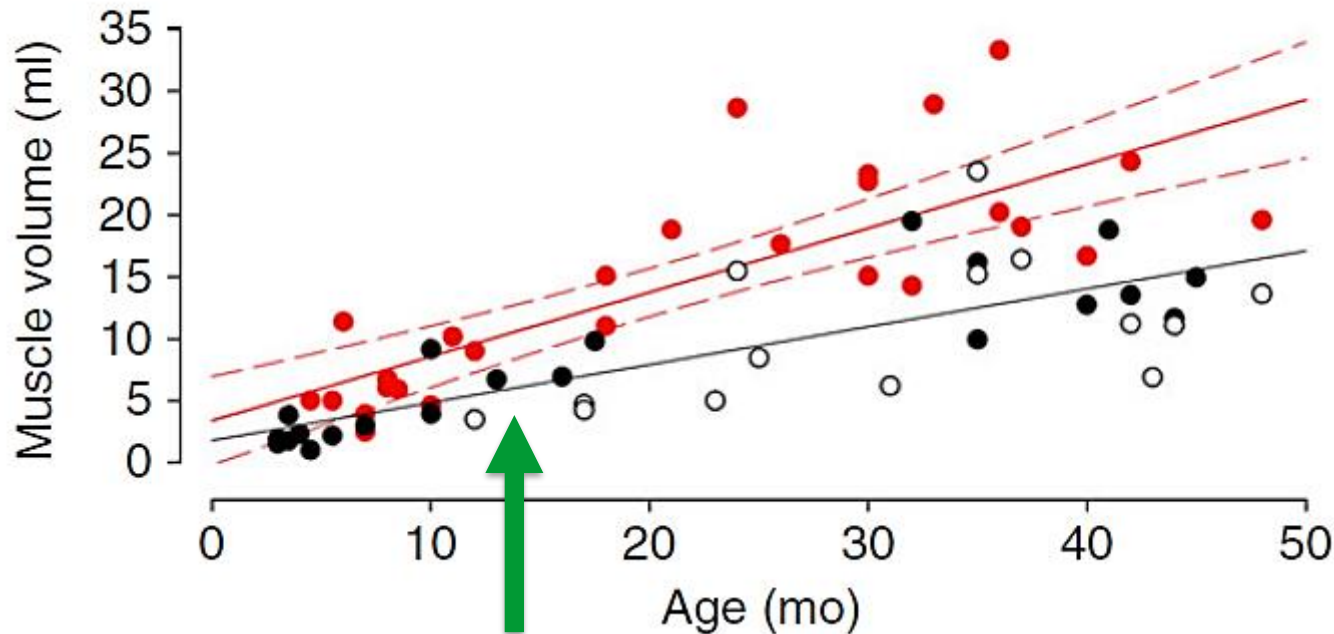
- ❖ Standing from 9-12 months
- ❖ Stepping between 9 and 15 months



Muscle 'Growth' Rate

Now 6 months!

- TD (n=45)
- CP, Diplegic (n=17)
- CP, Hemiplegic (n=24)



Growth rate (ml/month)
TD = 0.52 $r^2 = 0.67$
CP = 0.34 $r^2 = 0.74$



Separation

Feasibility of ON-Time provision:

- ❖ High probability of CP from age 3-5 months
 - ❖ MRI
 - ❖ HINE
 - ❖ GMA-MOS

- ❖ Approximate GMFCS level



Hammersmith Infant Neurological Examination

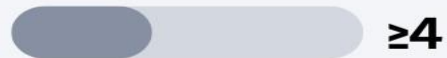
Interpretation 1.1

Ialgo-Robles, Á. (2024)

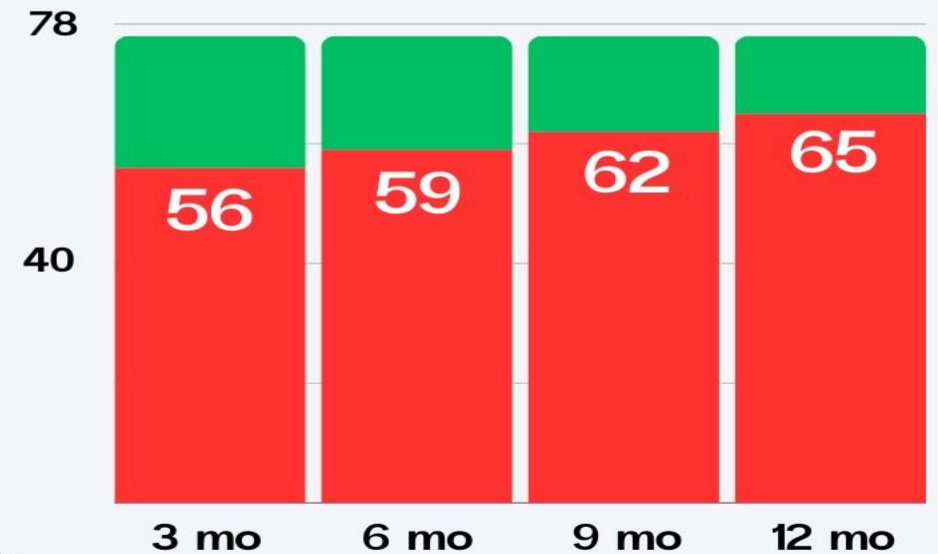
Predicting GMFCS²



Number of Asymmetries^{3, 4}



Cut-Off Scores for High-Risk of CP¹

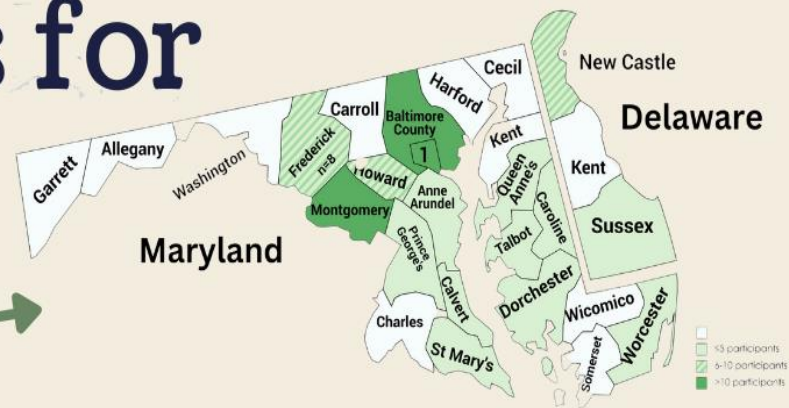


References

1. Romeo, D. M. et al., (2013). Neurological assessment in infants discharged from a neonatal intensive care unit. *European Journal of Paediatric Neurology*, 17(2), 192–198.
2. Romeo, D. M. et al., (2008). Neuromotor development in infants with cerebral palsy investigated by the Hammersmith Infant Neurological Examination during the first year of age. *European Journal of Paediatric Neurology*, 12(1), 24–31.
3. Hay, K. et al., (2018). Hammersmith Infant Neurological Examination Asymmetry Score Distinguishes Hemiplegic Cerebral Palsy From Typical Development. *Pediatric Neurology*, 87, 70–74.
4. Pietruszewski, L. et al., (2021). Hammersmith Infant Neurological Examination Clinical Use to Recommend Therapist Assessment of Functional Hand Asymmetries. *Pediatric Physical Therapy*, 33(4), 200–206.

Identifying opportunities for early detection of CP

- 72 healthcare professionals surveyed
- Only 19% children receive CP diagnosis < age 12 months
- Few clinicians use recommended tools: MRI (30%)
GMA (10%)
HINE (29%)
- Reliance on clinical signs:
 - stiffness in legs (95%)
 - excessive head lag (93%)
 - persistent fisting (92%)
- Changes needed:
 - organization and policy support
 - education and training



It's not either/or...
THE TYRANNY OF OR
THE POWER OF AND



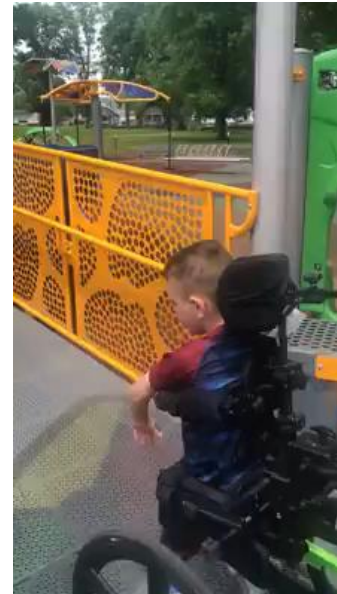
› Assist Technol. 2024 Jul 3;36(4):264-274. doi: 10.1080/10400435.2023.2283461. Epub 2023 Dec 11.

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

Roslyn W Livingstone^{1 2 3}, Ginny S Paleg⁴, Debra A Field^{1 2}

Home Use of Assistive Technology for Children (HUTCH)

- 42 participants aged 18 months to 80 months
- 8 GMFCS III
- 15 GMFCS IV
- 19 GMFCS V
- Use of standing and stepping devices at the start and end of 6 month loan of a power mobility device



Power mobility introduction did not decrease use of standing or stepping devices

- No statistically significant difference in time spent standing or stepping over 6 months
- All GMFCS V who used a stepping device (14/19) maintained or increased time stepping and in power
- 4/8 GMFCS III and 6/14 GMFCS IV increased time stepping while spending same or less time in power
- Only 1/36 increased use of power mobility and decreased time stepping





Overground Home, School and Community Use

Supported Stepping Devices

Activall



Adapta Walker



Bronco



Comet



Cricket



Crocodile



Dynamico




Gait Master



GaitWay



Grillo



Hart



Hibbot



Kaye Harness



Kidwalk





Lift Walker



Meywalk and MiniWalk





MK4



Moxie



Mowego



Mustang



MyWay





NF Walker




Pacer Traditional, Dynamic and E



Pivot



Pony



Prone Walk



Second Step





Smart



Taos



Tram



Trekker





Up-N-Free



Up-N-Go



WalkAbout



Devices identified by Google search January 4 2023



- Puma Enliten



9/3/20XX

What About Robotics?






Original Article |  **Free Access**

Locomotor and robotic assistive gait training for children with cerebral palsy

Dayna Pool , Jane Valentine, Nicholas F Taylor, Natasha Bear, Catherine Elliott

First published: 22 November 2020 | <https://doi.org/10.1111/dmcn.14746> | Citations: 25

 SECTIONS

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- ❖ 44 children (mean age 8y 1mo, SD 2y 1mo; range 5y 1mo–12y 11mo) with CP GMFCS III, IV, and V
- ❖ Randomly assigned to the RAGT and locomotor training (RAGT+LT) group or locomotor training only group (dosage for both: three 1-hour sessions a week for 6 weeks).
- ❖ Outcomes were assessed at baseline T1 (week 0), post-treatment T2 (week 6), and retention T3 (week 26). The primary outcome measure was GAS. Secondary outcome measures included the 10-metre walk test, children's functional independence measure mobility and self-care domain, COPM and GMSFM

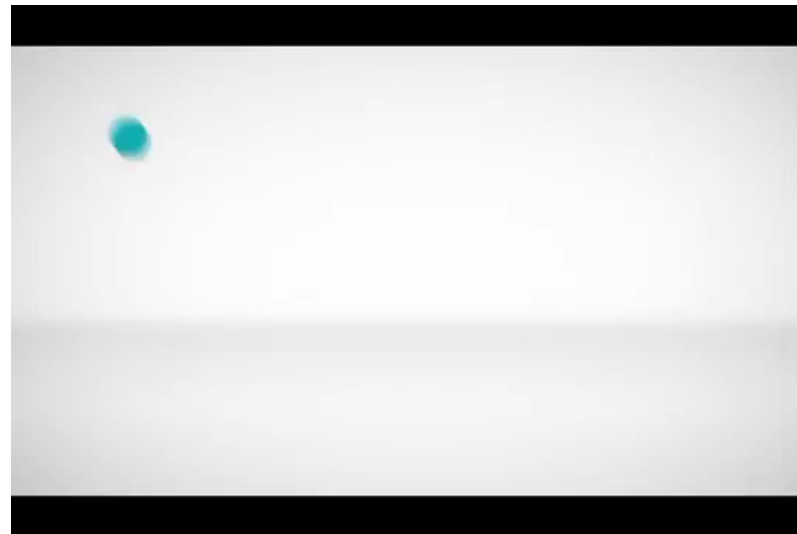
- ❖ There were no significant differences between the groups for both the primary and secondary outcome measures. All participants completed the intervention in their original group allocation. There were no reported adverse events.

- ❖ Interpretation
- ❖ The addition of RAGT to locomotor training does not significantly improve motor outcomes in children with CP in GMFCS levels III, IV, and V.

- ❖ What this paper adds
- ❖ Marginally ambulant and non-ambulant children with cerebral palsy can participate in locomotor training.
- ❖ Robotic assisted gait training when added to locomotor training does not appear to be any more effective than locomotor training alone.

Summary of CP and Robotic Walking

- ❖ Robotic devices that provide assistive gait training for individuals with cerebral palsy do not provide a greater benefit for improving mobility than the standard of care. (Connor, 2022)
- ❖ Due to the methodological variability of the studies, it is not possible to determine whether robot-assisted gait training is effective for treatment in children with CP. (Colomera, 20202 in Spanish)



Help the parent/caregiver
delight in the child and
find happiness in being a
parent/caregiver.

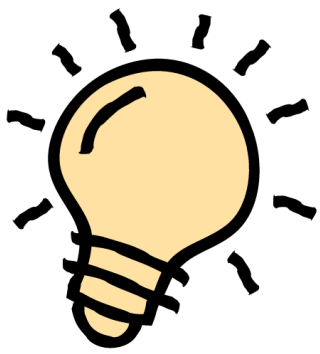
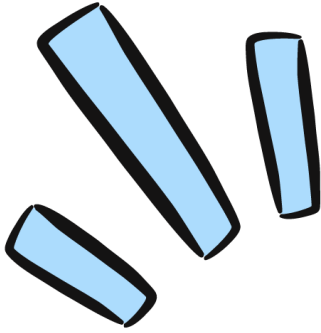
Build their capacity to
develop strategies for
participation.

Help them smile and
giggle.



THE MEANING OF LIFE



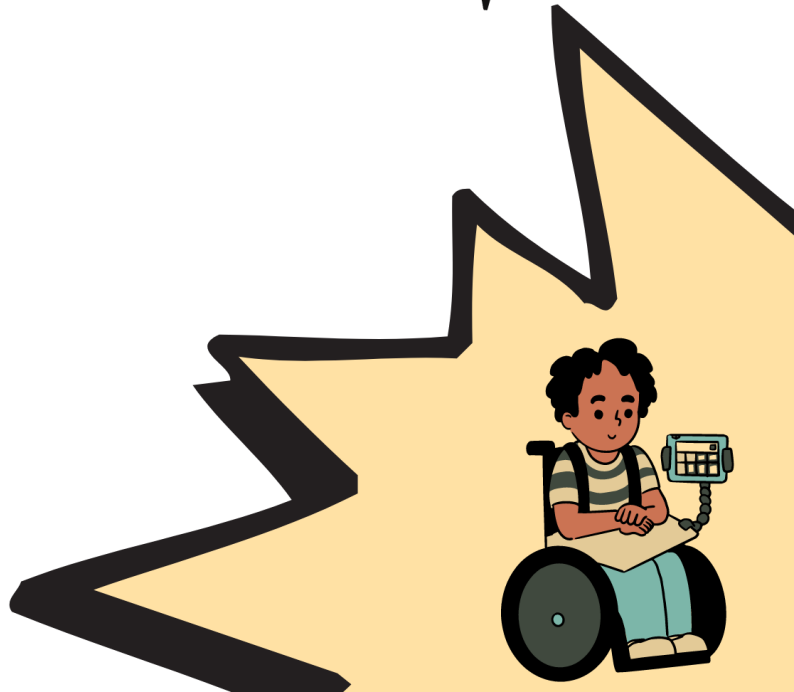
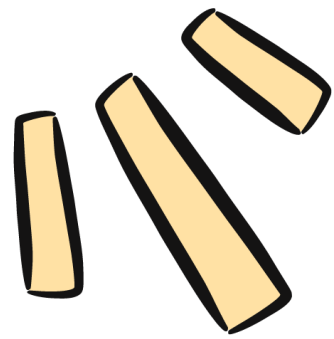


To Stand,
Step and

MOVE

Is a
Human

RIGHT





**Let's
Discuss**



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