

TREATING PEDIATRIC MOVEMENT DISABILITIES: FOR THE NON- PHYSICAL THERAPIST

BY: MONIQUE CHARBONNET, PT, DPT, DSC

**MONIQUE
CHARBONNET, PT,
DPT, DSC**

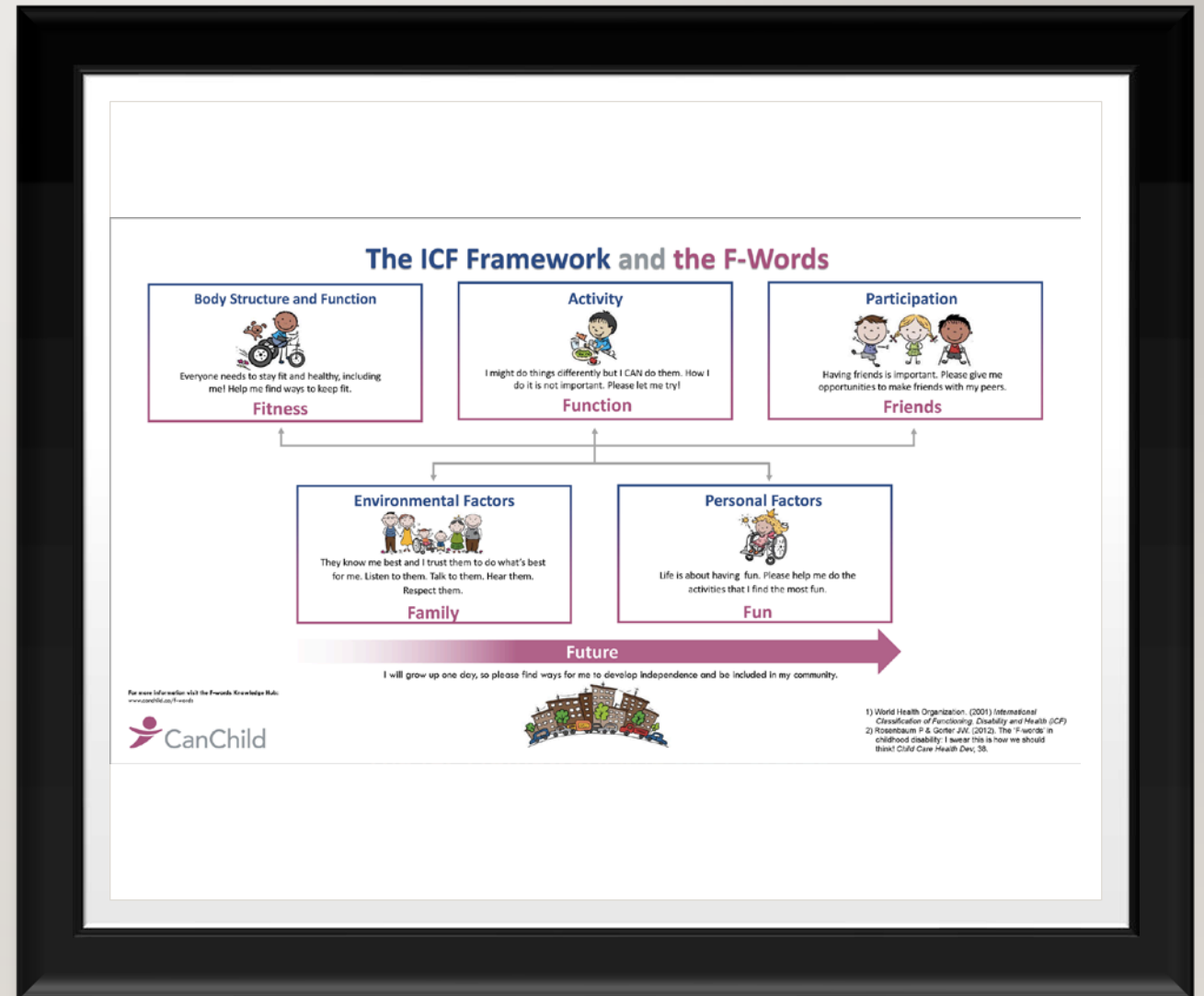
- Graduate of Azusa Pacific University Physical Therapy Program
- Graduate of University of Oklahoma-Health Science Center
- Practicing for 13 years in pediatric outpatient, early intervention and school based-settings.
- Volunteer with Global Health Outreach and Medical Education International since 2012

LEARNING OBJECTIVES

- 1. Identify stages of gross motor development
- 2. Identify common motor impairments in three of the most common developmental disabilities: Down syndrome, Cerebral Palsy, Autism
- 3. Identify low tech exercises and activities to address common impairments
- 4. Discuss tips and tools for educating and supporting parents

FOCUS OF PHYSICAL THERAPY

- Help child gain new skills or relearn old skills in order to help them move.
- Primary focus is gross motor development
 - Gross motor development involves use of large muscle groups
 - Gross motor is the basis for fine motor development
- Work to address the needs of the whole child



TYPICAL
Physical
DEVELOPMENT*

BY **3**
MONTHS

While lying on their tummy...

- Pushes up on arms
- Lifts and holds head up



SIGNS TO WATCH FOR IN
Physical
DEVELOPMENT*

BY **3**
MONTHS

- Difficulty lifting head
- Stiff legs with little or no movement



- Pushes back with head
- Keeps hands fisted and lacks arm movement



TYPICAL
Physical
DEVELOPMENT*

BY **6**
MONTHS

- Uses hands to support self while sitting
- Rolls from back to tummy and tummy to back
- While standing with support, accepts entire weight with legs



SIGNS TO WATCH FOR IN
Physical
DEVELOPMENT*

BY **6**
MONTHS

- Rounded back
- Unable to lift head up
- Poor head control
- Difficult to bring arms forward to reach out
- Arches back and stiffens legs
- Arms held back
- Stiff legs



GROSS MOTOR MILESTONES

TYPICAL
Physical
DEVELOPMENT*

BY **9**
MONTHS

- Sits and reaches for toys without falling
- Moves from tummy or back into sitting
- Starts to move with alternate leg and arm movement e.g. creeping, crawling



SIGNS TO WATCH FOR IN
Physical
DEVELOPMENT*

BY **9**
MONTHS

- Uses one hand predominately
- Rounded back
- Poor use of arms in sitting
- Difficulty crawling
- Uses only one side of body to move
- Inability to straighten back
- Cannot take weight on legs



TYPICAL
Physical
DEVELOPMENT*

BY **12**
MONTHS

- Pulls to stand and cruises along furniture
- Stands alone and takes several independent steps



SIGNS TO WATCH FOR IN
Physical
DEVELOPMENT*

BY **12**
MONTHS

- Difficulty getting to stand because of stiff legs and pointed toes
- Only uses arms to pull up to standing
- Sits with weight to one side
- Strongly flexed or stiffly extended arms
- Needs to use hand to maintain sitting



GROSS MOTOR MILESTONES

TYPICAL
Physical
DEVELOPMENT*

BY **15**
MONTHS

- Walks independently and seldom falls
- Squats to pick up toy



SIGNS TO WATCH FOR IN
Physical
DEVELOPMENT*

BY **15**
MONTHS

- Unable to take steps independently
- Poor standing balance, falls frequently
- Walks on toes



GROSS MOTOR MILESTONES

DOWN SYNDROME

DOWN SYNDROME

- Incidence: 1:1000 live births worldwide
- Life span in developed countries is approximately 60 years.
- Types of Down Syndrome
 - Trisomy 21 (95%)- Triplicate of chromosome 21
 - Translocation (3%)- Part or whole chromosome attached to different chromosome
 - Mosaic (2%)- Some cells have triplicate copies

DS: GROSS MOTOR SKILL DEVELOPMENT

- Most children with DS follow the developmental pattern as other children

Motor Milestone	Range for Children with DS	Typical Range
Rolling	6-18 months	4-6 months
Sitting	6-22 months	5-9 months
Crawling	18-24 months	6-12 months
Stand without support	12-38 months	6-12 months
Walking	18- 38 months	9-18 months

DOWN SYNDROME

- Common Motor Impairments
 - Low muscle tone
 - Ligamentous laxity
 - **Decreased strength**
 - Joint hypermobility
 - C1/C2 atlantoaxial instability (10-30% of population)
 - **Decreased motor control and planning**
- Other impairments to be aware of
 - Cognitive deficits
 - Feeding difficulties
 - Hearing and Vision deficits
 - Language impairments

DOWN SYNDROME

- Late childhood challenges
 - Obesity
 - Degenerative joint disease
 - Diabetes
 - Cardiovascular health
 - Sleep apnea

DOWN SYNDROME AND PHYSICAL THERAPY

- Focus on
 - Minimize compensatory movement strategies
 - Improper movement strategies can lead to orthopedic and functional problems in the future
 - Generalizing skills
 - Balance, coordination, and postural control
 - Physical fitness



SITTING

SITTING

- Skills needed for sitting
 - Head control
 - Postural control
 - Trunk strength
 - Static/Dynamic balance
 - Symmetric weight bearing through hips



PREPARATION FOR SITTING



SUPPORTED SITTING



MORE SITTING ACTIVITIES



LEARNING TO SIT



STANDING/WALKING

STANDING

- Optimal standing
 - Narrow base of support
 - Upright trunk
 - Hips, knees, ankle aligned
 - Feet facing forward
 - Knees in slight flexion



PREPARATION FOR STANDING



STANDING ACTIVITIES



WALKING ACTIVITIES- WEIGHT SHIFTING



WALKING



WALKING ACTIVITIES


- 2HHA
- Pelvis walking
- Walker/push toys
- Where you place your hands is important (higher to low support)

AUTISM


AUTISM

- Prevalence: 1:160 children
- Cognition and abilities vary
- Communication is most often primary focus

GROSS MOTOR SKILLS AND AUTISM

- 
- Early descriptors categorized children with autism as clumsy
 - Increase in the number of studies that explore autism and gross motor abilities

- Motor delays or deficits are not included in DSM-V diagnostic criteria
- Gross motor skill deficits become apparent between 14-24 months of age
- There may be early motor descriptors that can detect signs of autism

- 
- Gross motor skills are often overlooked
 - 80% of children with ASD have some type of movement impairment

COMMON GROSS MOTOR IMPAIRMENTS

- Gait
- Postural Control
- Pretend play and Functional play skills
- Motor planning, initiation and coordination
- Joint attention activities (i.e. catching, throwing)
- Some kids with ASD have joint hypermobility and low muscle tone

BALL SKILLS

CATCHING



CATCHING



CATCHING



CATCHING



JUMPING



JUMPING

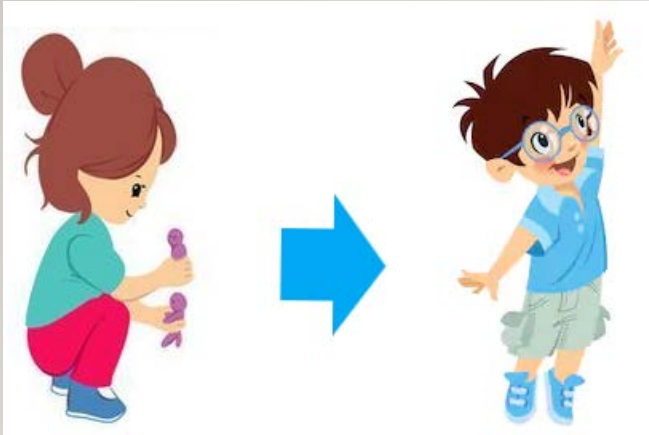
- Jumping requires
 - Cognitive understanding
 - Equal leg strength
 - Balance
 - Coordination
 - Motor planning and control

JUMPING

- Jumping Milestones
 - Jumping forward with one foot leading – 18- 24 months
 - Jumping in place (up) 2 feet – 22-24 months
 - Jumping off small step – 24 -30 months
 - Jumping over small obstacles – 30-36 months
 - Jumping forward – 36 months

JUMPING

- Start with tasks that require bilateral flexion of the knee



Squatting activities:

- Squat to stand
- Squat to tip toes



Bouncing activities:

- Therapy ball
- Couch cushions
- Trampoline

JUMPING

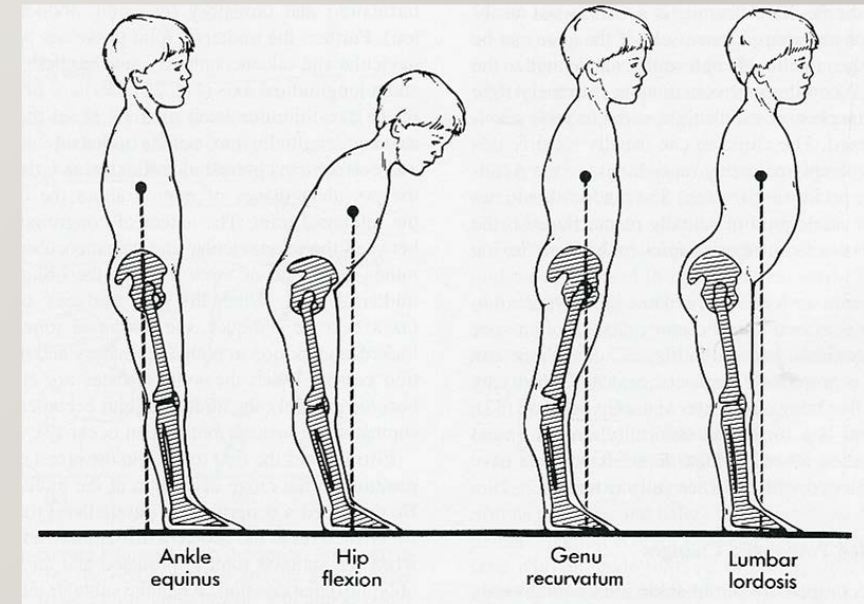
- Proceed to jumping on the floor
 - Support under the trunk
 - 2 hand held support
 - 1 hand held support



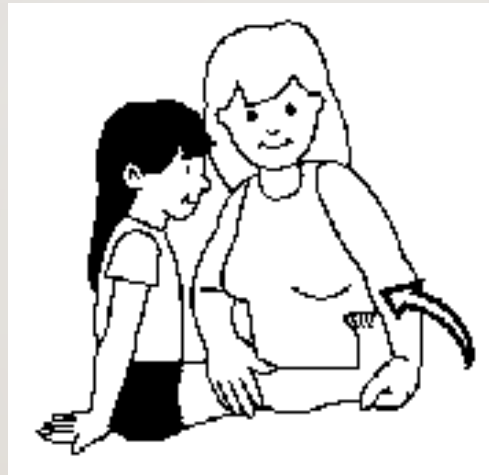
STRETCHING FOR TIP TOE WALKERS

MUSCLES TO STRETCH AND MUSCLES TO STRENGTHEN

- Stretch
 - Gastrocnemius (calf)
 - Soleus
 - Achilles tendon
 - Hamstrings
 - Trunk extension/flexion
- Anterior tibialis
- Glutes
- Core



CALF STRETCHES



Knee flexion in standing or kneeling can help stretch the soleus muscle. Knee flexion in supine can help improve joint mobility at the ankle

HAMSTRING



NOT stretching
hamstrings

STRENGTHENING- ANTERIOR TIB



Sit to stand on an incline



Lifting objects with the foot



Duck walk

MORE STRENGTHENING



Walking on an incline,
elevated or uneven surfaces

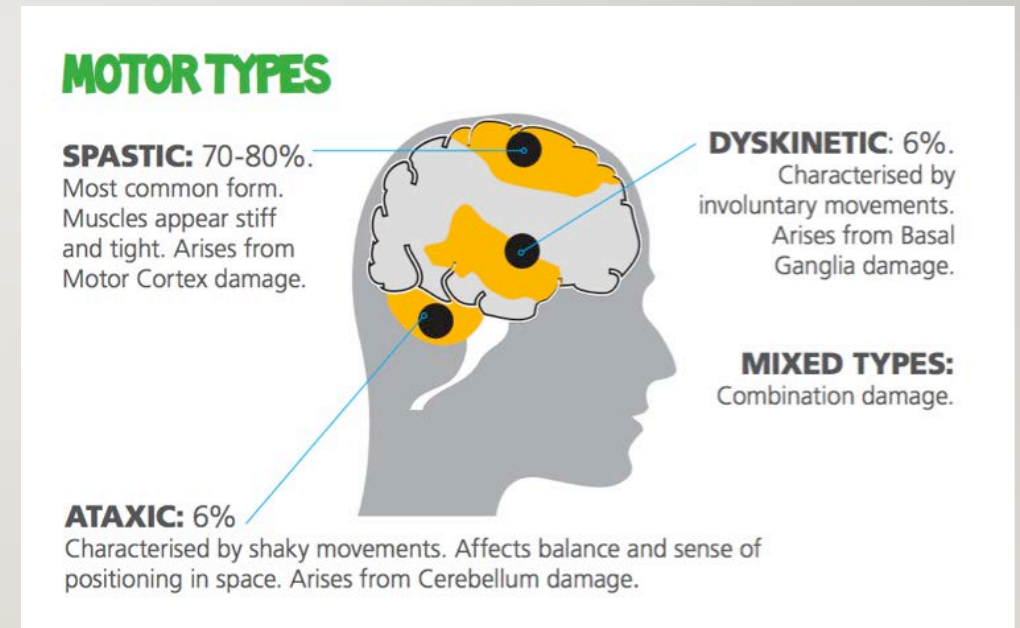


Yoga poses

CEREBRAL PALSY

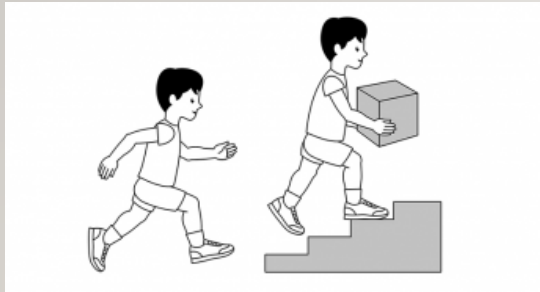
CEREBRAL PALSY

- Most common motor disability
- Types of Cerebral Palsy
 - Spastic (Quad, Di, Hemi)
 - Ataxic
 - Dyskinetic
 - Mixed
- Co-occurring conditions
 - Autism
 - Intellectual impairment
 - Seizures

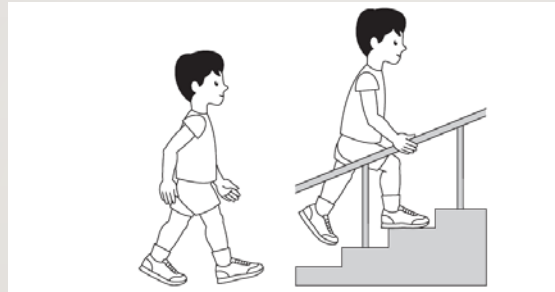


<https://cerebralpalsyScotland.org.uk/get-information/types-of-cerebral-palsy/>

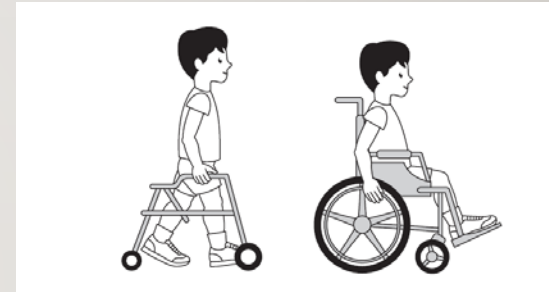
GROSS MOTOR CLASSIFICATION SYSTEM (GMFCS)



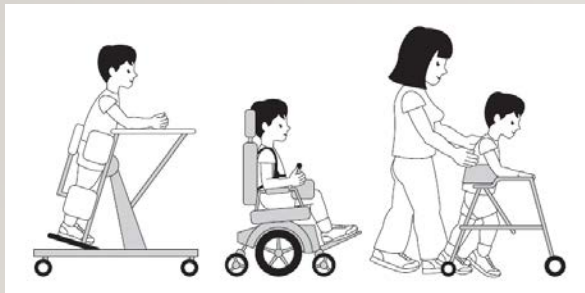
Level I:



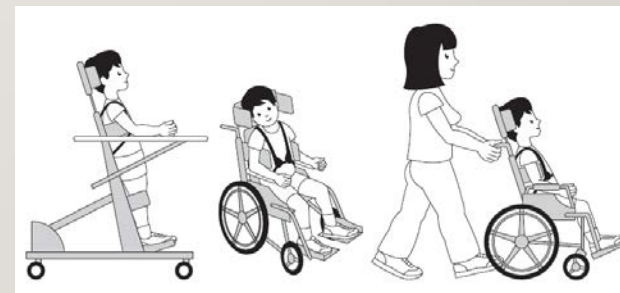
Level II:



Level III:

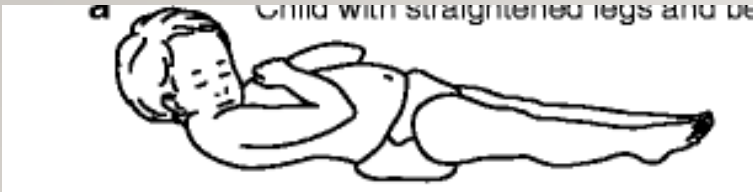


Level IV:

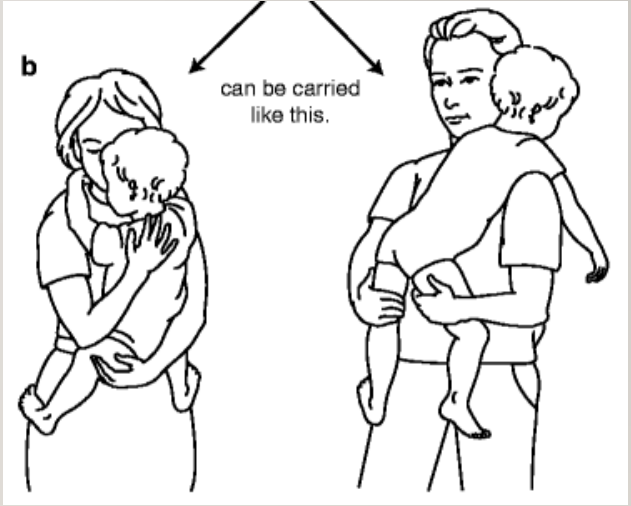


Level V:

HANDLING AND POSITIONING FOR LEVEL IV-V

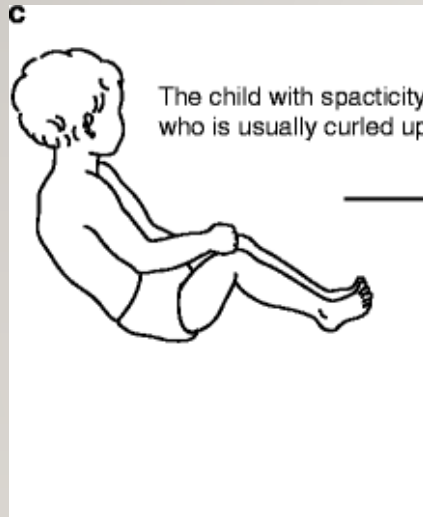


Child pushes into extension



Carry in positions of flexion

HANDLING AND POSITIONING FOR LEVELS IV-V



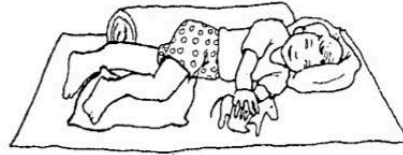
Child prefers positions of flexion

Carry in positions of extension

HANDLING AND POSITIONING FOR LEVEL IV-V



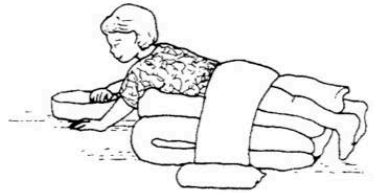
Hips too straight.
She pushes back and
slides out of the chair.



- Maintain skeletal alignment
- Prevent pressure sores and contractures
- Promote mobility
- Facilitating bone growth, digestion, respiratory cardiovascular function



Hips too bent.
She falls forward.



HANDLING AND POSITIONING FOR LEVEL IV-V

- Position should be changed every 30 mins-1 hr throughout the day

IMPORTANCE OF HANDLING, STRETCHING, POSITIONING



PARENT EDUCATION

- Child is not lazy
- Progress takes time
- Practice makes “better”
- Build activities into a routine

TIPS FOR WORKING WITH CHILDREN

- Follow the child's lead
- Know when to quit
- Start with visual and facilitated demonstration
- Find the motivation (interactive and purposeful)
- Skill development vs Compensatory strategies
- Have fun!



RESOURCES

- <https://www.canchild.ca/en/resources/42-gmfcs-e-r>
- https://www.physio-pedia.com/images/7/79/Hambisela_Module_3.pdf
- <https://www.dinf.ne.jp/doc/english/global/david/dwe002/dwe00201.html>



Monique Charbonnet, PT, DPT, DSc

mcharbonnetdpt@gmail.com

REFERENCES

Chawarska, K, Paul, R, Klin, A, Hannigen, S, Dichtel, L and Volkmar, F. (2007). Parental recognition of developmental problems in toddlers with autism spectrum disorder. *Journal of Autism and Developmental Disorders*, 37, 62-72

Fournier, K., Hass, C, Naik, S, Lodha, N, Cauraugh, J. (2010). Motor coordination in autism spectrum: a synthesis and meta-analysis. *Journal of Autism Developmental Disorder*, 40, 13.

<https://www.un.org/en/observances/down-syndrome-day> (9/6/21)

<https://www.cdc.gov/ncbddd/birthdefects/downsyndrome.html>

<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2532127/>

<https://cparf.org/what-is-cerebral-palsy/facts-about-cerebral-palsy/>

<https://pathways.org/topics-of-development/motor-skills/>

<https://cerebralsyscotland.org.uk/get-information/types-of-cerebral-palsy/>

REFERENCES

<https://blog.dinopt.com/sitting-101-tips-and-tricks/>

Jeste, S. (2011). The neurology of autism spectrum disorders. *Current Opinion in Neurology*, 24 132-139.

Palisano R, Rosenbaum P, Walter S, Russell D, Wood E, Galuppi B. Development and reliability of a system to classify gross motor function in children with cerebral palsy. *Dev Med Child Neurol*. 1997 Apr;39(4):214-23. doi: 10.1111/j.1469-8749.1997.tb07414.x. PMID: 9183258.

Werner, D. (2018). *Disabled Village*. Hesperian Health Guides.

<https://www.dinf.ne.jp/doc/english/global/david/dwe002/dwe00201.html>

Winders, P. (2001). The goal and opportunity of physical therapy for children with down syndrome. *Down Syndrome Quarterly*, 6(2): 1-5. Retrieved from <http://www.ds-health.com/physther.htm>