Physical Activity:

A Prescription for Health

Sara Liegel, MD

UW Health
American Family Children's Hospital

Disclosures

- I disclose the following relationships with commercial interests: None
- I do not intend to reference unlabeled or unapproved uses of drugs or products in my presentation.

UW Health
American Family Children's Hospital

Objectives

- Discuss the health benefits of physical activity
- Provide guidelines for activity
- Explore activities for all levels of ability
- Identify common barriers to activity

UW Health
American Family Children's Hospital

Individuals with CP have:

- Reduced cardiorespiratory endurance
  - Use 2-3 times more energy than peers without disability = tire more easily
- Muscular weakness
- Increased risk of hypertension, high cholesterol, obesity
- Loss of independence earlier than age-matched peers

UW Health
American Family Children's Hospital

Health benefits of physical activity:

- ↓ Risk of developing functional limitations
- ↓ Cardiovascular disease
- ↓ Pain
- ↓ Obesity

- ↑ Bone health
- ↑ Participation
- ↑ Self-worth
- ↑ Functional competence
- ↑ Endurance, agility, strength

Unger et al 2006
Chad et al 1999
Darrah et al. 1999

UW Health
American Family Children's Hospital

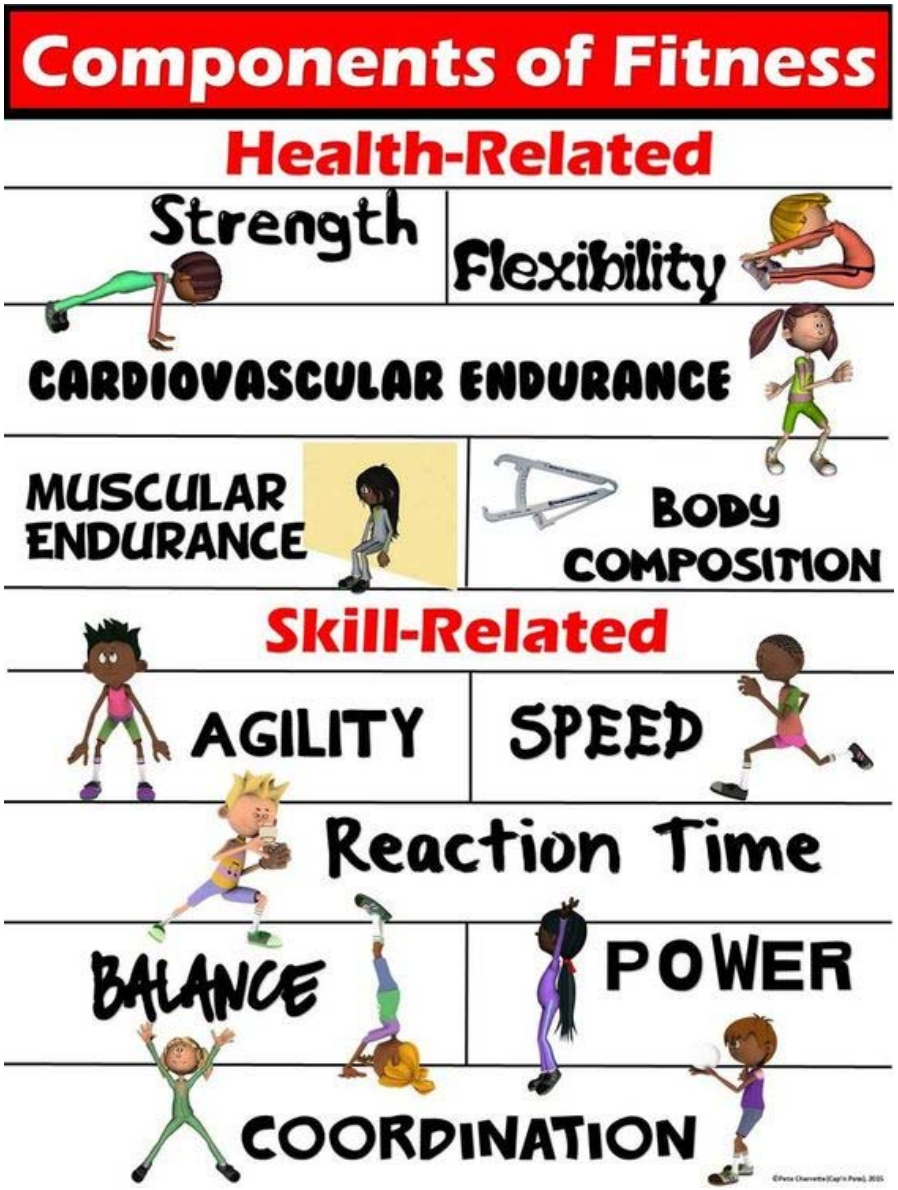
Self-Worth

- Children with CP asked to list aspects they didn't like:
  - Arms, legs, surgical scars, excess adipose tissue

- Participated in exercise intervention then asked again:
  - Listed behaviors rather than appearance (nail biting, unhealthy beverages, smoking)

Unger et al 2006

UW Health
American Family Children's Hospital



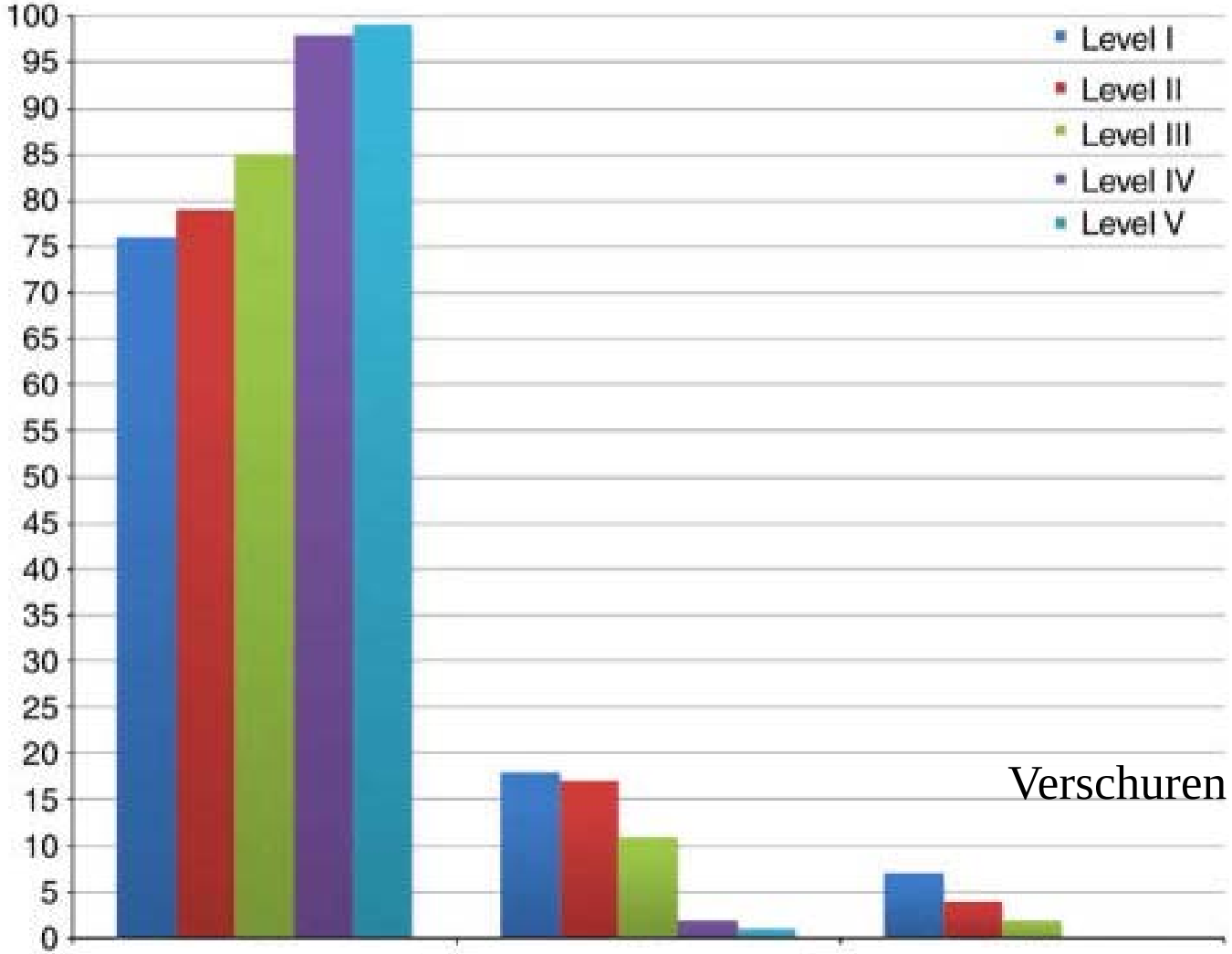
UW Health
American Family Children's Hospital

Strengthening

- Children with CP are weak, can get stronger with exercise
  - Leads to improved function
    - Damiano et al 1998
- Strength influences gait more than spasticity
    - Ross and Engsberd 2007

UW Health
American Family Children's Hospital

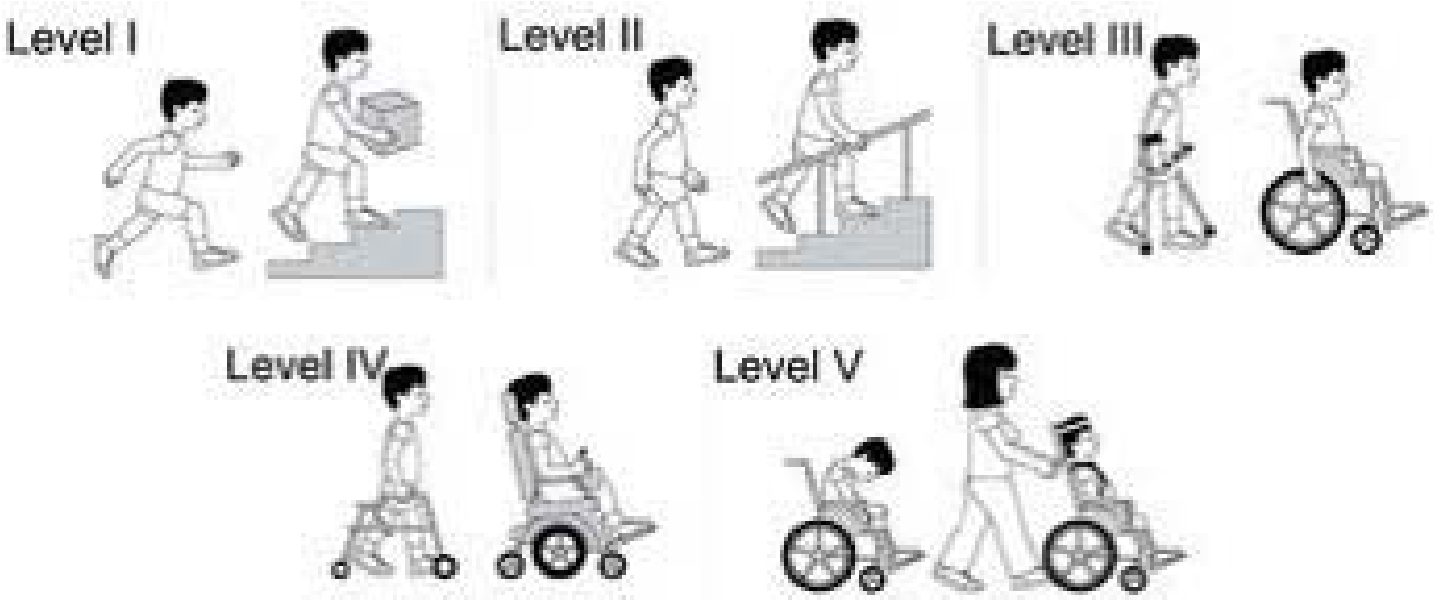
- **Percentage of time spent in sedentary, light, and moderate to vigorous physical activities across all GMFCS levels**



Verschuren et al 2016

Motor Function in Cerebral Palsy

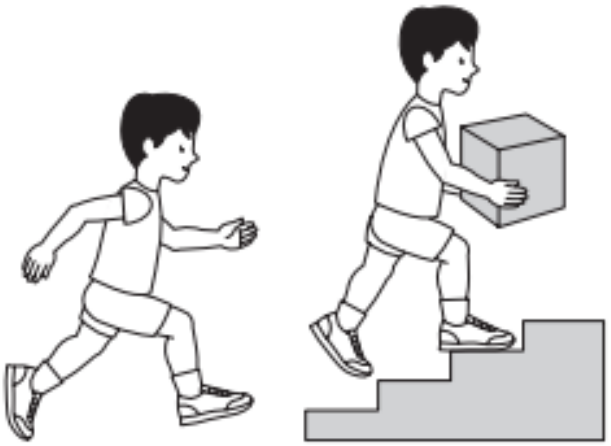
- Gross Motor Function Classification System (GMFCS)



https://canchild.ca/en/resources/42-gross-motor-function-classification-system-expanded-revised-gmfcs-e-r

UW Health
American Family Children's Hospital

LEVEL I - Walks without Limitations

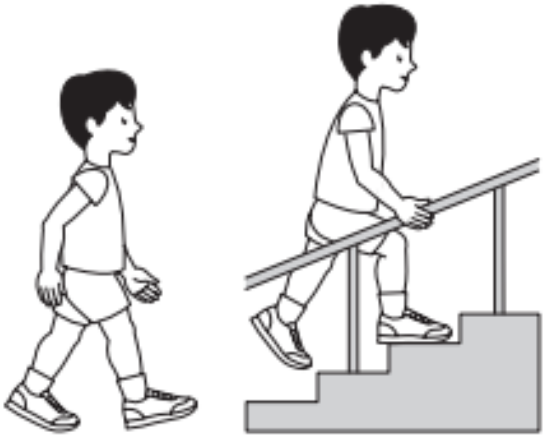


GMFCS Level I

Children walk at home, school, outdoors and in the community. They can climb stairs without the use of a railing. Children perform gross motor skills such as running and jumping, but speed, balance and coordination are limited.

UW Health
American Family Children's Hospital

LEVEL II - Walks with Limitations

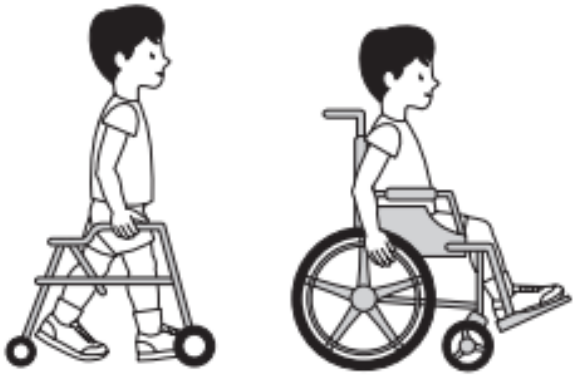


GMFCS Level II

Children walk in most settings and climb stairs holding onto a railing. They may experience difficulty walking long distances and balancing on uneven terrain, inclines, in crowded areas or confined spaces. Children may walk with physical assistance, a hand-held mobility device or used wheeled mobility over long distances. Children have only minimal ability to perform gross motor skills such as running and jumping.

UW Health
American Family Children's Hospital

LEVEL III - Walks Using a Hand-Held Mobility Device

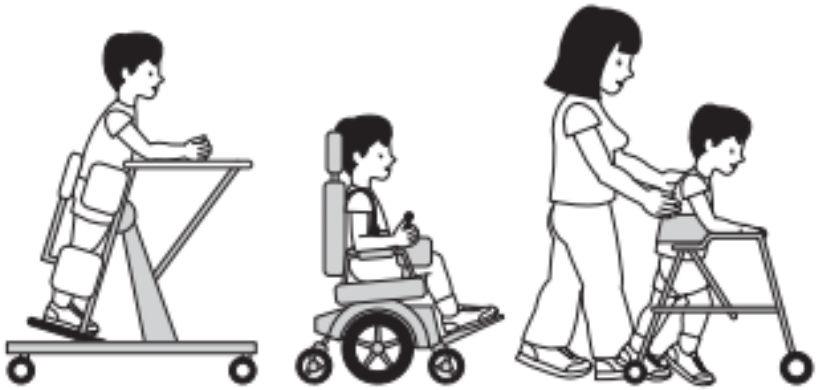


GMFCS Level III

Children walk using a hand-held mobility device in most indoor settings. They may climb stairs holding onto a railing with supervision or assistance. Children use wheeled mobility when traveling long distances and may self-propel for shorter distances.

UW Health
American Family Children's Hospital

LEVEL IV - Self-Mobility with Limitations; May Use Powered Mobility

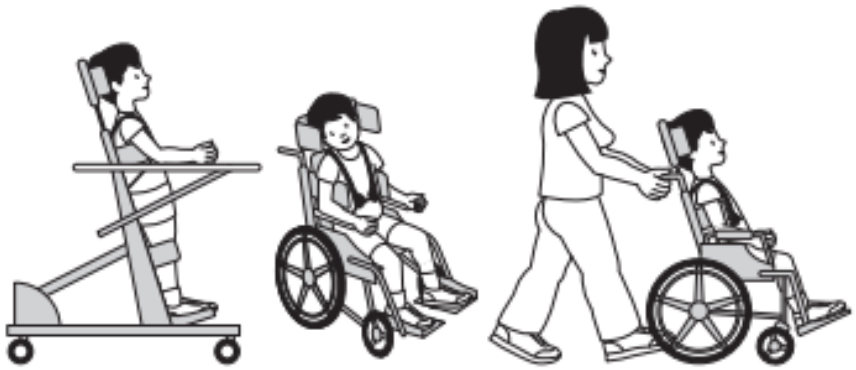


GMFCS Level IV

Children use methods of mobility that require physical assistance or powered mobility in most settings. They may walk for short distances at home with physical assistance or use powered mobility or a body support walker when positioned. At school, outdoors and in the community children are transported in a manual wheelchair or use powered mobility.

UW Health
American Family Children's Hospital

LEVEL V - Transported in a Manual Wheelchair



GMFCS Level V

Children are transported in a manual wheelchair in all settings. Children are limited in their ability to maintain antigravity head and trunk postures and control leg and arm movements.

UW Health
American Family Children's Hospital

- Children with CP often get physical activity through formal PT sessions or organized sports events for children with disabilities
- Activity can eventually replace the formal therapies when transitioning to adulthood
- Need to have a healthy lifestyle – limit sedentary activity, increase general activity

Verschuren et al 2016

UW Health
American Family Children's Hospital

Exercise recommendations

- Cardiorespiratory exercise
  - Start 1-2 sessions per week
  - >60% of peak heart rate
  - 20 minutes per session for 8-16 weeks
  - Use major muscle groups in continuous and rhythmic nature
- Example: swimming, cycling, walk/run, propelling wheelchair, arm cycling, stairs

Verschuren et al 2016

UW Health
American Family Children's Hospital

Exercise recommendations

- Resistance Exercise
  - 2-4 time per week
  - 1-3 sets of 6-15 repetitions
  - 50%-85% repetition maximum
  - 12-16 weeks
- Start with single joint movement
  - Knee extension, machines
- Later include multi-joint activity
  - Step-ups, sit-to-stand, squatting

Verschuren et al 2016

UW Health
American Family Children's Hospital

General Activity Guidelines

- Daily activity
  - 5+ days per week
  - 60 minutes
  - Moderate-Vigorous activity
  - Vary the activities

Verschuren et al 2016

UW Health
American Family Children's Hospital

General Activity Guidelines

- Sedentary time
  - Less than 2 hours per day (outside of school)
  - May be difficult to achieve in GMFCS IV and V
    - Alternative: break up sitting for 2 minutes every 30-60 minutes

UW Health
American Family Children's Hospital

Verschuren et al 2016

Activities

- Cycling/ Arm Cycling
- Walking, Jogging
- Wheelchair propulsion
- Stair climbing

Activities

- Dance
- Yoga or Tai Chi

UW Health
American Family Children's Hospital

Activities

- Swimming
  - Warm water has relaxing effect, can help decrease muscle tone
  - Potential exercises
    - Length swimming
    - Shallow water tuck jumps
    - Running/walking
    - Stride jumps, jumping jacks
    - Wall and sit kicking

UW Health
American Family Children's Hospital

Activities

- Active standing/ use of stander with arm activity
- Chair aerobics

UW Health
American Family Children's Hospital

Prescription for Health

- Baseline activities help build a lifestyle in which physical activity is the social norm and where excessive sedentary lifestyles are discouraged

UW Health
American Family Children's Hospital

Prescription for Health

- Improved muscle strength reverses quickly with cessation of exercise
- Harder to build than to maintain strength
- Even small activity increase can lead to profound health gains

ACSM 2009
Verschuren et al 2016

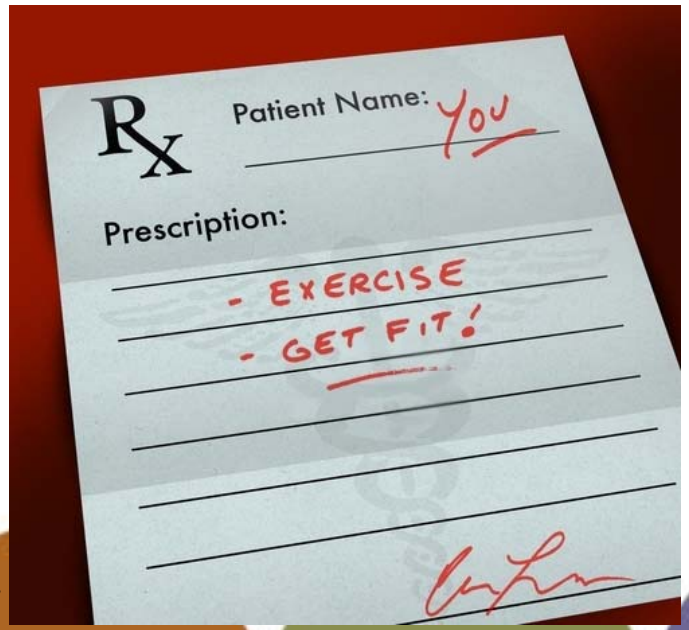
UW Health
American Family Children's Hospital

Prescription for Health

Increased baseline activity

→ Increased energy expenditure

→ Healthy body weight



Verschuren et al 2016

UW Health
American Family Children's Hospital

- Physical activity should start in childhood
- Level of physical activity in adolescence stays stable into adulthood

UW Health
American Family Children's Hospital

Barriers to activity

- Time
- Transportation
- Equipment
- Cost
- Support/Aides
- Available opportunities
- Pain
- Level of ability, vision
- Acute injuries, health
- Fear of Injury
- Weather
- Motivation

UW Health
American Family Children's Hospital

Pain during activity

- Muscle fatigue
  - Start slow, build up activity
- Poor-fitting equipment
  - Borrowed, old, new
  - Height, growth
- Excessive stretch
  - Watch contractures or dislocated hips

UW Health
American Family Children's Hospital

Pain during activity

- Blisters, pressure
  - Check and adjust equipment
  - Padding
  - Position
- Overuse injury
  - Adapt the activity, adjust equipment
- Acute injuries/Fractures
  - Medical evaluation
  - Change activity while recovering

"My Arm Hurts"

UW Health
American Family Children's Hospital

Activity should be:

- Enjoyable
- Developmentally appropriate
- Include a variety of activities

UW Health
American Family Children's Hospital

Staying motivated

- Short-term goals
- Long-term achievements
- Track progress on a chart
- Pick enjoyable activities
- Include family and friends
- Partner with others/join a group

- If you fall off the wagon, just start again
  - short lapses happen

UW Health
American Family Children's Hospital

Is physical activity right for me?

- YES!

UW Health
American Family Children's Hospital

References

- Verschuren, O., Peterson, M. D., Balemans, A. C. J. and Hurvitz, E. A. (2016), Exercise and physical activity recommendations for people with cerebral palsy. Dev Med Child Neurol, 58: 798–808.
- Darrah, J., Wessel, J., Nearingburg, P. and O'Connor, M., 1999. Evaluation of a community fitness program for adolescents with cerebral palsy. *Pediatric Physical Therapy*. , vol. 11, no. 1, pp. 18-23.
- The United Cerebral Palsy Research Foundation and Educational Foundation. 1999. Exercise principles and guidelines for persons with cerebral palsy and neuromuscular disorders. Available from: http://www.ucpaindy.org/wp-content/uploads/2010/03/Exercise-Principles-and-Guidelines-for-Persons-with-Cerebral-Palsy-and-Neuromuscular-Disorders.pdf
- Chad, K.E., Bailey, D.A., McKay, H.A., Zello, G.A. and Snyder, R.E., 1999. The effect of a weight-bearing physical activity program on bone mineral content and estimated volumetric density in children with spastic cerebral palsy. *The Journal of Pediatrics*. , vol. 135, no. 1, pp. 115-117.
- Unger, M., Faure, M. and Frieg, A., 2006. Strength training in adolescent learners with cerebral palsy: a randomized controlled trial. Clinical Rehabilitation. Jun, vol. 20, no. 6, pp. 469-477.
- Palisano R., Rosenbaum P., Bartlett D., Livingston M. Canchild Centre for Childhood Disability Research, Mcmaster University. Institute for Applied Health Sciences McMaster University; Hamilton, ON, Canada: 2007. Gmfcs-e&r. Gross motor function classification system expanded and revised; p. b15.
- Damiano DL, Abel MF. Functional outcomes of strength training in spastic cerebral palsy. Arch Phys Med Rehabil 1998; 79: 119–25.
- Ross SA, Engsberg JR: Relationships between spasticity, strength, gait, and the GMFM-66 in persons with spastic diplegia cerebral palsy. Arch Phys Med Rehabil, 2007, 88: 1114–1120.
- American College of Sports Medicine position stand. Progression models in resistance training for healthy adults. Med Sci Sports Exerc. 2009;41:687–708.

UW Health
American Family Children's Hospital