Distribution of Motor Impairment: Influence on Habitual Walking Activity in Children with Cerebral Palsy—A Pilot Study

Kristie Bjornson 1,2, Alyssa Fiss3, Cheryl Kerfeld3, Erin Wentz4, Nancy Cicirello2

1University of Washington, Seattle, WA, 2Seattle Children’s Research Institute, Seattle, WA, 3Mercer University, Atlanta, GA, 4University of Michigan, Ann Arbor, MI

BACKGROUND & OBJECTIVES

- Limitations in daily walking activity is a dominating clinical problem for ambulatory children with cerebral palsy (CP).
- A broad spectrum of rehabilitation strategies focus on optimizing habitual walking levels and intensity in daily life.
- Habitual walking activity in children with CP decreases as functional impairment increases (Bjornson, 2014), as reported by Gross Motor Function Classification System (GMFCS) levels.
- Little is known about how motor distribution influences habitual walking activity.
- This pilot study aims to examine accelerometry-based habitual walking activity in children with CP by distribution of motor impairment and functional level.

STUDY DESIGN

Prospective, observational, cross sectional, cohort study

SAMPLE

- N = 31 children with cerebral palsy OR delays in gross motor development
- Gross Motor Function Classification System levels
  - I=18
  - II=9
  - III=4
- Average Age = 7.2 years
- 16 (52%) female
- 21 (68%) demonstrated unilateral motor distribution
- Participants were recruited through the Activity Participation substudy of the multisite, longitudinal ON TRACK Study

METHODS

- Habitual walking activity was captured by participants wearing a biaxial StepWatch (SW) accelerometer on their left ankle all their waking hours for a goal of 7+ days (Modus Health, 2015).
- Raw SW data were processed with proprietary software (average of 5 days, 4 week days, 1 weekend day) for the outcomes of average strides/day, percent time walking during waking hours, number of strides greater than 30 strides/min, and peak activity index (Bjornson, 2010).
- GMFCS levels and motor distribution were classified by research therapists during home study visits.
- Walking activity by motor distribution and GMFCS levels were examined with Wilcoxon Sign Rank and Kruskal-Wallis tests.

RESULTS

- Compared with bilateral distribution, participants with unilateral motor impairment exhibited higher:
  - average strides/day (5338 [1377] vs. 3115 [1359], p < .001)
  - number of strides > 30 stride/min (2282 [810] vs. 1000 [744], p < .001)
  - peak activity index (45.6 [5.2] vs. 35.5 [12])
- There was no difference in percent time walking by motor distribution (p = 0.15).
- Percent time walking was greater for children in GMFCS Levels I compared to Level III and level II compared to level III (p < 0.02).
- No significant differences were documented by GMFCS levels for the remaining SW variables (p = 0.17 - 0.24).

CONCLUSIONS

- This is the first documentation of habitual walking activity by distribution of impairment in ambulatory elementary school-aged children with CP.
- Unilateral motor distribution appears to be associated with higher levels of walking activity and intensity.
- Walking activity by GMFCS results were not consistent with published information (Bjornson, 2014), which may be due to small sample size of lower GMFCS levels.
- Replication with a larger sample and comparison of unilateral distribution to typically developing children is warranted.

CLINICAL RELEVANCE

- Children with hemiplegia appear to have higher strides/day and spend more time at higher stride rates than children with diplegia.
- Interventions/research to optimize community walking activity should be informed by this information relative community walking goals/outcomes should be informed by this information.

REFERENCES


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On Track https://canchild.ca/en/research-in-practice/current-studies/on-track

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