

# Measuring Daily Activity of Children with Cerebral Palsy Using Accelerometry

Jan Willem Gorter, Stephen Noorduyn, Brian Timmons (on behalf of the stay-FIT study group\*)

REB# 09-169

## BACKGROUND:

The study of exercise training in adolescents with cerebral palsy (CP) has undergone significant development since 2006. Of special interest is the translation of a rehabilitation exercise program into daily activity and participation in an adolescent with CP. This poster details current research addressing the measurement of daily activity of adolescents with CP.

### Introduction:

- There is a need to measure daily physical activity in the natural environment of adolescents with CP.
- This study addresses the feasibility and interpretation of the use of the Actigraph® accelerometer in adolescents with CP.



### Participants

- 23 adolescents (17M, 6F, mean age: 13.5 years) have been analyzed.
- GMFCS Levels I (n=9), II (n=5), III (n=5), IV (n=4) with a diagnosis of CP



### Methods

- The accelerometer worn for 7 days (range: 5-7 days)
- Wrist and waist accelerometry data were collected and correlated to a daily log kept by the adolescents.

### Analysis

- Data analyzed by one investigator (SN) following the guidelines for general accelerometer use.
- Activity intensity was examined using the cut-points developed by Evenson, *et al.* (2008) which were recently validated for use in children and adolescents with CP by Clanchy, *et al.* (2011).

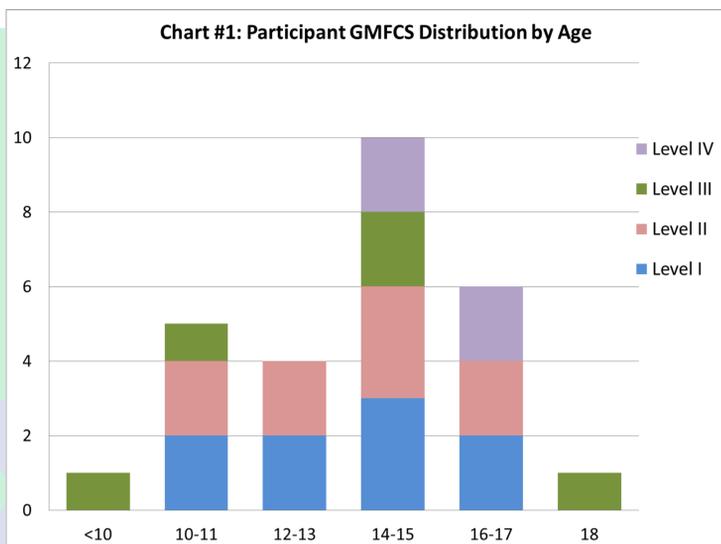


Chart #2: Example Activity Log Sheet

ACCELEROMETER DIARY: STUDY ID: \_\_\_\_\_

In addition to having your child wear the accelerometer for one week (except when sleeping, showering or swimming), we ask that you keep this log to monitor the times the accelerometer was put on or taken off. This will help us to explain times of minimal activity (such as when your child is sleeping, sitting down in class, or sitting down to eat). Please return this form along with your accelerometer at your next visit to the Children's Exercise and Nutrition Centre. Should you have any questions regarding what you should be recording, when you should or should not be wearing the accelerometer or any other questions or concerns, please do not hesitate to contact Dr. Brian Timmons at 905-521-2100, extension 77218. Thank you.

Event	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
Time the device was put on	8:30AM	8:30AM	9:30 AM	9:15AM	9:30AM	8:30AM	10:15AM
Times the device may have been taken off and put back on and reason(s) (e.g. nap, swimming, shower, etc)	2-6pm	12-1pm	10:30 - 12:30 NAP	2pm-4pm for swim	4-5:30 pm for swim	3pm-5pm for swim	3:00-5pm swim
Time the device was taken off before bed	7:20 pm	10 pm	6:00 pm	8:15 pm	9:15 pm	8:45 pm	9:05 pm

Children's Exercise & Nutrition Centre 2007 - Version 1

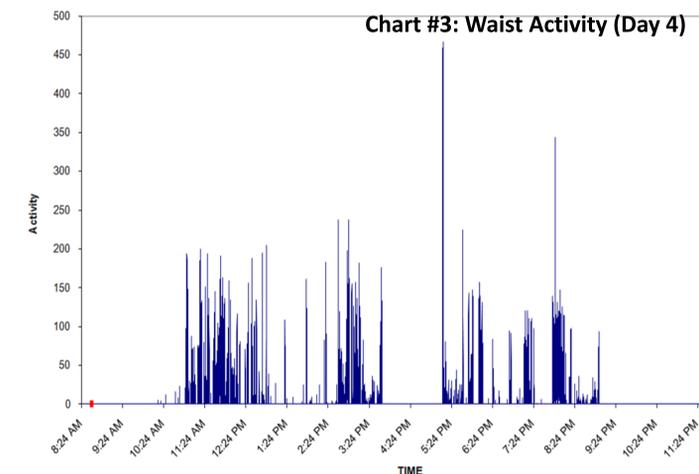
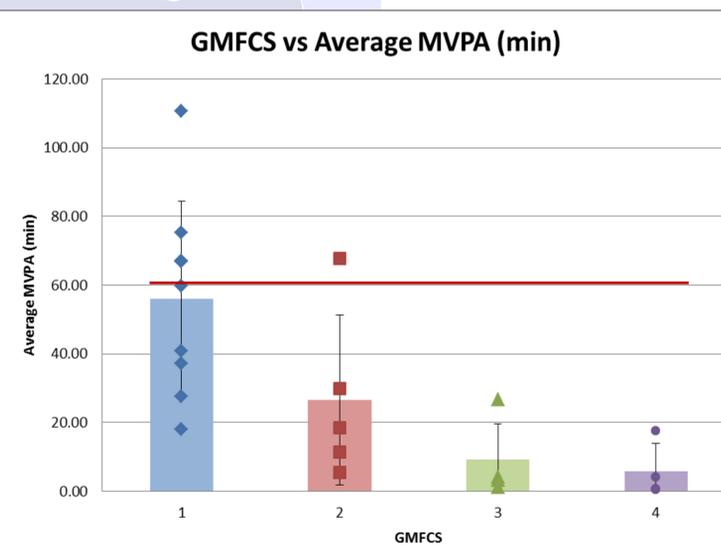


Table #1: Mean Activity Levels by GMFCS

		GMFCS				
		Level I	Level II	Level III	Level IV	Total
		(n = 9)	(n = 5)	(n = 5)	(n = 4)	(n = 23)
LPA	min/day	121.5 (38.7)	95.7 (43.7)	66.7 (33.5)	32.1 (18.2)*	88.4 (47.8)
	min/hr	10.2 (3.4)	8.2 (3.6)	5.6 (2.3)	1.6 (1.2)*†	7.3 (4.2)
MPA	min/day	33.0 (15.6)	16.4 (12.5)	6.0 (5.7)*	2.7 (3.7)*	18.2 (17.1)
	min/hr	2.7 (1.2)	1.4 (1.0)	0.5 (0.4)*	0.2 (0.3)*	1.5 (1.4)
MVPA	min/day	56.0 (28.4)	26.6 (24.7)	9.3 (10.4)*	5.8 (8.0)*	30.7 (30.3)
	min/hr	4.5 (2.1)	2.2 (2.1)	1.5 (1.5)*	0.5 (0.7)*	2.6 (2.4)

Data are presented as mean (SD). \* indicates significant difference from Level I, † indicates significant difference from Level II, p < 0.05.

## Results

- Waist activity is much lower than provincial health guidelines (60 minutes MVPA).
- Wrist accelerometry interesting comparison, but not yet validated.
- Participants showed a high acceptance rate of accelerometers; only concerns expressed regarding the visibility of the device.
- Log sheets show consistent attention to detail.

## CONCLUSION

- The Actigraph Accelerometer shows promise as a feasible and valid measurement of performance in daily activity of adolescents with CP.
- Preliminary analysis shows a significant depression in activity levels in adolescents with CP.
- The Stay-FIT pilot study is an important first step to developing an effective intervention study focusing on the translation of an exercise training program into the daily activity/ participation of children and adolescents with CP.

## Acknowledgements:

\*Stay-FIT Study Group Includes: J.W. Gorter, B. Timmons, M. MacDonald, P. Rosenbaum, B. Palisano and V. Wright.  
Special mention to Joyce Obeid for her assistance with the accelerometry data analysis and Barb Galuppi, research coordinator of the Stay-FIT study for contributions.