

Measuring Daily Activity of Children with Cerebral Palsy Using Accelerometry

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INTRODUCTION:

The study of exercise training in children & adolescents with cerebral palsy (CP) has undergone significant development since 2006. Of note is the interest in the translation of a rehabilitation exercise program into daily activity and participation in a child/ adolescent with CP. This poster updates the findings of Verschuren, *et al.*'s 2008 systematic review (performed in 2006) and examines the results for the possibility of a meta-analysis. It also details current research addressing the translation of an intervention into daily activity of adolescents with CP (stay-FIT pilot study).

Current research in exercise training:

Appendix #1: Population and Intervention													Appendix 3: Control and Outcome									
Study	Diagnosis	Population					n	Land/water	Intervention				Study	Control			Outcome					
		Age	Severity (GMFCS)	I	II	III			IV	V	Aerobic	Anaerobic		Strength	Other	Randomized	Blinded	CP?	Body function	Activity	Participation	Other
1. Liao (2007)	Spastic Diplegia	5-12	Y	Y			24	L				Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
2. Unnithan (2007)	Spastic Diplegia	14-18	Y	Y	Y		13	L	Y			Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
3. Dodd (2007)	Athetoid Quadrip	5-14		Y	Y		14	L	Y			Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
4. Provost (2007)	Hemiplegia, Assy	6-14	Y	Y			6	L	Y			Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
5. Verschuren (2008)	CP	7-12	Y	Y			86	L	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
6. McKee (2008)	Spastic CP	6-17	Y	Y	Y	Y	19	L	Y			Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
7. Williams (2008)	Dyskinetic quadri	11-15	Y	Y	Y	Y	11	L	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
8. Eek (2008)	Bilateral Spastic	10-15	Y	Y	Y		16	L	Y			Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
9. Unger (2008)	Diplegic, Hemip	13-18	Y	Y	Y		31	L	Y			Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
10. Engsborg (2008)	Spastic Diplegia	?	Y	Y	Y		12	L	Y			Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
11. Salem (2008)	CP	4-12	Y	Y	Y		10	L	Y			Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
12. Chermg (2008)	Spastic diplegia	3-7	Y	Y	Y		8	L	Y			Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
13. Compton (2008)	Spastic Diplegia	6-14	Y	Y	Y		15	L	Y			Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
14. Davis (2008)	CP	4-12	Y	Y	Y		99	L	Y			Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
15. Lee (2008)	Spastic Diplegic, I	4-12	Y	Y	Y		17	L	Y			Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
16. Gordon (2008)	Hemiplegic CP	3-16	Y	Y	Y		20	L	Y			Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
17. Getz (2007)	Spastic Diplegia	4-8	Y	Y	Y		22	L/W	Y			Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
18. Zaidat (2008)	Hemiplegia	8-12	Y	Y	Y		8	L/W	Y			Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
19. Chysagis (2008)	Spastic tetraplegi	13-20	Y	Y	Y		12	W	Y			Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
COUNT			13	14	12	2	1		9	3	8	6										
													12	6	12	17	11	2	7			

Stay-FIT Pilot Study

Introduction:

- Objective is to measure daily physical activity/ participation in children and adolescents with CP using the Actigraph Accelerometer (a promising outcome measure).
- Currently, these accelerometers have not been used in adolescents with CP.

Methods:

- 9 children and adolescents between the ages of 8-16 have been analyzed.
- All participants are within GMFCS Levels I-III, with a diagnosis of CP.
- Hip and waist accelerometry data collected and correlated to a daily log kept by the adolescents.



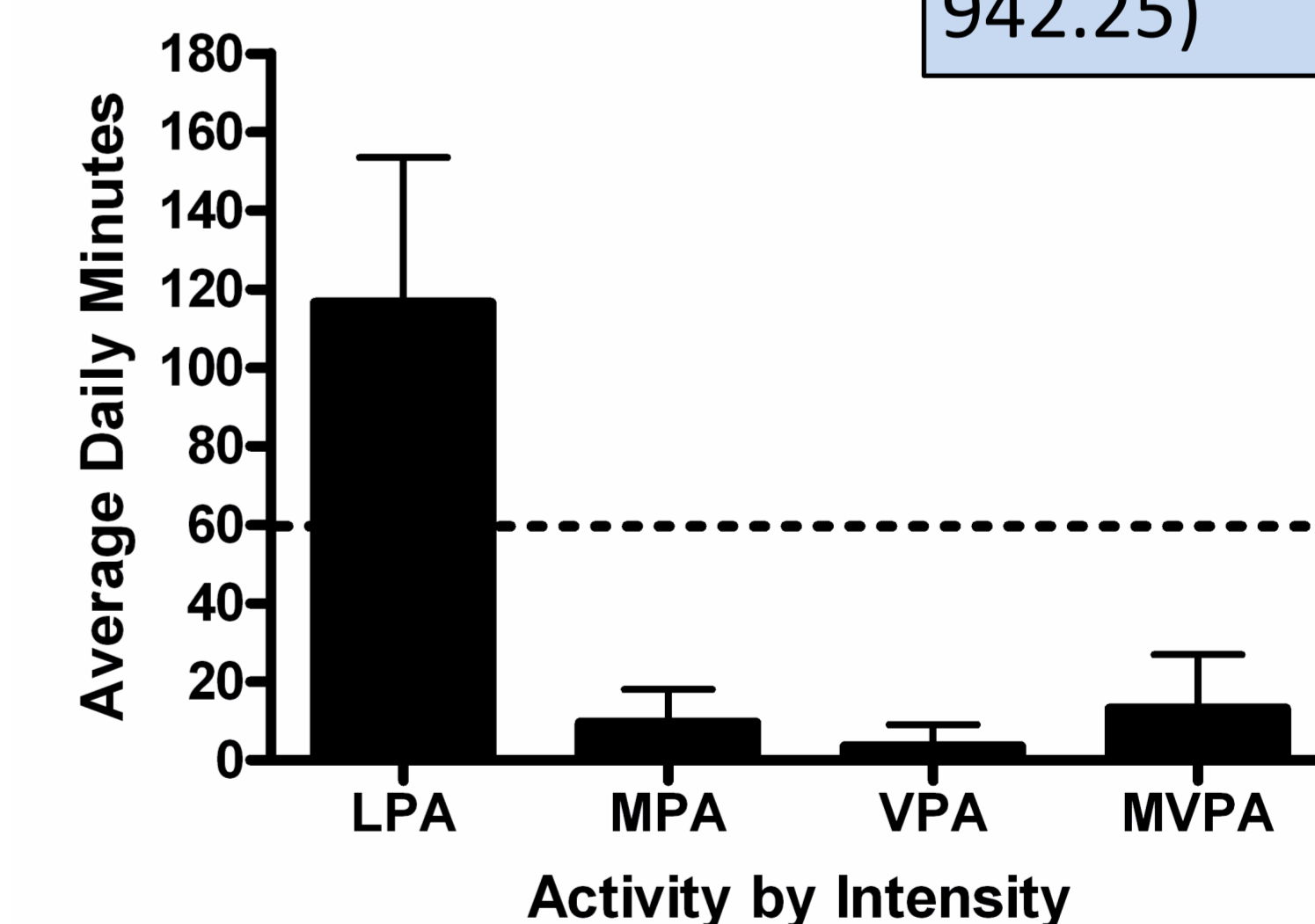
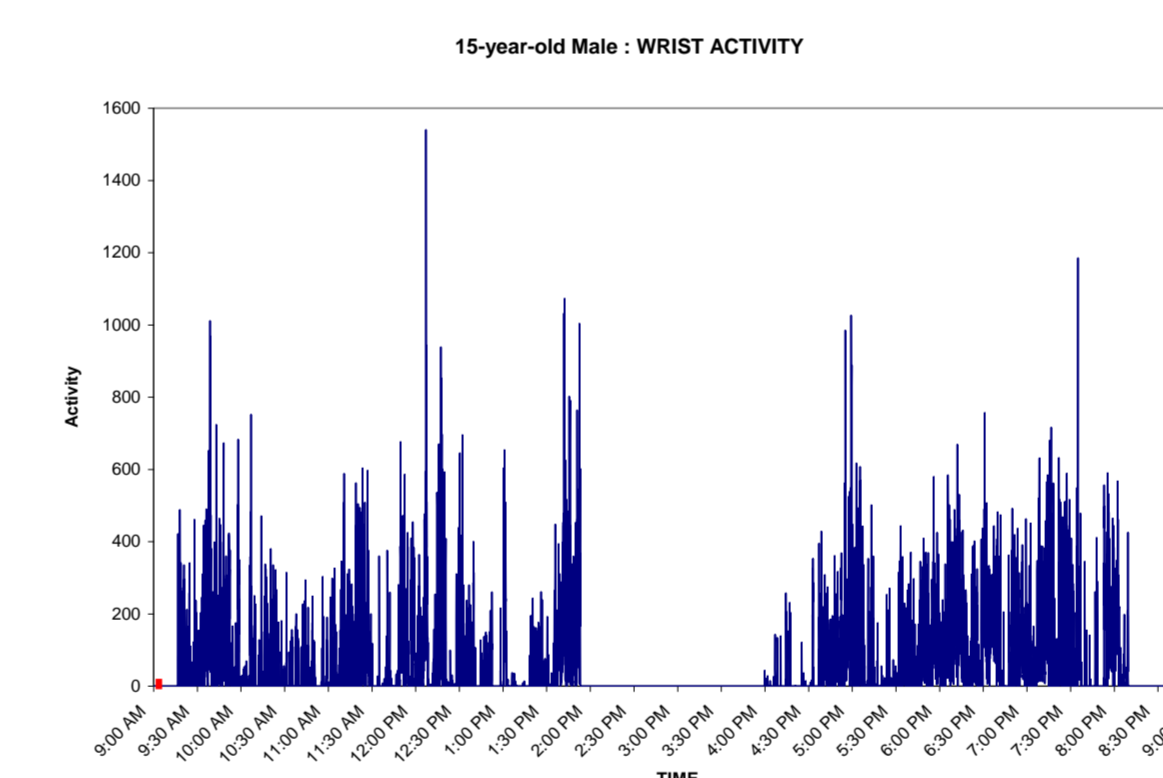
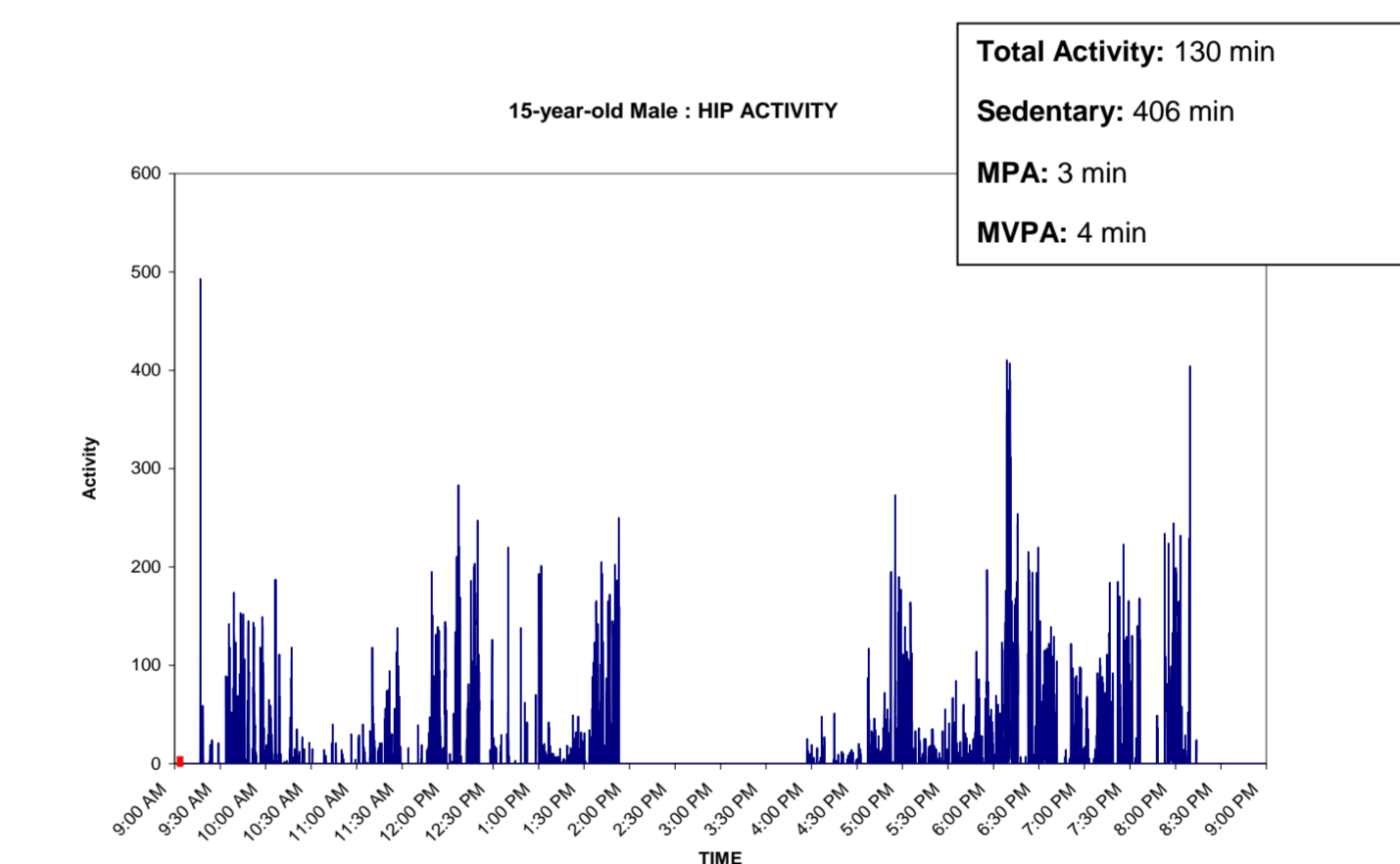
Participant Feedback:

- Few participants expressed concern with visibility of accelerometer.
- Most enjoyed the experience and welcomed the novel indicator of their current health status.

Results Overview:

- 6 Participants all male (age range: 8-15a)
- Accelerometer worn for 7 days (range: 5-7 days)
- Minimum wear time: 300 minutes/ 5 hours (range: 0-942.25)

NEED ONE MORE PICTURE HERE (ACCELEROMETRY LOG)



NOTE:

- **Population:**
 - Diagnosis biased to Spastic CP
 - Functionality biased to GMFCS Levels I-III
- **Intervention**
 - Mainly land based
 - Biased toward the strength/ aerobic training
 - Great heterogeneity in components
- **Control**
 - Few blinded
 - Most controlled, randomized
- **Outcome**
 - Biased to body function and standardized activity (GMFM).
 - Extreme diversity in outcome measures, except GMFM.

METHODS:

MEDLINE, PubMed, EMBASE, CINAHL, Sports Discus, Cochrane, and PEDro were searched under the following key words: (1) cerebral palsy combined with (2) exercise and (3) strength, fitness, working capacity, aerobic power, anaerobic power, endurance, cardiorespiratory physical training, cardiorespiratory physical program, and aquatic.

The ICF:

This literature review makes use of the International Classification of Functioning, Disability, and Health (ICF) to classify the outcome measures used in each study. The ICF was designed by the WHO as a standard system to classify disability by its impact on body function, participation, and activity instead of the cause of disability. Thus disability can be standardized across varying diagnoses, simply by assessing impact on the patient.

CONCLUSION

The findings of this literature search show that the focus and compatibility of research since the Veschuren (2007) article has not improved. Not only are the interventions quite varied, but the outcome measures show little cohesion when classified under ICF guidelines. These results call for the implementation of studies that use a common validated outcome measure (such as the Actigraph Accelerometer) to measure activity/ participation in a more practical setting. Thus the stay-FIT 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.

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