

A school-based intervention to improve fitness and function in severe cerebral palsy: A pilot study

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Purpose

- Physical therapy is provided under IDEA to assist students in accessing their educational environment.
- Children with severe cerebral palsy (CP) often have low levels of cardiorespiratory fitness and functional limitations that negatively impact independent mobility.
- The purpose of this study was to investigate the impact of a school-based adapted bicycle-riding program to improve fitness and function in students with severe CP.

Subjects

- Subjects in this study included three students ages 8 to 14 years with CP, Gross Motor Function Classification System (GMFCS) Levels IV and V.
- All subjects had previous experience with adapted bicycle-riding in the school setting.

Subject	GMFCS	Age	CP Type	Vision
1	V	14	Spastic Quad	Low Vision
2	IV	8	Spastic Quad	CVI
3	IV	10	Spastic Quad	-

Subject	MACS	EDACS	CFCS
1	IV	V	III
2	V	IV	V
3	IV	III	III

Subject	School PT	Walking Device	Days Absent
1	"Direct" 90 min/month	KidWalk®	1
2	"Support to School Personnel" 60 min/month	KidWalk®	16
3	"Support to School Personnel" 60 min/month	Rifton Pacer®	3

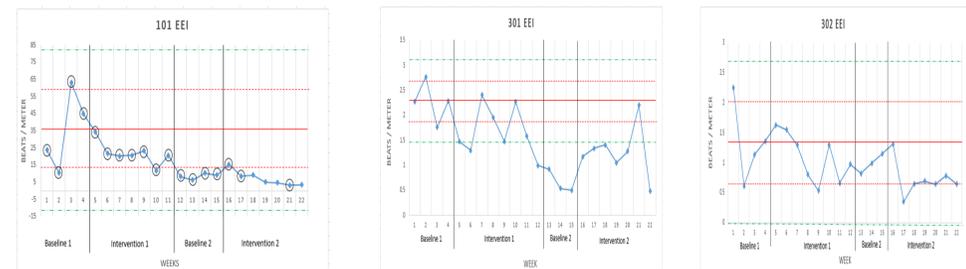
Methods

- A multiple-baseline, single-subject A-B-A-B design with repeated measures was used.
- Every effort was made to conduct the study in a manner that was consistent with the actual practice of school-based physical therapy.
- To accommodate the school calendar, the duration of each phase of the study was as follows:
 - Initial baseline: 4 weeks
 - Initial intervention: 8 weeks
 - Second baseline: 7 weeks
 - Second intervention: 8 weeks.
- Prior to the start of the initial baseline phase, subjects were fitted for adapted bicycles¹.
- The Energy Expenditure Index (EEI) was used weekly during all phases to measure cardiorespiratory fitness.
- At the initial baseline phase and at the end of each intervention phase, function was measured using the Gross Motor Function Measure-66 (GMFM-66) and the status of individualized goals as determined by Goal Attainment Scaling (GAS) on a scale of -2 to +2.
- During intervention phases, an adapted bicycle-riding program was carried out daily for up to 30 minutes as part of each subjects' regular school activities.
- EEI data was analyzed using the 2 standard deviation (SD) band method.
- Findings from the GMFM-66 and the GAS were interpreted relative to values indicating true change.



Results

- Actual subject completion of the adapted bicycle-riding program was high (75%, 83%, 97%).
- All 3 subjects appeared to enjoy the program and all school personnel were supportive and receptive to the program.
- One subject demonstrated significant change in cardiorespiratory fitness.



- Two of 3 subjects demonstrated true change in gross motor function.

Subject	GMFM Score and SEM, 95% CI		
	Baseline	Post-Intervention 1	Post-Intervention 2
1	28.0 +/- 2.0	30.0 +/- 1.9	32.9 +/- 1.8
	24.1 – 31.9	26.2 – 33.8	29.3 – 36.4
2	36.4 +/- 1.5	42.4 +/- 1.1*	42.8 +/- 1.1*
	33.6 – 39.3	40.3 – 44.6	40.7 – 45.0
3	35.7 +/- 1.6	41.6 +/- 1.1*	42.8 +/- 1.1*
	32.6 – 38.8	39.4 – 43.8	40.7 – 45

- All 3 subjects demonstrated better than expected change in individualized goals as determined by GAS.

Subject	Goal Statement	GAS Criteria	GAS Score / T-Score		
			Baseline	Intervention 1	Intervention 2
1	Student will require touch cues to hold his head upright while riding the bike 6-8 times in a 30 minute time frame.	-2 = >12 -1 = 11-9 0 = 6-8 +1 = 5-3 +2 = 2-0	-2 / 30	+2 / 70	+2 / 70
2	Student will be able to ride 1 kilometer on 2/5 days.	-2 = 0.8 km -1 = 0.9 km 0 = 1.0 km +1 = 1.1 km +2 = 1.2 km	-2 / 30	+2 / 70	+1 / 60
3	Student's ride time will be 90% of the total ride time 2/5 days.	-2 = 0/5 -1 = 1/5 0 = 2/5 +1 = 3/5 +2 = 4/5	-2 / 30	0 / 50	+2 / 70

Conclusion and Relevance

- The adapted bicycle-riding program allowed the subjects to participate in a school-based activity that may have resulted in improvements in their fitness and function.
- Students in this age range at GMFCS Levels IV and V often have a poor prognosis in regard to achieving measurable gross motor improvement and yet may still require school-based physical therapy services to optimize their educational outcomes.
- PT-directed school-based activities such as this adapted bicycle-riding program may allow the opportunity to provide a meaningful service to older, severely involved students.

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