



Treadmill Training With Partial Body Weight Support In Ambulatory Children With Developmental Delay: A Pilot Study.

L Lowe¹, J Ferguson¹, C Yates^{1,2}

1. Physical Therapy, University of Central Arkansas

2. Center for Translational Neuroscience, University of Arkansas for Medical Science



INTRODUCTION

Body weight supported treadmill training (BWSTT) is a task-specific method of retraining or, in children, developing gait. Body weight supported treadmill training employs the use of a suspended harness over a moving treadmill to unload a selected percentage of weight from the child while providing a safe environment for repetitive stepping.

The benefits of BWSTT have been documented in children with down syndrome, cerebral palsy, and spinal cord injury. Children receiving BWSTT have shown improvements in endurance, gross motor function, self-selected walking speed, gait kinematics, gait symmetry, and improved safety.

BWSTT has not been studied in children with a primary diagnosis of developmental delay (DD) who are ambulating.



OBJECTIVE

Little is known about the effects of BWSTT on refining gait and improving gross motor milestone achievement. Our study investigated the effect of a 10 week, high intensity BWSTT program on gait and gross motor skill development in a small group of ambulating children (ages 2-5 years) with developmental delay.

SUBJECTS

Subjects enrolled in the study comprised four children, two boys and two girls, aged two to five years with a primary diagnosis of developmental delay (no past or present neurology or genetics consult). One subject withdrew from the study following an unrelated illness and hospitalization. Three subjects completed the study, one boy and two girls.

Subject	Age (Months)	Gender	Ethnicity	Dx	PDMS Z-score
1	29	M	Hispanic	DD	-2.33
2	65	F	African American	DD	-2.05
3	50	F	White	DD	-1.75

Table 1 Pilot Study Subjects

METHODS

Testing

- 10 Meter Walk Test and the Gross Motor Function Measure (GMFM-88)
- Testing at baseline prior to implementation of treadmill training, after four, six, and ten weeks of treadmill training, and six and half weeks after completion of the program.

BWSTT Intervention

Subject continued receiving physical therapy with an additional BWSTT program consisting of:

- Up to three, 15 minutes sessions per week.
- Gradual increase in speed, treadmill inclination, and time on the treadmill.
- Gradual decrease in body weight support through the yoke with each subject eventually achieving safe ambulation under imposed parameters (with or without therapist tactile cueing) at 0% body weight support (though the harness remained in place for safety measures).

The mean number of BWSTT sessions throughout the 10-week period was 27 with a range of 25-28 sessions. No adverse events occurred for any subject during any training session.

RESULTS

Subject	Baseline (m/s)	Four Week (m/s)	Six Week (m/s)	Ten Week (m/s)
1	0.94	0.86	1.03	1
2	1.07	0.95	1.09	1.08
3	0.98	1.02	1.17	1.21

Baseline SSW	Four WK SSW	Six WK SSW	10 WK SSW
.9967 (.06658)	.9433 (.08021)	1.1000 (.07550)	1.0967 (.10599)

Table 2 Self Selected Walking Speed Individual Scores, Means, and Standard Deviations

Subject	Baseline Raw Scores	Four Week Raw Scores	Six Week Raw Scores	Ten Week Raw Scores
1	50	62	64	66
2	63	69	68	68
3	56	65	66	67

Baseline GMFM-E	Four WK GMFM-E	Six WK GMFM-E	10 WK GMFM-E
56.3333 (6.50641)	65.3333 (3.51188)	66.0000 (2.00000)	67.0000 (1.00000)

Table 3 GMFM- E Individual Scores, Means, and Standard Deviations

Subject	10 Wk SSW	Follow Up SSW	Subject	10 Wk GMFM-E	Follow Up GMFM-E
1	1.00	1.24	1	66	61
2	1.08	1.09	2	68	65
3	1.21	1.44	3	67	67

Table 4 Follow Up Maintenance of Self Selected Walk Speed Raw Scores (m/sec) and GMFM-E Raw Scores

Discussion

Significant improvements were found in Self-Selected Walking Speed on the 10 Meter Walk Test and on the GMFM-E after BWSTT. Significant improvements occurred at four or six weeks of training and maintenance of improvements in all areas was noted at follow-up testing.

Further studies with adequate sample size, randomization of subjects, blinded assessments, and the use of a control group are needed to establish the efficacy of this intervention in this population.

CONCLUSIONS

The results of this pilot study suggest that BWSTT is a safe, time –efficient, and clinically practical intervention for improving gait speed and higher level gross motor skills for children with DD.

CLINICAL SIGNIFICANCE

- Children with DD need interventions that improve common impairments.
- BWSTT is a task specific practice with improved parameters that may serve as a refining intervention for this population.
- With continued physical therapy, a concurrent 10 week BWSTT program may assist ambulating children with DD in improving walking speed and obtainment of gross motor skills.

GRANT SUPPORT

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