

### Effectiveness of Supported Treadmill Training on Functional Mobility in School-Aged Children with Cerebral Palsy

Prevalence: The Canadian Institute of Child Health reported that 7.7% of Canadian children live with a disability.<sup>1</sup> Cerebral palsy (CP) is the most common and significant physical disability in childhood, with an incidence of 1 in 500 births.<sup>2</sup> CP is a non-progressive, but often changing, disorder of movement and posture, secondary to brain injury or malformation in early stages of development.<sup>2</sup> CP can be classified using the Gross Motor Function Classification System (GMFCS), based on children's functional abilities and need for assistive devices.<sup>3</sup> Children with a GMFCS classification of level I walk independently whereas children with a classification of V are very limited in their ability to move themselves around, even with assistive technology.<sup>3</sup>

Enhancing Function in CP: Because there is no cure for CP, the primary aim of intervention is to improve functional motor skills after determining the cause of functional deficit and severity of dysfunction.<sup>4</sup> Walking is a fundamental motor performance task and the motor skill most frequently requested by families of children with CP as the intervention focus.<sup>5</sup> Developing walking skills can have a significant impact on function in many other areas of life. Children who are able to walk are more successful in social roles and activities of daily living than children who use a wheelchair.<sup>6</sup> Thus, it is reasonable to predict that

increasing the ability of children with CP to walk will lead to reduced restrictions and enhanced participation in life activities.

Intervention in CP: Although many therapy interventions have been tried over the years for children with CP, such as neurodevelopmental treatment<sup>7</sup> and, more recently, constraint-induced movement therapy,<sup>8</sup> supported treadmill training (STT) is the only intervention aimed directly at enhancing functional mobility, the motor goal most frequently requested by children with CP and their families.<sup>5</sup>

Treadmill training with partial body weight support has proved effective in restoring gait in adults with stroke.<sup>9</sup> This method of training involves the use of a body-weight support harness during the treatment and is congruent with contemporary models of motor control and motor learning that recommend a task-specific approach that emphasizes repetition and practice. Recently, supported treadmill training (STT) has emerged as a treatment approach to improve the gait of children with CP.<sup>10</sup> In this case the support harness allows the therapist to hold the child over the treadmill. This partial un-weighting allows the child to practice walking at a faster, more typical pace without the exertion expected during over-ground walking.<sup>10</sup> The support harness also allows the therapist to

use their hands to manually assist the child in walking.

Although studies have evaluated the physiological responses to STT in children with CP,<sup>11,12</sup> few studies have examined its effects on functional mobility. The available studies varied greatly in their protocols, with program intensity ranging from 1-6X/week for 2 - 23 weeks.<sup>5,13,15-18</sup> For example, Richards et al.<sup>13</sup> undertook a feasibility study that was completed through a pre-post design of 4 children with CP younger than age 3. The results indicated that STT was a feasible intervention that could positively affect functional mobility.<sup>13</sup> Subsequently, two studies (a case report and a pre-posttest study with 10 children) have evaluated the effectiveness of STT in improving functional mobility in school-aged children with CP as measured by the Gross Motor Function Measure's (GMFM),<sup>14</sup> with results indicating a significant increase in GMFM scores.<sup>5,15</sup> Three additional studies have been published with results on STT in school-aged children with CP in 2007. Two pre-posttest studies were conducted with 6 children each.<sup>16,17</sup> Results indicated a significant increase in group mean walking speed over 10 meters (although distance walked on the 6-minute walk test showed only minor, non-significant improvement)<sup>16</sup> and significant improvements in walking velocity and energy expenditure.<sup>17</sup> In addition, a small (n=14) matched pairs controlled trial was completed with results indicating a significant improvement in self-selected walking speed over 10 meters in the intervention group.<sup>18</sup>

Due to the inability to make inferences from a case report and the lack of a control group in the pre-posttest studies, limited evidence (as determined by the Centre for Evidence Based Medicine)<sup>19</sup> from one small non-randomized controlled trial is available to provide support for STT as an intervention for children with CP.<sup>18</sup> Further research is needed to determine if STT can be used to improve mobility in children with CP.

Significance: Treadmill training is a promising intervention for children with CP. Gaining a better understanding of the effects of STT, and of specific STT protocols, would assist therapists throughout British Columbia (BC) in knowing whether or not this is an efficacious type of intervention for their clients with CP. If STT is found to be effective in improving functional mobility, it can be carried out in any region of the province, whether in a child development centre, a community centre, a school, or in the child's home. STT may not only have an important impact on the overall participation of children with CP but could also have far reaching implications for enhancing the quality of life of all children with disabilities throughout BC.

*This literature review was completed by Tanja Mayson (MSc, BScPT) on March 30<sup>th</sup>, 2007 and was used in a grant proposal to fund research regarding the effectiveness of supported treadmill training in school-aged children with cerebral palsy.*

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