



Harry is an 8 year old boy who has Hemiplegic Cerebral Palsy (GMFCS level 2). Harry is deaf and non-verbal, but he has cochlear implants and uses his app on his iPad and simple sign language to aid his communication and understanding. Harry loves going to school, playing with friends and visiting parks with his family. Due to the weakness through the left side of his body, Harry can tire over longer distances when mobilising. Harry's physiotherapist was keen to explore the inclusion of an adaptive tricycle into Harry's daily school routine to see if this had beneficial impacts on his mobility, fatigue and quality of life.

Study period:

Use of a Rifton Adaptive Tricycle was added alongside Harry's existing therapy routine for a period of 4 weeks. Prescription of the tricycle was determined using UK Governmental guidelines for physical activity in disabled Children and adolescents [1] and exercise recommendations for people with cerebral palsy [2].

As such, the tricycle exercise programme for Harry was the following:
20-30 mins of moderate intensity cycling, 3-5 times per week, over a 4 week period.

Intensity was measured by Harry wearing a sports watch and aiming for between 50-70% of Harry's maximum heart rate (calculated by subtracting Harry's age from 220).



- 1) 1. UK Chief Medical Officers' Physical Activity Guidelines for Disabled Children and Disabled Young People 2022. Retrieved from https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1055018/infographic-physical-activity-for-disabled-children-and-disabled-young-people.pdf
- 2) Verschuren, O. et. al. Exercise and Physical Activity Recommendations for People with Cerebral Palsy. Dev Med Child Neurol. 2016; 58(8): 798-808

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Outcome Measures:

Outcome measures assessed pre and post study were resting heart rate (measured through a sports watch after Harry had lay down for 20 minutes), distance covered during the 1-minute walk test and Physiotherapist's assessment of Harry's gait, and the Paediatric Balance Scale. Comments from Harry using his communication aid, his physiotherapist, his teacher and his mother were used to assess impact on Harry's quality of life acutely.

On the first assessment with the Rifton Tricycle, Harry was unable to pedal independently and needed assistance turning the handlebar and to step on and off the tricycle safely.

Results:

In just 4 weeks, Harry's resting heart reduced from 81 bpm to 75 bpm, his Paediatric Balance Scale score improved from 44 to 50 out of 56 and his distance covered over the 1-minute walk test increased from 72 metres to 84 metres. Harry's physiotherapist also felt there had been noticeable improvements in his gait pattern.

Comments from Harry's Physiotherapist: 'I have noticed great improvements in Harry's ability to pedal and turn the bike. Initially Harry needed assistance, but now he is pedalling independently. Harry is now working hard on his skills on the outdoor track trying to keep the tricycle within the lines. Harry really enjoys using the tricycle but I have also noticed a carry-over effect into his gait pattern. Even in just 4 weeks, I feel Harry's stride length and single leg stance time through his hemiplegic lower limb has improved'

Comments from Harry's Teacher: 'Harry really enjoys using the trike and gets so excited whenever he sees it. I was initially unsure if Harry would be able to use the trike due to his weakness, but he is excelling on it! He's become so fast at his pedalling and he is now completely independent with his turning and navigation'

Comments from Harry's Mum: 'Harry's teaching staff report he really enjoys using the trike at school which is lovely to hear. It's great that Harry can now be more included in physical activity, but also be more included socially, including cycling with his friends at breaktimes. We are hoping to get a trike for Harry to use at home and cycle round the park during family walks'

Harry has been using his communication aid to let us know he 'loves' the tricycle and finds it 'fun' to use.

After 4 weeks of using the trike Harry was able to:

- Get on and off the trike independently
- Push off independently
- Steer independently around the race-track printed on the school play ground
- Propel the tricycle fast and now loves to chase the staff member accompanying him around the playground!

Summary:

These results could suggest that use of an adaptive tricycle as a cardiovascular exercise, in conjunction with Harry's existing therapy programme, may have had positive acute beneficial effects on his function, gait efficiency, fitness, balance and quality of life.



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The ICF Framework¹ and the F-Words²

Fitness

(Body Structure & Function)

Harry's resting heart rate has reduced, and distance covered in the 1-minute walk test has increased, suggesting an improvement in cardiovascular fitness

Functioning

(Activity)

Harry's therapist has noticed an improvement in his walking ability and Harry has learned a new skill – cycling independently!

Friends

(Participation)

Harry is now able to cycle together with friends at break time in school

Family

(Environmental Factors)

Harry's family are now looking to acquire a tricycle for home to use during family walks around the park

Fun

(Personal Factors)

Harry loves using the tricycle and finds it a really fun activity; he particularly enjoys trying to navigate around the school track outside

Future

Harry will continue to use the tricycle at school with his friends, working with his therapist to improve his navigation skills and independence, and using the tricycle outdoors for family trips

1) World Health Organization. (2001) International Classification of Functioning, Disability and Health (ICF)

2) Rosenbaum P & Gorter JW. (2012). The 'F-words' in childhood disability: I swear this is how we should think! Child Care Health Dev. 38.

For more information visit the

F-Words Knowledge Hub: www.canchild.ca/f-words www.canchild.ca



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