

**The introduction of Petra running bikes to encourage and facilitate weight-bearing exercise for children with cerebral palsy who are unable to walk independently:
a pilot study**

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A summary report of the findings

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What was the main purpose of the study?

The main aim of the study was to find out if children with cerebral palsy, who have walking difficulties, could use the Petra running bikes as a form of weight bearing exercise and if they enjoyed using them.

Exercise is very important in order to develop healthy strong bones, particularly weight bearing exercise. We know that there are not many forms of weight bearing exercise for children with cerebral palsy. We wanted to find an activity that would be fun and feasible for the children to participate in which may increase their physical fitness, stimulate bone formation and improve their quality of life.

A novel mobility device, the Petra running bike has been designed in Denmark for outdoor use for children and adults with mobility and balance disorders. The Petra running bike consists of a 3 wheeled frame with handlebars, saddle and trunk support (as shown in the picture above). As opposed to a pedalling system the user sits on the saddle and propels themselves forward by contact with his/her feet on the ground.

What happened in the study?

We recruited 15 children with cerebral palsy, who were unable to walk independently, to participate in the study. The children, aged 4 to 12 years, were recruited from two specialist schools in the South East (Chailey Heritage School and Valence School). With regards to usual methods of mobility, ten of the children use a powered mobility chair in most settings, and 5 of the children are transported in a wheelchair in all settings.

The physiotherapy teams in both schools were provided with 4 running-bikes of varying sizes and additional items of postural support including body supports, gripping aids and leg separator plates. The running bikes were then individually adapted for each child for each session according to the level of support required. The physiotherapy teams assisted the children to use the running bikes 3 times a week for a 12 week period.

In order to assess if the children were able to use the running bikes and to monitor any change in ability over the 12 weeks we took a short video recording of each child using the running bike at the start of the study, half way through the study, and at the end of the study.

We also used the Gross Motor Function Measure to assess each child's standing ability at the start and end of the study. Additionally in order to monitor any change in bone health we took an ultrasound measurement of each child's heel bone at the start and end of the study using an ultrasound machine. Each assessment was carried out in the school with the physiotherapist or carer present.

Parents/carers were also asked to complete a short quality of life questionnaire with regards to their children on two occasions, once at the start of the study and once at the end of the study. At the end of the trial the physiotherapy teams and some children were interviewed to obtain their views on and experiences of the running-bikes.

So what did we find?

The ability of the children to use the running bike significantly improved over the 12 weeks. At the start of the study 4 children (30.8%) were unable to initiate walking with assistance from their physiotherapist. At the end of the study all children could initiate walking with assistance from their physiotherapist. As expected, the children who have limited control of their leg movements required considerably more support to enable them to initiate walking. Whilst only 2 children (15%) were actually running with the running bikes at the end of the study, all children were able to propel themselves forward using their legs, some completely independently, which was a novel experience for some children.

The ultrasound measurements of the heel bone significantly improved over the 12 weeks which is very encouraging. We saw a small increase in the children's ability to stand but this was not statistically significant. No change was observed in the Quality of Life data.

From the interview data we found both the children and the physiotherapists were extremely positive about their experiences using the running bikes. Overall, despite the severity of their disability, the children enjoyed using the running bikes. Additionally, as the running bikes were found to be easy to use, they are now being used regularly in both schools.

So what happens now?

This pilot study has shown that running bikes offer an enjoyable way for children with cerebral palsy to participate in weight bearing exercise, giving greater mobility, independence and the potential to stimulate bone formation.

We are really encouraged by the pilot study and are now seeking funding to run a large scale study in the community to investigate the effect of running bike use on bone strength.

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