

Article Title

Effects of Participation in Sports Programs on Walking Ability and Endurance Over Time in Children With Cerebral Palsy

Article Citation

Ross SA, Yount M, Ankarstad S, Bock S, Orso B, Perry K, et al. Effects of Participation in Sports Programs on Walking Ability and Endurance Over Time in Children With Cerebral Palsy. *American Journal of Physical Medicine & Rehabilitation*. 2017 Dec;96(12):843–51. [10.1097/PHM.0000000000000767](https://doi.org/10.1097/PHM.0000000000000767)

Adaptive Sport/Recreation Categories

- Participation frequency
- Physical activity
- Intensive Sport Summer camp
- Cerebral palsy

Study Type: Retrospective Cohort Study

Summary:

Ninety-seven children who were 6 to 20 years of age and who had attended a summer sport program from 2004 to 2012 were analyzed for the effect of participation in the programme on walking ability and endurance. The program included 7 hours days (6 hours/d of activity, and 1 hour for lunch), 5 d/week. ‘Camp Independence’ was offered for a total of 6 weeks; however, children could only attend up to 4 consecutive weeks. All children participated in the same group activity, at the same time and all activities were adapted to the child's functional level. The activities remained the same over the eight years and included: swimming, tennis, dance, martial arts, basketball, soccer, baseball and adaptive cycling. A large team of volunteers/PT students was present to help adapt each activity to the child's level. The outcome measures (Timed Up and Go (TUG) test, 25-ft walk/run and modified 6-min walk distance) were assessed pre and post by six different physical therapists for the 8 years of data collection.

Following the restricted maximum likelihood estimation for longitudinal modeling, there were significant linear trends using time as a level I predictor such that the TUG ($P = 0.046$), and 25-ft walk/run ($P = 0.045$) significantly improved (time decreased so they performed faster), and the modified 6-minute walk distance ($P = 0.045$) increased over time. The GMFCS levels I and II were not significantly different from each other in TUG and 25-ft walk/run score but were significantly different than level III. For the modified 6-MWdistance, GMFCS level I, II, and III were all significantly different from each other. There was a main effect for the actual number of weeks attended for the TUG (more weeks/year, lower the TUG values for the TUG (walked faster). There was no main effect for the actual number of weeks attended over the years

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for the m6MW distance and 25-ft walk/run. For all outcome measures, there was no significant difference for whether the participants had the same therapist performing the pre/post measures.

Article Strength:

- Eight years of longitudinal sports program data collected and analysed
- Wide variety of age groups and numbers in GMFCS I-III levels
- The male and female (50:47) ratio was almost similar, therefore the findings can be generalized to any gender
- Disclosure of missing data and explanations accounting for this were included
- Comparison of number of sessions and number of weeks included in separate analysis
- A large number of volunteers were included in the program to help adapt each activity to the child's level

Article weakness:

- Large amount of missing data in the study – only 5 participants data for all 8 years
- Participation frequency measured – did not account for other variables recognized to be important to participation – diversity, duration and involvement
- Reliability and validity of the 25ft walk/run test and m6MW run tests have not been established for the CP population (at the time of publication in 2017) and other tests with established reliability/validity could have been chosen
- No control group, therefore, whether the lack of participation would have caused a decline in the outcome was not measured
- As it was a longitudinal study, as the age increases there can be the impact of maturation which may also contribute to positive outcomes
- No repository for the additional intervention/therapy, medication, home exercises documented, therefore, the determination of result by the sport program per se is uncertain
- A follow-up evaluation after the wash-off period of a vdv few weeks data could have been useful to confirm the impact of sports program in the children with CP

Take home message:

- Sports camps may have potential to contribute to long-term benefits in walking ability and endurance in children with CP
- In addition to benefits of being physically active and having peer based opportunities, sports camps enable longitudinal data collection to show children and their families of change within a program and over time
- Children functioning at GMFCS level III are able to make significant gains using a sports camp based model
- The frequency of attendance in the sports program (1-32 weeks over the 8 years) contributed to faster TUG walking times but not quicker time for 25ft walk/run test and greater distance for m6MW run tests. Choice of participation measures beyond frequency and reliable and valid physical activity measures should be considered in the future.

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Impacts on Clinical Practice:

- Community based sport camps may be important to consider to reduce the monotonicity in the regular exercise program and therapy sessions
- Not only the summer program can be recreational, but it has also shown a significant improvement in the time taken to walk a dedicated distance
- Improvements in walking ability and endurance can be achieved for children with CP GMFCS levels I-III