




Physical fitness since childhood associated with cerebellar volume in adolescence: Study






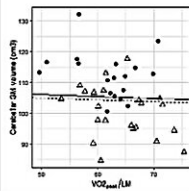
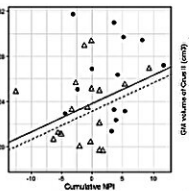
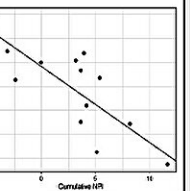
November 10 2023



QUESTION Is physical fitness since childhood associated with cerebellar grey matter volume in youth?

CONCLUSION Cardiorespiratory fitness at adolescence and neuromuscular fitness since childhood were associated with cerebellar grey matter volume in adolescence and young adulthood.

POPULATION	PREDICTORS	FINDINGS
<p> 40 adolescents 22 females 18 males</p> <p>Mean age 17.9 years</p> <hr/> <p>MAIN OUTCOME</p> <p> Cerebellar grey matter volumes of cognition-related lobules in adolescence and young adulthood.</p>	<p> Peak oxygen uptake normalised for lean body mass</p> <p> Neuromuscular fitness including speed-agility, muscle strength, and coordination</p> <p> Body fat percentage by DXA</p>	<div style="display: flex; justify-content: space-around;"> <div style="text-align: center;">  <p>Adolescents with higher peak oxygen uptake had smaller total cerebellar grey matter volume</p> </div> <div style="text-align: center;">  <p>Those with better neuromuscular fitness since childhood had larger Crus I grey matter volume</p> </div> <div style="text-align: center;">  <p>Males with better neuromuscular fitness since childhood had smaller Crus II grey matter volume</p> </div> </div>

Jalanko P, Säisänen L, Kallioniemi E, Könönen M, Lakka TA, Määttä S, Haapala EA. Associations between physical fitness and cerebellar grey matter volume in adolescents. *Scandinavian Journal of Medicine and Science in Sport* 2023.

Physical fitness since childhood predicts cerebellar volume in adolescence.
Credit: Petri Jalanko

Physical fitness since childhood is associated with cerebellar gray matter volume in adolescents. According to a recent study conducted at the University of Jyväskylä and the University of Eastern Finland, those who were stronger, faster and more agile, in other words, had better neuromuscular fitness since childhood, had larger Crus I gray matter

volume in adolescence. The study was published in the *Scandinavian Journal of Medicine and Science in Sports*.

Despite the importance of the developing cerebellum on cognition and learning, the associations between physical [fitness](#) and cerebellar volume in adolescents have remained unclear. This study examined the associations of physical fitness with gray matter volume of cerebellar lobules related to cognition in adolescents, and whether these associations differed between females and males.

Those adolescents with better neuromuscular fitness since [childhood](#) had larger Crus I gray matter volume. However, adolescents with better cardiorespiratory fitness had smaller total cerebellar gray matter volume. Moreover, males with better neuromuscular fitness since childhood had smaller Crus II gray matter volume.

"Our study highlights the importance of physical activity through childhood and adolescence, leading to better physical fitness, as it might be relevant to cerebellar volumes related to cognition and learning. However, the associations we observed are in part contradictory," says Doctoral Researcher Petri Jalanko from the Faculty of Sport and Health Sciences at the University of Jyväskylä.

"The study sheds light on the associations between physical fitness and the cerebellum. Future randomized controlled trials utilizing direct cardiorespiratory fitness measurements and novel brain imaging to assess a larger population and both sexes separately are needed to better understand the associations and causality between [physical fitness](#) and cerebellar volumes in adolescents," Jalanko says.

The findings are from the FitBrain study, which included 40 participants from the eight-year follow-up examinations of the Physical Activity and Nutrition in Children (PANIC) study. Of the participants, 22 were

female and 18 were male, and their mean age was 17.9 years.

Cardiorespiratory fitness was assessed by maximal ramp test on a cycle ergometer, muscular strength with standing long jump, speed-agility with the 10 x 5 m shuttle-run test, coordination with the Box and Block Test and neuromuscular fitness as the sum of standing long jump, Box and Block Test and shuttle-run test z-scores. Cerebellar volumes were assessed by [magnetic resonance](#) imaging.

More information: Petri Jalanko et al, Associations between physical fitness and cerebellar gray matter volume in adolescents, *Scandinavian Journal of Medicine & Science in Sports* (2023). [DOI: 10.1111/sms.14513](#)

Provided by University of Eastern Finland

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