

Physical Fitness Plays a Crucial Mediator Role in Relationships Among Personal, Social, and Lifestyle Factors With Adolescents' Cognitive Performance in a Structural Equation Model. The Cogni-Action Project

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Abstract

Background: The beneficial relationship between physical fitness and cognitive performance is affected and modulated by a wide diversity of factors that seem to be more sensitive during the development stage, particularly during early adolescence. This study aimed to examine the role of physical fitness considering the multivariate association between age, health-related quality of life (HRQOL), school vulnerability index (SVI), body mass index z-score (BMIz), physical activity, and sleep problems with the cognitive performance in boys and girls. **Method:** Participants were 1,196 adolescents aged 10–14 years (50.7% of boys) from Chile. Three physical fitness components and eight cognitive tasks were measured. BMIz was determined using growth references by age and sex, whereas questionnaires were used to assess sleep problems, physical activity, and HRQOL. SVI was established according to the score given by the Chilean Government to educational establishments. We performed a structural equation model (SEM) to test multivariate associations among study variables by sex. **Results:** Fitness was positively associated with boys' and girls' cognitive performance ($\beta = 0.23$ and $\beta = 0.17$; $p = 0.001$, respectively). Moreover, fitness presented a significant mediator role in the relationships between BMIz, SVI, and physical activity with cognitive performance (indirect effect). Additionally, SVI showed a negative association both direct and indirect effect in all three fitness components and all cognitive tasks, being this relationship stronger in girls than in boys. **Conclusion:** Our findings suggest that physical fitness and all its components play a crucial mediator role in the associations between several factors associated with adolescents' cognitive performance. Thereby, educational and health strategies should prioritise improving physical fitness through physical activity. They also should address other factors such as school vulnerability, obesity, and the early gender gap in a

comprehensive approach boosting cognitive performance among early adolescents.
Trial registration: Research Registry (ID: researchregistry5791). © Copyright © 2021
Lemes, Gaya, Sadarangani, Aguilar-Farias, Rodriguez-Rodriguez, Martins, Fochesatto
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Author keywords

adolescence; body composition; cognitive performance; physical fitness; quality of
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