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DOES IGF-1 MEDIATE THE ASSOCIATIONS OF CARDIORESPIRATORY FITNESS AND NEUROMUSCULAR PERFORMANCE WITH COGNITION IN PREPUBERTAL CHILDREN?

Haapala EA¹, Väistö J¹, Lintu N¹, Tompuri TT^{1,2}, Jääskeläinen J³, Lindi V¹, Lakka TA^{1,2,4}

¹Institute of Biomedicine/Physiology, University of Eastern Finland, Kuopio, Finland,

²Department of Clinical Physiology and Nuclear Medicine, Kuopio University Hospital and

University of Eastern Finland, Kuopio, Finland, ³Department of Pediatrics, Kuopio University Hospital, Kuopio, Finland, ⁴Kuopio Research Institute of Exercise Medicine, Kuopio, Finland.

E-mail: ehaapala(a)student.uef.fi

Objectives

Insulin-like growth factor 1 (IGF-1) may mediate the effects of exercise on the brain and cognition. However, the evidence of the effects of IGF-1 on cognition in children is lacking. We investigated the associations of cardiorespiratory fitness (CRF) and neuromuscular performance with cognition and whether IGF-1 mediates these associations in children.

Methods

The participants were 360 prepubertal children (50% girls, 6–8yrs). CRF was assessed using maximal cycle ergometer test and was defined as peak workload per lean body mass (LBM) or per body mass. Neuromuscular performance was assessed using 10x5m shuttle run time (SRT, s), 15m sprint run time (s), standing long jump (SLJ, cm/stature), hand grip strength (kilopascals [kPa]/body mass or LBM), balance (errors in 30s), sit-up (repetitions/30s) and box and block (BBT) tests. Overall neuromuscular performance and overall motor performance (SRT, balance, BBT) were computed as sum of z-scores. Cognition was assessed using Raven's Coloured Progressive Matrices (RCPM). Serum IGF-1 was assessed using ELISA kit (Mediagnost, Germany). The data were analyzed using linear regression and were adjusted for growth maturation index. The mediation analyses were performed using four step regression method introduced by Baron and Kenny.

Results

In boys, SRT time was inversely ($\beta=-0.178$, $P=0.017$) and BBT ($\beta=0.233$, $P=0.002$), overall neuromuscular performance ($\beta=0.153$, $P=0.043$) and overall motor performance ($\beta=0.223$, $P=0.003$) were directly associated with RCPM scores. Peak workload/LBM ($\beta=-0.170$, $P=0.022$), peak workload/body mass ($\beta=-0.246$, $P=0.001$), SLJ performance ($\beta=-0.162$, $P=0.035$) and kPa/body mass ($\beta=-0.220$, $P=0.004$) were inversely associated with IGF-1. 15m sprint run time was directly ($\beta=0.221$, $P=0.003$) related to IGF-1. IGF-1 was not associated with RCPM scores ($\beta=-0.040$, $P=0.600$). In girls, no associations were found between CRF, neuromuscular performance, IGF-1 and RCPM scores.

Conclusions

Indices of neuromuscular performance were directly associated with cognition in boys. IGF-1 was not mediating these associations.