The association between physical activity, cognitive performance, and academic achievement in adolescents

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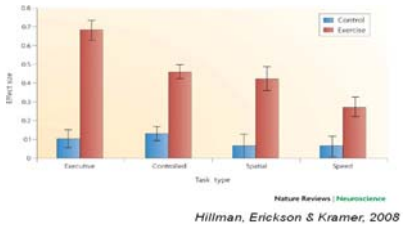
Background

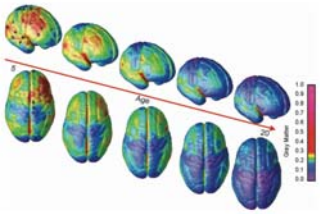


Hillman, Erickson & Kramer, 2008

- Physical activity has a positive effect on cognitive performance in older adults

Background

- Adolescents as a group did not get much attention



- The brain of adolescents is still in development until the age of 20 years

Taken together

- Physical activity is positively associated with cognitive performance in adults
- Little research has been done in adolescents
- Brain of adolescents is still in development
- The association between physical activity and cognitive performance in adolescents is interesting and important to investigate

Previous studies in adolescents

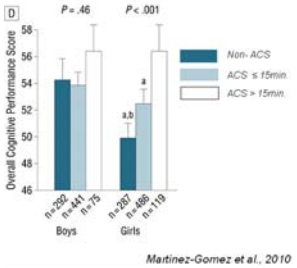
Table I. Cognitive performance by participation in physical sports activity during leisure time in adolescents

	Model 1				Model 2			
	Yes (n = 1053)	No (n = 506)	*P*	Cohen's *d* (95% CI)	Yes (n = 817)	No (n = 393)	*P*	Cohen's *d* (95% CI)
Overall cognitive performance (0-99)	64.7 (13.0)	59.1 (13.5)	< .0010	.32 (0.221-0.421)	56.0 (14.3)	51.4 (13.9)	< .0010	.35 (0.139-0.360)
Verbal ability (0-33)	21.4 (6.5)	19.6 (6.7)	< .0010	.25 (0.153-0.353)	21.5 (5.7)	20.4 (5.9)	.006	.18 (0.063-0.289)
Numeric ability (0-33)	14.6 (3.2)	13.1 (4.5)	< .0010	.29 (0.191-0.391)	14.8 (5.7)	13.3 (5.8)	< .0010	.27 (0.153-0.380)
Reasoning ability (0-33)	18.6 (6.5)	17.2 (6.7)	< .0010	.26 (0.160-0.360)	18.8 (5.6)	17.7 (5.7)	.003	.19 (0.076-0.303)

Ruiz et al., 2010

- Self-reported sport participation associated with better cognitive performance

Previous studies in adolescents



Martinez-Gomez et al., 2010

- Self-reported active commuting to school positively associated with cognitive performance

Previous studies in adolescents

Kwak et al., 2009

- Vigorous physical activity was positively associated with academic achievement
- Threshold level of intensity is necessary to produce beneficial effects

Limitations previous research

- Not all studies measured physical activity objectively
- None of these studies include both cognitive performance and academic achievement
- No inclusion of other interesting variables (sleep duration, computer gaming and television viewing)
- Lack of other relevant outcomes (mood, self-esteem)
- No longitudinal perspective

Research questions

What is the effect of :

- Physical activity
- Commuting to school
- Sleep duration
- Computer gaming and television viewing

On:

- Cognitive performance
- Academic achievement
- Mood
- Self-esteem

Methods

- Longitudinal observational study
- 360 students, aged 12-17 years
- Universitary prepatory education level
- Secondary schools in Zuid-Limburg

Procedures

Independent variables

- Physical activity
  - Accelerometer
  - Self-reported questionnaire
- Sleep duration
- Computer gaming
- Television viewing

Dependent variables

- Cognitive performance
  - Letter Digit Substitution Test
  - The D2 test of Attention
  - Fluency test
- Academic achievement
  - Dutch, English, Mathematics
- Mood
  - Self-report scale (CES-D)
- Self-esteem
  - Rosenberg self-esteem scale

Covariates

- Body mass index
- Alcohol consumption
- Smoking
- Socioeconomic status
- Pubertal phase
- Aerobic fitness

Thank you for your attention!