


The GOALS Study:

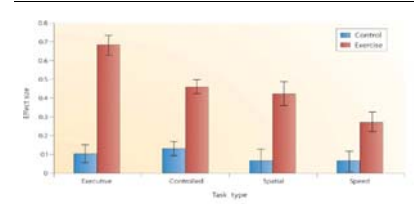
The association between physical activity, cognitive performance, and academic achievement in adolescents

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Background (I)

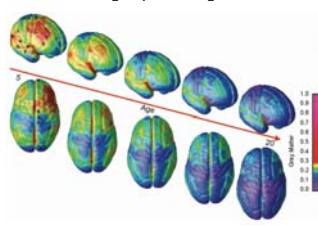


Nature Reviews | Neuroscience
Hillman, Erickson & Kramer, 2008

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

Background (II)

- Adolescents as a group did not get much attention



- Therefore: high importance to investigate factors which may stimulate optimal brain development in adolescents

Background (III)

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

Previous studies in adolescents (I)

- Spanish adolescents, aged 13-18 years

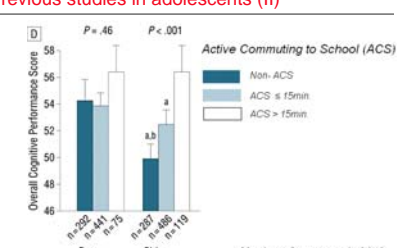
Table I. Cognitive performance by participation in physical sports activity during leisure time in adolescents

	Model 1			Model 2		
	Yes (n = 1953)	No (n = 508)	Cohen's d (95% CI)	Yes (n = 817)	No (n = 393)	Cohen's d (95% CI)
Overall cognitive performance (0-99)	14.7 (13.0)	11.1 (13.3)	0.33 (0.22-0.42)	14.3 (14.3)	11.1 (13.3)	0.32 (0.22-0.42)
Verbal ability (0-33)	21.4 (18.8)	19.8 (19.7)	0.10 (0.05-0.15)	21.5 (19.7)	19.8 (19.5)	0.17 (0.03-0.30)
Numeric ability (0-33)	14.8 (13.2)	13.1 (14.5)	0.16 (0.10-0.22)	14.8 (15.7)	13.3 (15.8)	0.15 (0.01-0.28)
Reasoning ability (0-33)	18.8 (16.5)	17.2 (16.7)	0.16 (0.10-0.22)	18.8 (18.8)	17.7 (16.7)	0.11 (0.07-0.15)

Ruiz et al., 2010

- Sport participation during leisure time is associated with better cognitive performance

Previous studies in adolescents (II)



Martinez-Gomez et al., 2010

- Active commuting to school and its duration may positively influence cognitive performance in girls

Previous studies in adolescents (III)

- Swedish adolescents, aged 15-16 years

Academic achievement				
	Step 1	β^2	Step 2	β^2
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Kwak et al., 2009

- Vigorous physical activity is positively associated with academic achievement in girls

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
- 500 students, aged 12-17 years
- Universitary preparatory education level
- Secondary schools in Zuid-Limburg

Procedure

Before (week 0)



- Follow-up



End (week 2)



Independent variables

- Physical activity
 - Objective (accelerometer)
 - Subjective (self-reported)
- Sleep duration
- Computer gaming
- Television viewing

Dependent variables

- Cognitive performance
- Academic achievement
 - Dutch, English, Mathematics
- Mood
 - CES-D self-report scale
- Self-esteem
 - Rosenberg self-esteem scale

Covariates

- Body Mass Index
- Alcohol consumption
- Smoking
- Socioeconomic status
- Pubertal phase
- Aerobic fitness

Thank you for your attention!

