

# Contribution of Physical Education and Active Transport to Energy Expenditure in Adolescents

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# We sincerely apologise.....



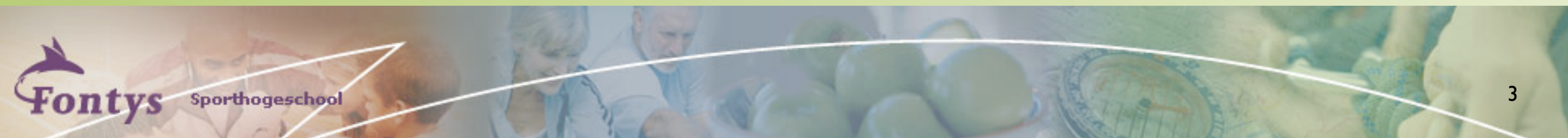
# Introduction

Important role for schools in stimulating PA behavior in youth (Naylor & McKay, 2009, McKenzie & Lounsberry, 2009):

- Reaches a large number of children and adolescents
- Children and adolescents spend most of their waking hours in school

Ferreira et al (2007):

“.....little research has investigated specific features of the school environment that impact on youth physical activity”





# Introduction

## Physical Education (PE)

- Dutch PE lessons provide 1/3 of total daily needed minutes of MVPA, (Slingerland & Borghouts, EJSS, *in press*), other countries similar results (Fairclough & Stratton, 2005)
- Contribution of PE to total PA is unknown

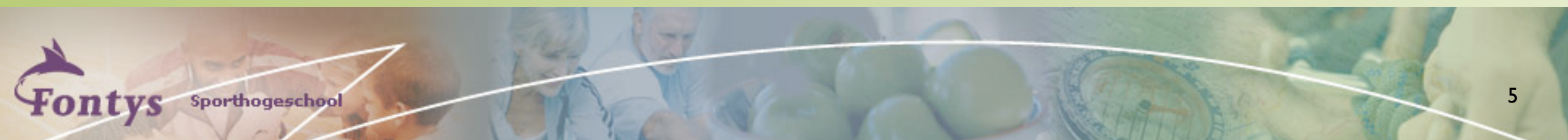


## Active Transport to school (AT)

- Important variable in youth PA (Strong et al., 2005)
- Internationally declining rates of AT (McCann, 2000, Noble et al., 2000)
- No data available on contribution on total PA from objective measurements

# Aims of this study

1. To determine the amount of PA in adolescent boys and girls during a regular week.
2. To determine the contribution of PE and AT to total PA.



# Methods - Actiheart

Physical Activity Guideline: MVPA

Accelerometers / heartrate alone not accurate in determining PA intensity (Welk, 2000)

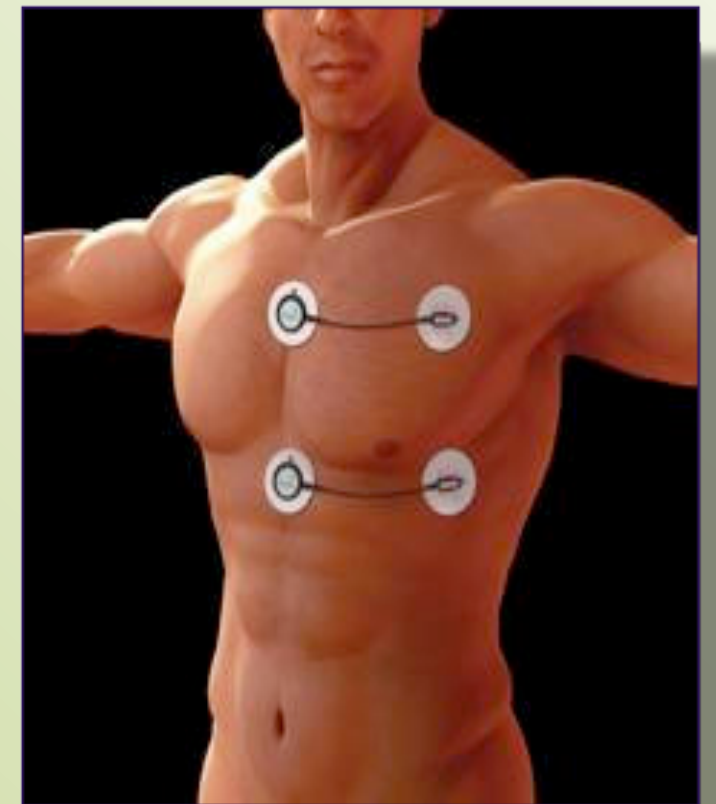
Combined uni-axial accelerometer + heartrate monitor: Actiheart

Reliable and valid measure of physical activity energy expenditure (PAEE) for youth populations (Corder et al., 2007, Barreira et al., 2009)

Step test calibration to determine individual HR – EE relationship

Data based on 4 weekdays and 2 weekend days

PAEE converted to MVPA: moderate physical activity > 3 METs





# Methods - Activity Diary



During measurement week, PA recorded in following categories:

- Physical Education
- Active transport (in general / to school)
- Organised and non-organised sports
- Work-related activities

# Study population

Secondary school students (15-17 yrs) randomly selected from 3 large schools in a middle-large city in the south of the Netherlands (pop. 204.929)  
(Data collection: October 2009 - July 2010)

- Response rate 55% (n = 82), data 8 participants excluded
- Final sample: n = 74 (38 boys, 36 girls)
- All students 100 minutes PE p/wk ( = 1 lesson p/wk)

	All (n = 74)	Boys (n = 38)	Girls (n = 36)
Age (yrs)	15,7 (0.83)	15.9 (.94)	15.6 (.69)
Height (m)	1.75 (0.1)	1.81 (.67)**	1.68 (.72)**
Weight (kg)	65.12 (11.0)	67.8 (11.4)*	62.2 (9.78)*
BMI (kg/m <sup>2</sup> )	21.33 (3.3)	20.66 (3.06)	22.13 (3.49)

\*P < .05 \*\*P < .01



# Results

Avg. minutes of MVPA per day	All (n = 74)	Boys (n = 38)	Girls (n = 36)
Weekday	114 ( $\pm 54$ )	123 ( $\pm 62$ )	105 ( $\pm 42$ )
Weekend day	98 ( $\pm 75$ )	107 ( $\pm 79$ )	88 ( $\pm 70$ )
Overall	109 ( $\pm 53$ )	117 ( $\pm 59$ )	100 ( $\pm 45$ )
Schoolday	63 ( $\pm 27$ )	65 ( $\pm 27$ )	62 ( $\pm 26$ )

Schoolday = leaving home for school - coming home from school



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# Results - PE

	All (n = 74)	Boys (n = 38)	Girls (n = 36)
MVPA in PE (minutes)	49 ( $\pm 18$ )	56 ( $\pm 16$ ) **	42 ( $\pm 17$ ) **
% of full day MVPA	12 ( $\pm 7$ )	14 ( $\pm 8$ )	11 ( $\pm 6$ )
% of schoolday MVPA	21 ( $\pm 10$ )	24 $\pm$ (10) *	18 ( $\pm 9$ ) *
AT minutes MVPA p/day	28 ( $\pm 17$ )	30 ( $\pm 20$ )	25 ( $\pm 14$ )
% of full day MVPA	26 ( $\pm 14$ )	26 ( $\pm 16$ )	25 ( $\pm 12$ )
% of schoolday MVPA	43 ( $\pm 17$ )	46 ( $\pm 19$ )	41 ( $\pm 14$ )

PE = physical education, AT = active transport

\*( $P < 0.05$ ) \*\* ( $P < 0.01$ ) denote statistically significant differences between the sexes

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# Results - Active transport

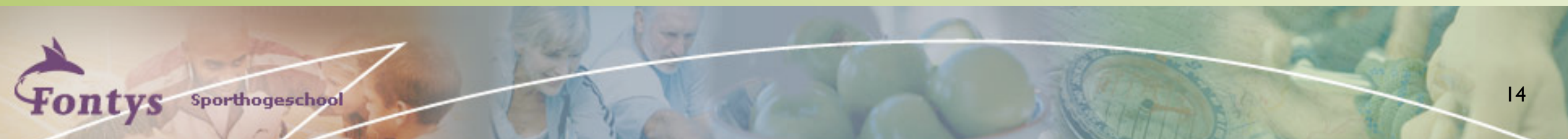
96% of the sample used active transportation to school (boys 95%, girls 97%)

	All (n = 74)	Boys (n = 38)	Girls (n = 36)
MVPA in PE (minutes)	49 ( $\pm 18$ )	56 ( $\pm 16$ ) **	42 ( $\pm 17$ ) **
% of total MVPA on Weekdays	12 ( $\pm 7$ )	14 ( $\pm 8$ )	11 ( $\pm 6$ )
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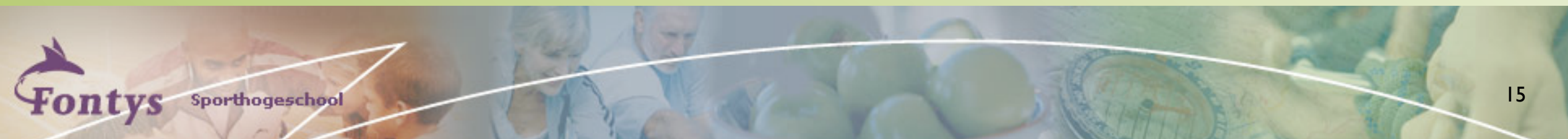
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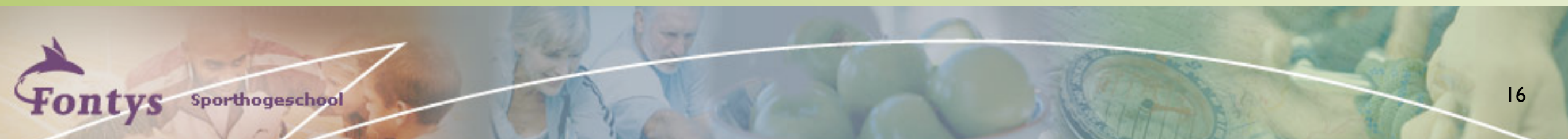


# Discussion

- First study that investigated contribution of PE and AT through measurements of PAEE, and provides insight into the order of magnitude of this contribution.
- Both boys and girls surpassed PA guidelines: However, operationalisation is a big issue!
  - This study: MVPA > 3 METs 1 min bouts
  - What happens with MVPA > 5 METs? 5 min bouts?

(See also de Vries et al., Med Sci Sports Exerc, 2009 (41) 1)

- Additional analyses needed





# Discussion

## Physical Education

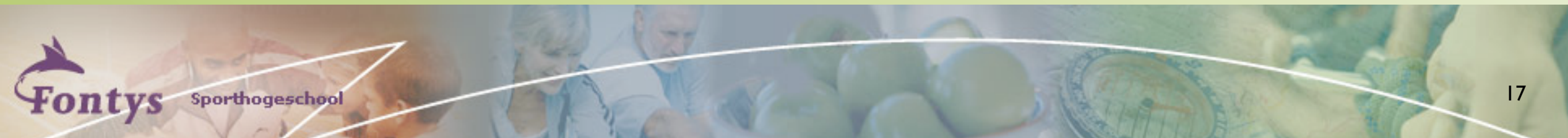
- In boys almost 25% of total MVPA during schooldays originated from PE
- Girls were less active during PE than boys: Is there an effect of the Dutch “competitive games dominated PE curriculum?”

(see also: Kulinna et al. 2003, Laurson et al., 2008, Slingerland & Borghouts, EJSS, *in press*)

- Overall 1 PE lesson accounts for 21 % of MVPA

Effective interventions strategies to increase PA:

- more PE lessons per week.....
- optimal use of allocated PE time by intensifying PE lessons without compromising other PE goals.



# Discussion

## Active Transport (AT)

- 96% of all students active transport to school
- “Born on 2 wheels”: Effect of the cycling-friendly infrastructure in the Netherlands
- Stimulating AT on all schooldays can increase MVPA by 43%



64% of schoolday MVPA = PE & AT

**PE and AT have great impact on total MVPA in adolescent boys and girls, especially in inactive populations.**



The image shows the exterior of a modern brick building, identified as Fontys Sporthogeschool. A large mural on the left side of the building depicts various sports activities. A semi-transparent rectangular box is overlaid on the center of the image, containing the text "Thank you for your attention".

Thank you for your attention

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