Correlates of Pedometer-Determined Physical Activity among Elementary School Children

Findings from the **TR**avel, **E**nvironment, and **K**ids (TREK) Study

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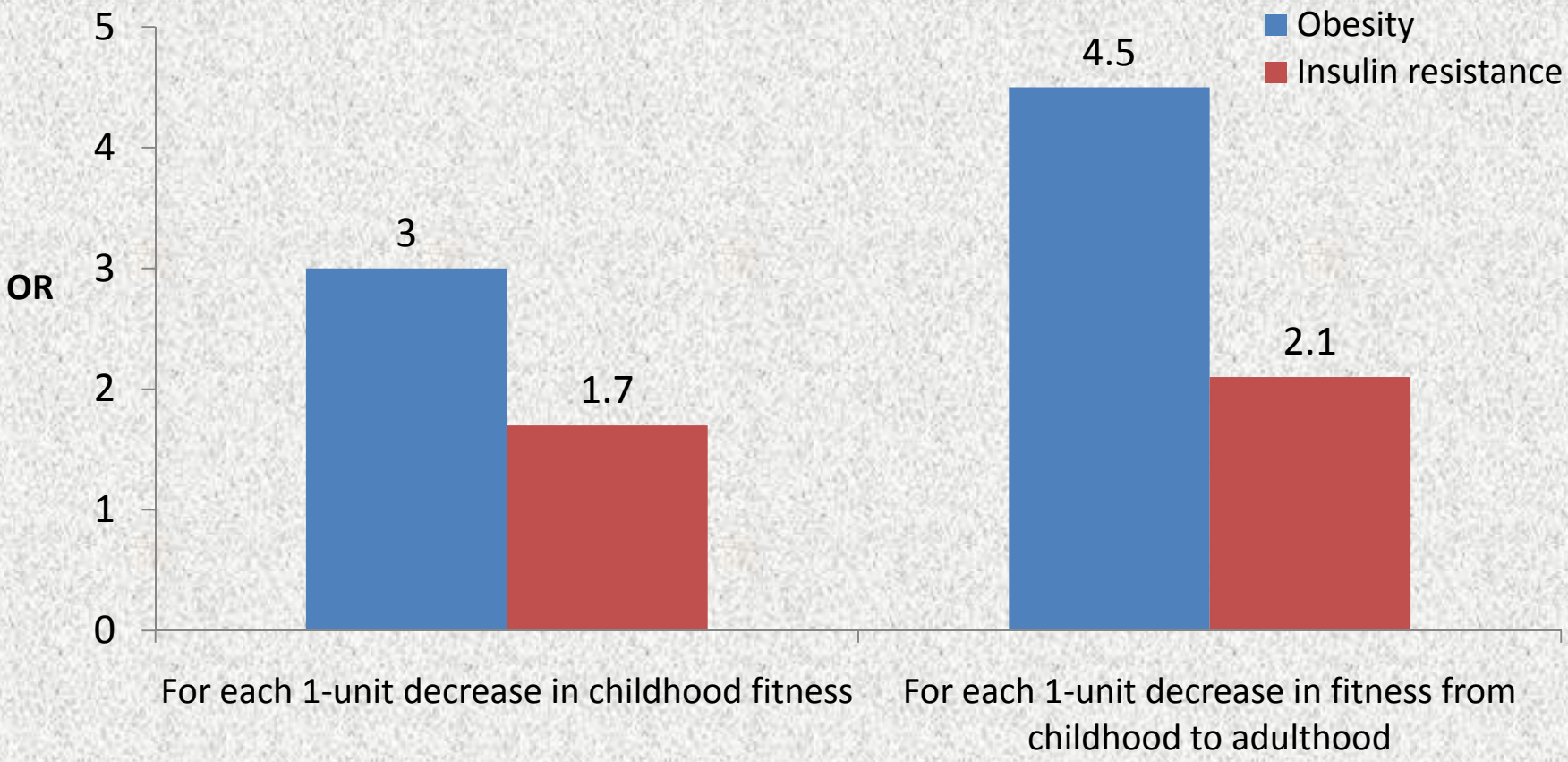
Childhood physical activity and fitness are associated with adult health

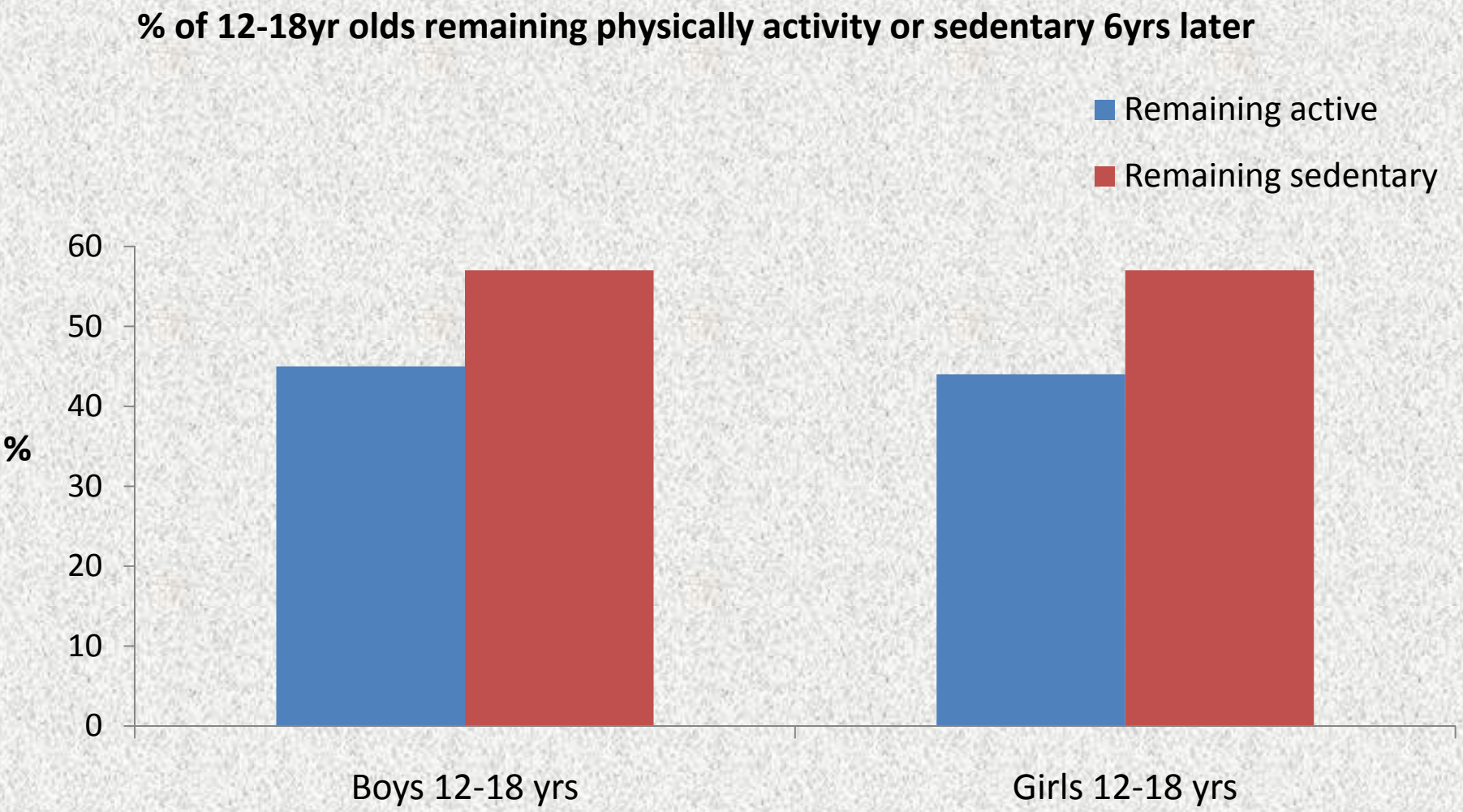
Odds ratios representing the likelihood of adulthood obesity and insulin resistance associated with childhood fitness (1985-2005; 7-15 yr olds)*



*Adjusted for demographics, baseline SES and BMI, FUP education, waist circumference

Adapted from Dwyer et al. (2009). Diabetes Care, 32, 683-687

Childhood physical activity tracks into adulthood



Adapted from Raitakan et al. (1994). Am J Epidemiol. 140, 195-205

Correlates of physical activity among children and adolescents*

*Sallis et al. (2000). Med Sci Sports Exerc. 32(5), 963-975;
*van der Horst et al. (2007). Med Sci Sports Exerc. 39(8), 1241-50

The TRavel, Environment and Kids (TREK) project

Specific objectives

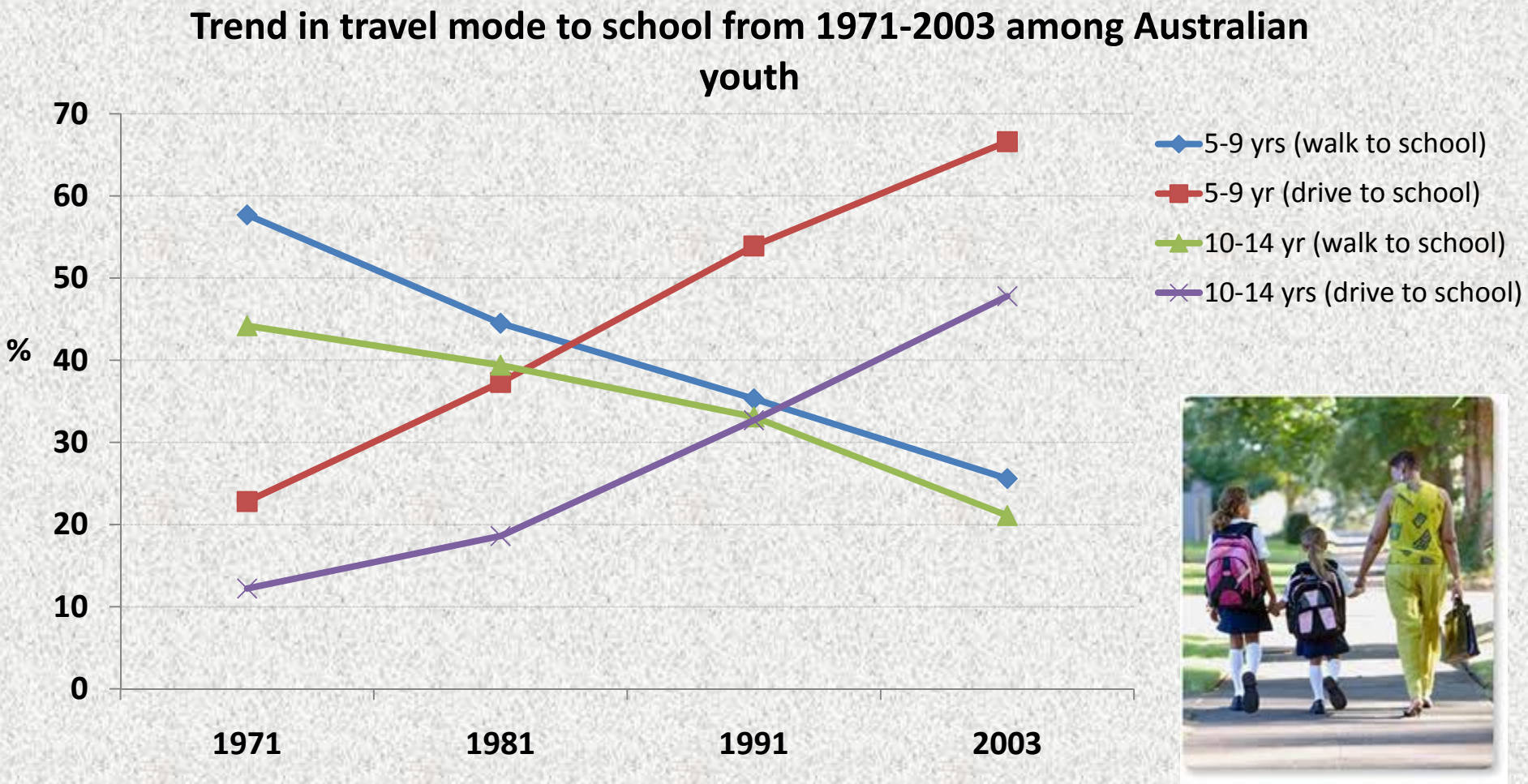
- To examine the associations between the built environment, socio-demographics, active transport, independent mobility, sedentary and leisure-time activity and 1) daily *pedometer-determined steps and 2) achieving established BMI-referenced pedometer-determined cutpoints.*

Overall project aim (TREK)

- To examine the extent to which the urban design of neighborhoods supports or discourages active transportation among grade 5-7 children attending metropolitan government primary schools in Perth, Western Australia.

Initially undertaken to address …

Active travel and physical activity among youth



Adapted from van der Ploeg et al. (2008). Prev. Med. 46, 60-62

The **TR**avel, **E**nvironment and **K**ids (**TREK**) project

Specific objectives

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Two stages

1) Creation of a school-specific walkability index
   (objectively-assessed: connectivity + road safety)

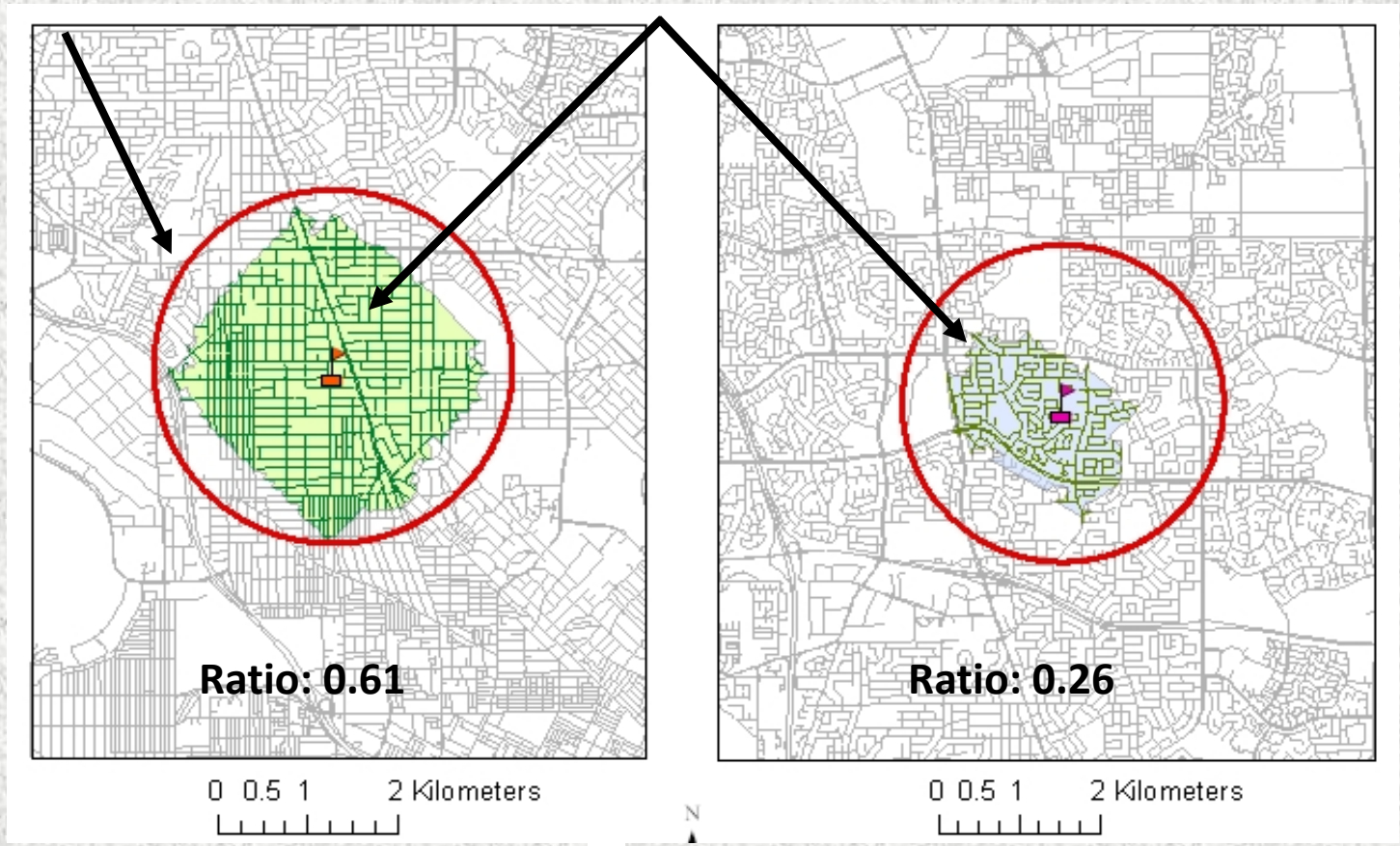
2) Cross-sectional survey
   (child survey, parent survey, pedometer data collection)

Pedshed (Connectivity)

Step 1
Area (AA) within a 2km Euclidean distance of school

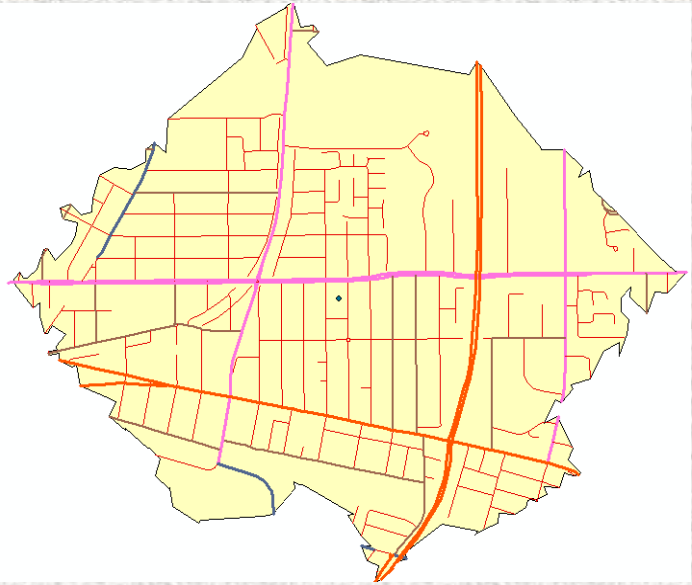
Step 2
Area within a 2km pedestrian network distance of school (i.e., Walkable Service Area: WSA)

Step 3
School pedshed calculated: WSA/AA



Road Volume Exposure (Traffic Safety)

Road Type[1]	# Vehicles/day
Primary Distributor (P)	> 15,000
District Distributor A (DA)	> 8,000
District Distributor B (DB)	> 6,000
Local Distributor (L)	6,000 max
Access Road (AR)	3,000 max
Based on Main Roads Department of Western Australia's Functional Road Hierarchy	



- Length of each road type (x 5) within 2km of each school
- Length of higher volume roads summed and divided by AR (i.e., **P + DA + DB + L / AR**)
- A high ratio of high volume : low volume roads = low walkability

Sampling: Schools and participants

- **Pedsheds** and **Road Volume Exposure** deciled and summed (walkability index: 2-20)
- School SES index tertiled (low, medium, and high)
- Schools ranked on walkability within SES tertile
- 4 top and 4 lowest ranked schools within each SES tertile recruited
- N=25 schools (RR=69.4%) with 1 class per grade per school randomly selected (>=30 children per grade or >=90 children per school)
- N=1480 children (RR=56.6%) completed surveys (July-December 2007)
  - N=1291 completed pedometer data collection
  - N=1314 parents completed a self-administered survey

Correlates from the child and parent surveys

- ***Socio-demographics:*** child's sex, grade, dog ownership, parent education, marital status, # dependents <18 yrs, home ownership

- ***Sedentary behavior :*** *screen time/day (TV/computer/video games)*

- ***Active leisure-time behavior :*** # of activities in last week: playing in park/playground/field; team sports; clubs/youth group; walking; playing in street; playing in yard, dog walking

- ***Independent mobility:*** play in neighborhood/park/street unsupervised

- ***Active transport:*** travel to and from school by motor vehicle

- ***Self-reported built environment:*** # diff. destinations w/in 10min walk of home, relative or friends house w/in 10min walk of home, neighborhood friendliness, traffic-related barriers, necessary to drive to a park with appealing equipment

Other objectively-assessed correlates:

- ***School-level social and built environment variables:*** # children in grade, average steps/day in same grade at same school, school SES, school-specific walkability index

Pedometer data

- Accusplit (AH120 M8) pedometers with built-in memory
- 7 days of data collection
- Valid counts: 1000-30000 steps/day; ≥4 days of pedometer data (day-to-day ICC=.65)

Outcomes

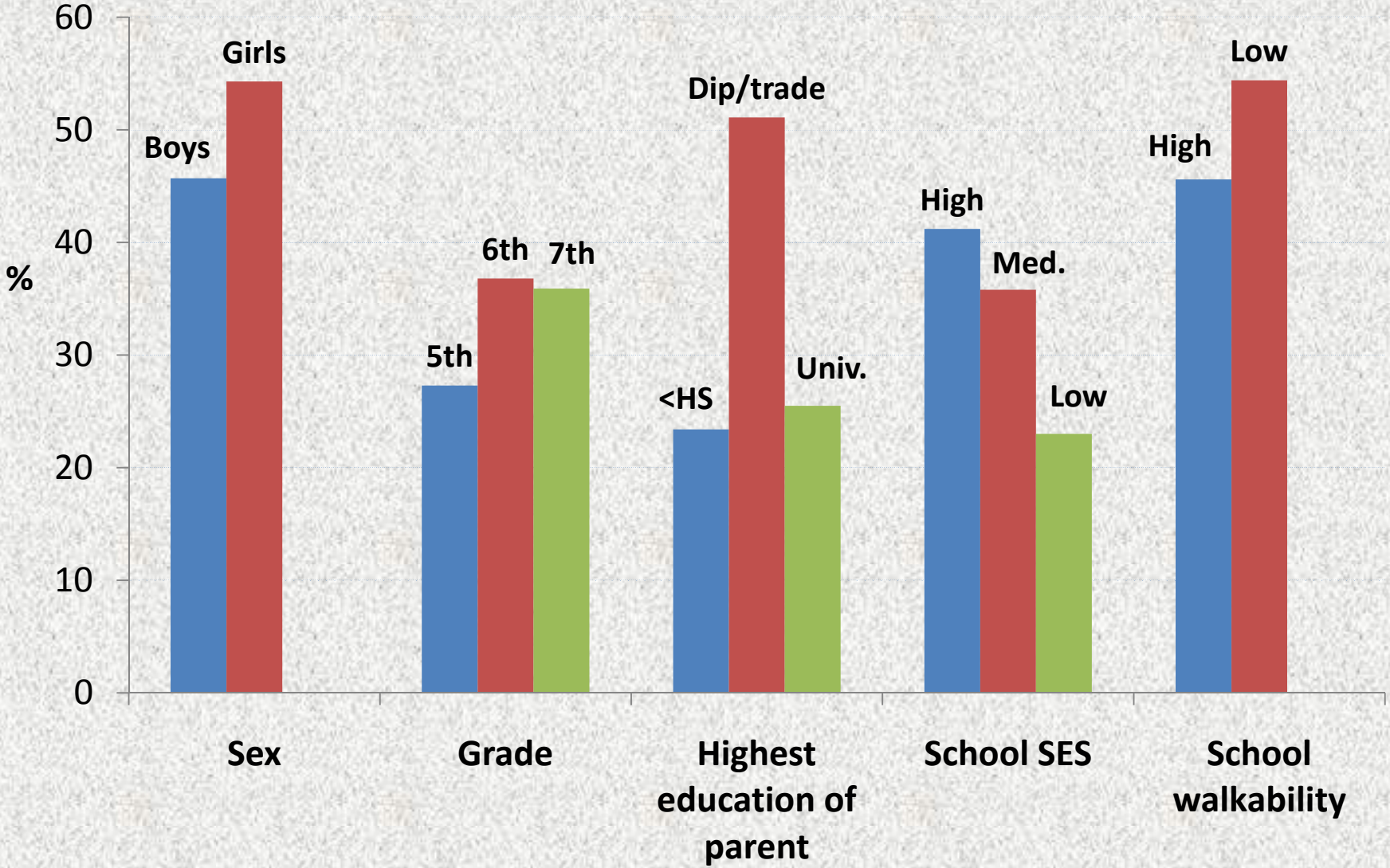
1) Average pedometer steps/day
2) Achieving ≥15000 steps/day for boys and ≥12000 steps/day for girls*

Analytical sample: n=927

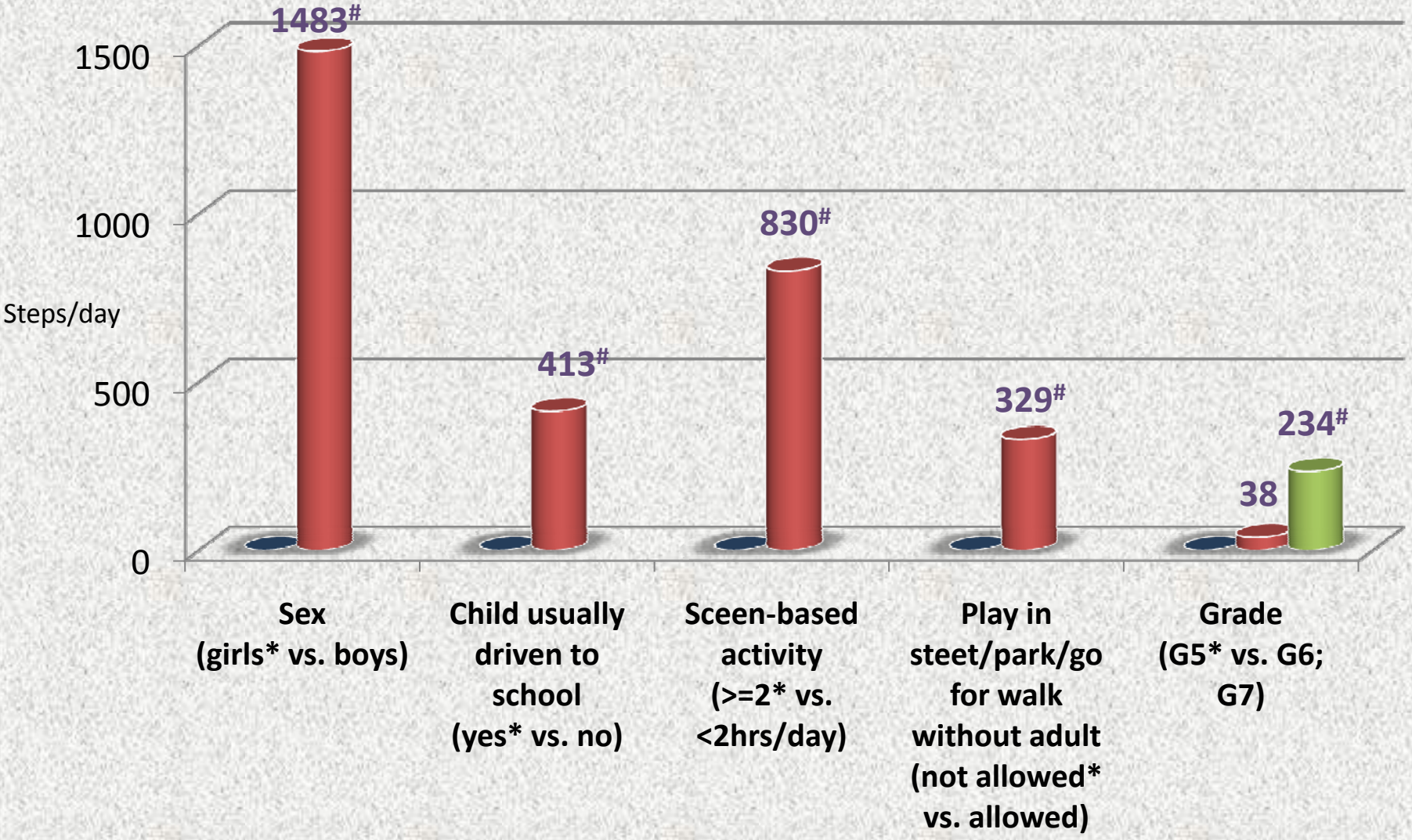
(including complete child survey, parent survey, pedometer data)

*Tudor-Locke et al. (2004). Prev. Med. 38, 857-864

Primary demographic characteristics (n=927)



Correlates of pedometer-determined steps per day



Adjusted for all correlates and school clustering

* Reference category. #p<.05.

Mean: 11407±3136 steps/day

Correlates of pedometer steps per day

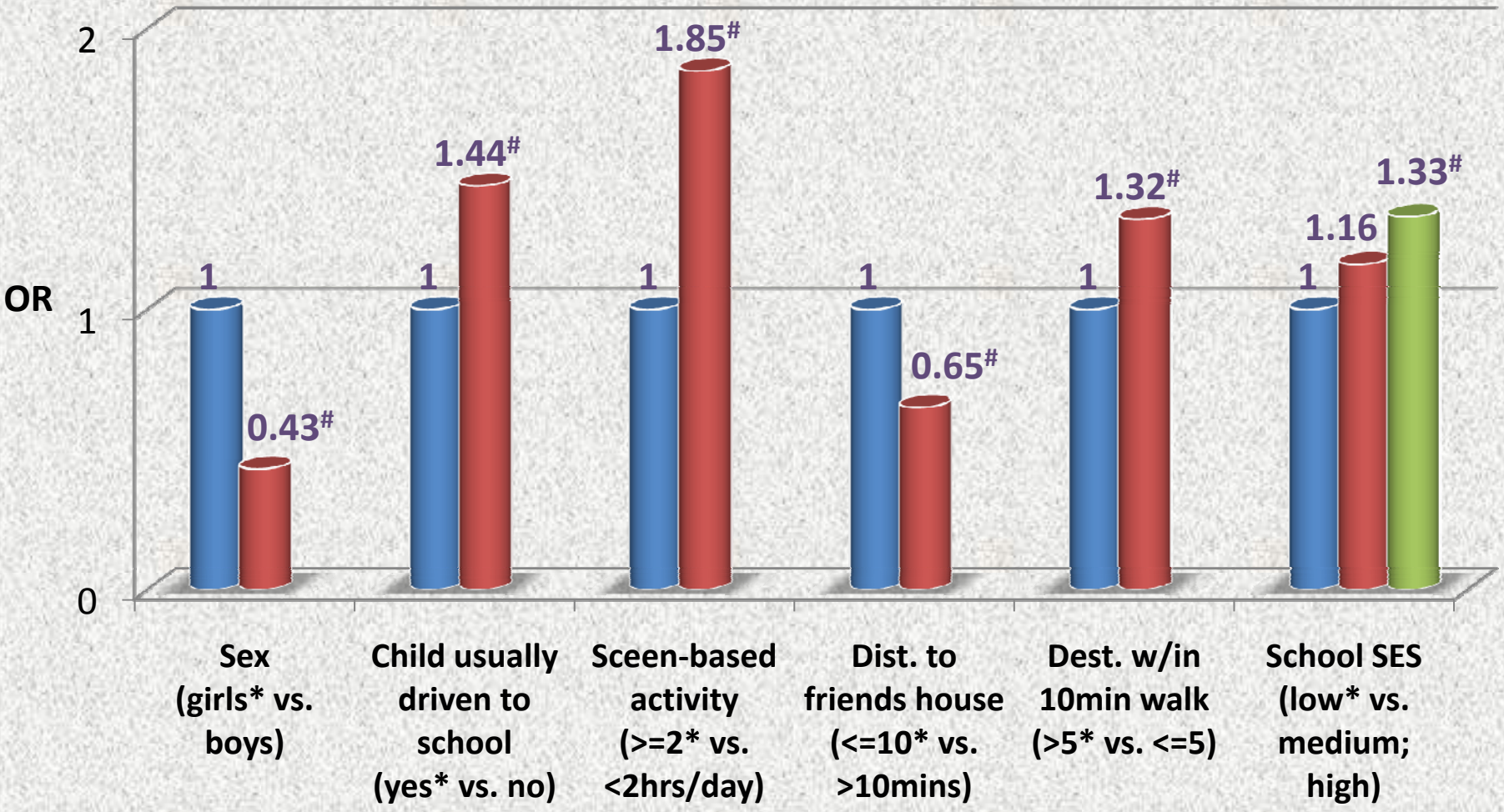
In addition…

- Steps per day were positively associated with the # weekly leisure-time activities (β=151 steps/day, p<.05)

- An idividual's steps per day were positively associated with the mean steps among students within same grade at the same school (β=432 step/day increase, p<.05; based on 500 steps/day increment)

Correlates of the pedometer cutpoints

(boys:≥15000 and girls: ≥12000 steps/day)



Adjusted for all correlates and school clustering

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% achieving cutpoint: 25.9%

Correlates of BMI-referenced pedometer cutpoints
(boys:≥15000 and girls: ≥12000 steps/day)

In addition…

- Achieving the pedometer cutpoint was positively associated with average steps among students within same grade and school (OR=1.29, p<.05; 500 step/day increment)

- Achieving the pedometer cutpoint was associated with the # students in the same grade at the same school (OR=1.03, p<.05; 5 student increment)

Conclusions

- Pedometer-determined physical activity was associated with:
  - child's behavior (i.e., AT , screen activity, leisure activity, independent mobility)
  - peer physical activity
  - neighborhood characteristics (i.e., school SES, proximity of a friend's house, destination mix)

- Sex, age, outside play, attending sports clubs, SES, active transport associated pedometer steps (Locucaides et al. 2006; Duncan et al. 2008; Hohepa et al. 2008; Le Masurier et al. 2005)

- Comprehensive multi-level interventions that reduce screen-time, encourage active travel to/from school, foster a physically active classroom culture and that make neighborhoods safer might encourage more physical activity among children

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- Mrs Bridget Beesley (GIS Research Assistant)
- Ms Claire Ruxton (Research Assistant)
- Ms Karen Villanueva (PhD candidate)
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WALK there today

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Forthcoming TREK publications:

Giles-Corti et al. (in press). *School Site and potential to walk to school: The impact of street connectivity and traffic exposure in school neighborhoods.* Health and Place

McCormack et al. (in press). *A cross-sectional study of the individual, social, and built environmental correlates of pedometer-determined physical activity among elementary school children*. Int J Behav Nutr Phys Act