Geospatial technologies to explore Dutch school commuting

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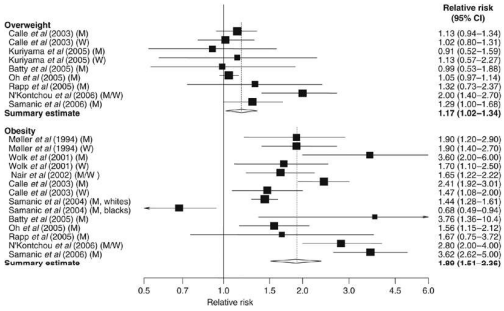
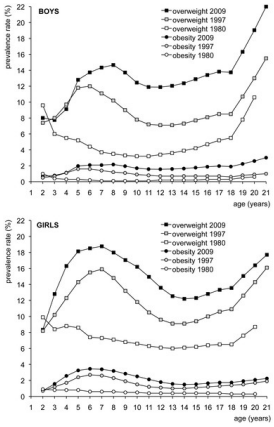
Overweight and obesity: a public health concern



(Larsson & Wolk 2007)

- Liver cancer, cardiovascular disease, type 2 diabetes etc.
- Trends alarming among children

A Dutch perspective



(Schoenbaeck et al. 2011, Makkes et al. 2013)

- Prevalence is rising
  - 4-6 times increase between 1980-2009
- Strong need for action to counteract these developments

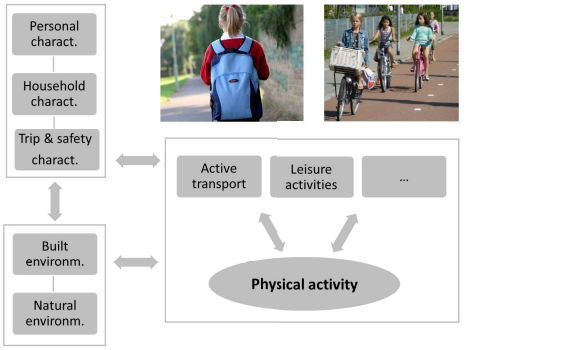
Transport-related physical activity

- Active transport to school

- 1/4 of all trips to educational institutions
- Counteract physical inactivity, support children's daily energy balance
- Cities must be designed to support walking and cycling

Study area

Conceptual model



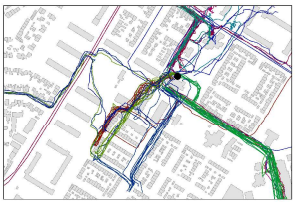
Exposure assessments

Residential/school buffer

GPS tracking

GPS data

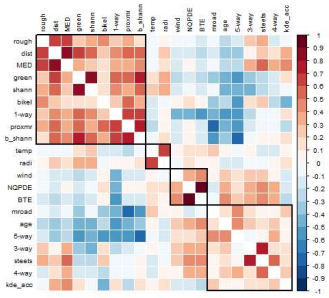
- 80 children between 6 to 11 years tracked by GPS for a 7-day period
- 623 trips from home to school or school to home



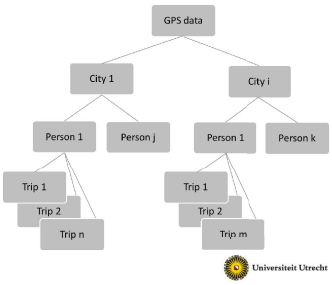
- Trip mode: response variable
  - Rule-based algorithm
  - 1: active transportation (walking/cycling)
  - 0: passive transportation (motorized)

Statistical analysis

Machine learning (elastic net) for variable pre-screening



Random effects models to explain mode choice



Statistical analysis

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Random effects

Groups Name        Variance Std.Dev.
Child (Intercept) 4.334    2.082

Fixed effects

             Estimate Std. Error z value Pr(>|z|)
(Intercept)  3.67762    3.51928   1.045  0.29603
age          0.65226    0.29817   2.188  0.02870 *
bike_path    0.04618    0.02386   1.935  0.05294 .
closeness   -0.11807    0.03717  -3.176  0.00149 **
betweenness  0.11593    0.06870   1.688  0.09150 .
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Conclusions

- Urban morphology and design affect children's transportation mode choice
- GPS is a valuable technology to explore en route exposures and activity locations
- Our findings offer decision-makers new dimensions to influence children's health outcomes through active transport.
- Planning strategies wherein good cycling infrastructure and accessibility are key
- Well designed cities encourage physical activity, promote a healthier urban living

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European Research Council

Helbich M, Zeylmans M, Dijst M, Kwan M-P, Pierik F, de Vries S 2016, Natural and built environmental exposures on children's active school travel: A Dutch global positioning system-based cross-sectional study. *Health & Place*, 39, 101-109.

Helbich M 2017, Children's school commuting in the Netherlands: Does it matter how urban form is incorporated in mode choice models? *International Journal of Sustainable Transportation*, 11, 507-517.