ALR Conference – San Diego 2007

Objective Measures of the Environment and Physical Activity – Results of the UK Environment and Physical Activity Study

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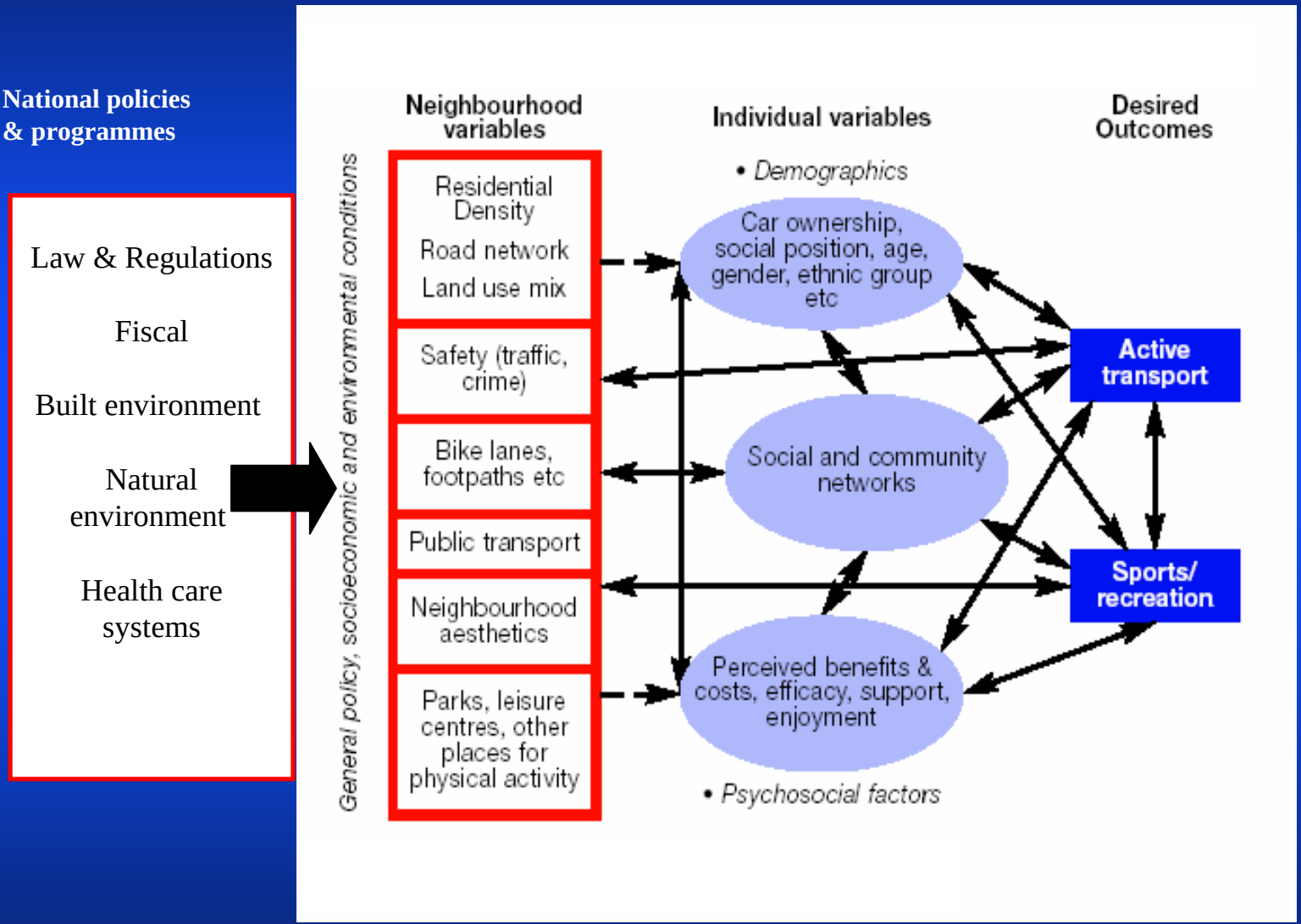
Background to study

- Earlier work: Perceived threats to safety and an absence of local destinations were associated with less walking in women. Men more likely to walk if perceived they lived near a park.
- Assess effects by gender
- Large population sample
- Need to examine the relationship of the objectively measured environment with physical activity data
- No UK based studies have explored quantifiable physical environmental barriers to physical activity

Foster C, Hillsdon M, Thorogood M. (2004b). Environmental perceptions and walking in English adults. *Journal of Epidemiology and Community Health*, **58**, 924-8.

A social-ecological model of physical activity behaviour



Foster et al (2005). Understanding why adults and children participate in physical activity and sport. London, Sport England.

Aim of study

Activity		Environment
Swimming for recreation	v	Proximity to swimming pool
Facility based activity	v	Proximity to facility
Cycling for recreation	v	Traffic levels
Walking for pleasure	v	Proximity to green space
Walking for pleasure	v	Levels of crime

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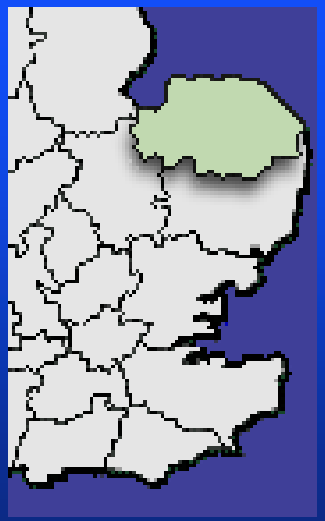
Data sources: individual physical activity

- EPIC cohort from EPIC Norfolk (University of Cambridge)
  - » Validated physical activity data (last 12 months)
  - » Postcode (position of residence)
  - » Socio-demographic data
  - » History of relevant illness
  - » 15786 adults



Data sources: measures of the environment

National Census Data disaggregated to small areas for deprivation measure (Townsend Score)

Local and national public datasets e.g. sports centres, swimming pools, crime statistics

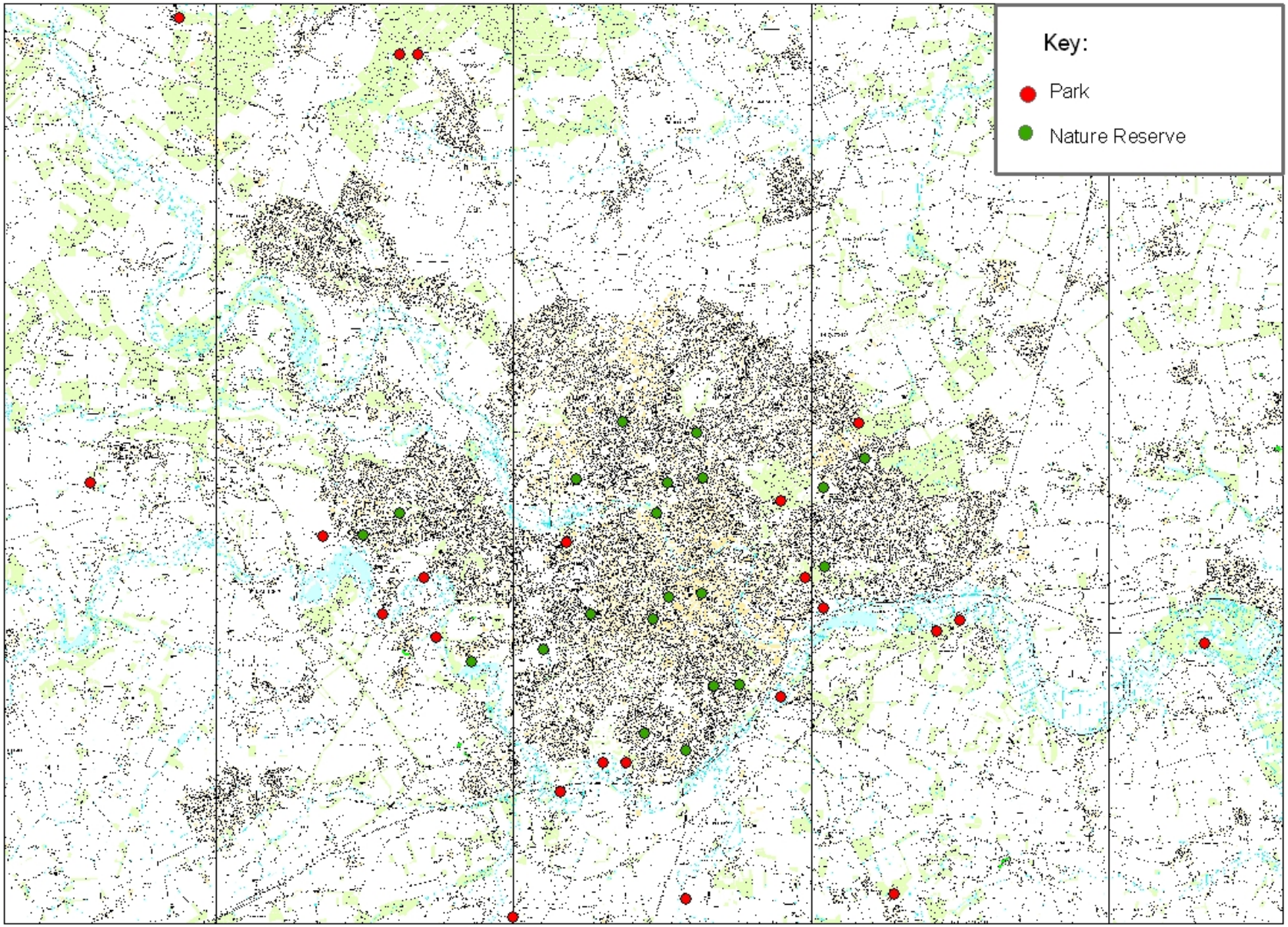
GIS from Ordnance Survey –e. g. green space, travel distances, traffic density

Data analysis

- Built a series of models in logistic regression calculating odds ratio of undertaking a particular activity (e.g. walking) associated with an environmental variable (e.g. distance to local park) adjusted for identified confounders
- Environmental variables constructed using GIS

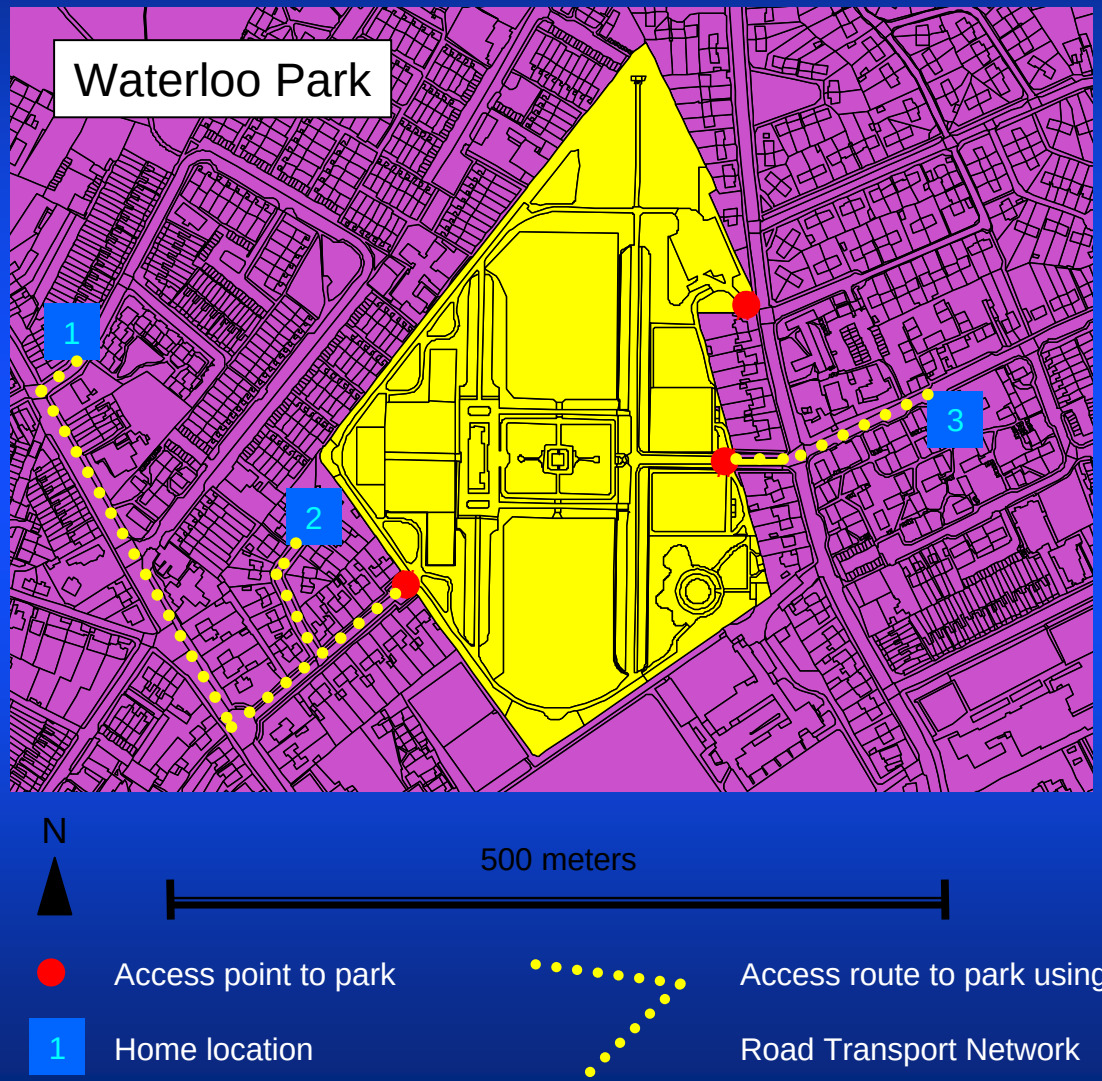
Some of the problems we encountered

- Temporality of data
  - » Needed to corroborate detailed information on facilities (e.g. access, hours)
- Accuracy of environmental data
  - » Green space data had to be physically checked and corrected (e.g. for points of access)



Map produced by Jenna Panter – UEA.

Associations of green space to recreational walking



Example proximity calculations

Home 1 to nearest park access	0.405 km
Home 2 to nearest park access	0.163 km
Home 3 to nearest park access	0.127 km

Construction of Road Traffic Volume Score

- Traffic counts not available for all roads in study area
- We calculated the total road lengths of four classifications of roads (Principle, A, B and unclassified roads) within a 2 mile radius of each adult's home location using GIS Road Traffic Network data
- Local speed data for four roads types (urban/rural)

Data sources

Data sources	Environment
Secondary data (LA) & field work	Proximity to swimming pool
Secondary data (LA) & field work	Proximity to facility
Secondary data & GIS	Traffic levels
Secondary data, field work & GIS	Proximity to green space
Secondary data & GIS	Levels of crime

- Multivariate model building (Rothman 2002) using STATA 9.2 SE

Results

Activity		Environment	Associations M	Associations F
Swimming for recreation	v	Proximity to swimming pool	0	0
Facility based activity	v	Proximity to facility	0	0
Cycling for recreation	v	Traffic levels	+	+
Walking for pleasure	v	Proximity to green space	0	0
Walking for pleasure	v	Levels of crime	0	0

Models adjusted for possible confounding variables including age, SES, educational qualifications, car access, Townsend Index, health conditions, active travel to work, occupational physical activity, recreational physical activity (minus dependent variable)

Cycling for leisure was greater when local traffic density was lower

Odds ratios (95% CI) for reporting any cycling for recreation in past month by quartiles of Road Traffic Volume Index Score (RTVIS) for 7793 female participants and 6134 male participants in the EPIC Norfolk cohort and relative contribution of the environmental variable to the variance explained in the final overall model (R^2 statistic)

Model & Nos. of cases	RTVIS	Any cycling for recreation	P value	R^2 statistic	
				En. V.*	Final Mod. [f]
Women – 7793 Final Model	Quartile 1 (Light traffic) Quartile 2 Quartile 3 Quartile 4 (Heavy traffic)	1.00 0.71 (0.60 to 0.84) 0.47 (0.39 to 0.57) 0.42 (0.35 to 0.52)	 <0.001 <0.001 <0.001	0.0151	0.0937
Men - 6134 Final Model	Quartile 1 (Light traffic) Quartile 2 Quartile 3 Quartile 4 (Heavy traffic)	1.00 0.77 (0.65 to 0.92) 0.61 (0.51 to 0.74) 0.41 (0.33 to 0.50)	 0.004 <0.001 <0.001	0.0148	0.0779

Models adjusted for age, social status, education, car access, travel mode to work, occupational physical activity.

Discussion

- Environment in Norwich does not vary much – would more variety have shown an effect?
- Measurements of physical activity were self reported
- May have been residual confounding
- Model building dependent on large number of data analysis decisions (e.g. what is a local neighbourhood?, how to group the categorical PA data)

What have we learnt?

- Developed skills in using complex multiple datasets
- Learnt importance of visually checking GIS data
- Need better (objective?) data on physical activity
- Should repeat study across an area with a greater variety of environments
- This analysis method is in its infancy and has great potential.
- Local practitioners will add detail to data

Implications for research

- UK specific measures and use of the environment
- Future studies should use both self report and objective measures of PA, and when possible, combine self-report and objective measures of the environment.
  - » Utilise GPS and GIS methods with objective measure of physical activity
- Examine dimensions of the environment that help or hinder active travel as part of the journey.
  - » Traffic outside door or between you and destination?
- Add integrate social environment into the relationship
- Focus on correlate to intervention pathways

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Environment and Physical Activity Study

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