Walking and Cycling for Healthy and Sustainable Communities

Part of £4M programme to develop ‘cross-disciplinary research consortia in the area of walking and cycling’

Impact of Constructing Non-motorised Networks and Evaluating Changes in Travel

For the role of walking and cycling in 2030
starting assumptions

walking and cycling for short journeys in urban areas could significantly:

- Reduce traffic congestion
- Contribute to a reduction in carbon emissions
- Improve the quality of the urban environment
- Promote improved personal health
Walking and cycling’s potential contribution to reducing traffic congestion
• Distance travelled on foot and by cycle continues to decline.
• Nearly two thirds of trips are under 8 km in length and two fifths under 3 km.
• One quarter of car trips are under 1.6 km where car efficiency is at its lowest
38% walking is not an important form of transport for them personally

60% never cycle

Source: National Omnibus Survey October 2002
Comparison of proportion of trips

Note. Modal split distributions for different countries are not fully comparable owing to differences in trip definitions, survey methodologies, and urban area boundaries. The distributions given here are intended to show the approximate differences among countries and should not be used for exact comparisons.

Source: Transportation Research Board, Table 2-2, p. 30.

FIGURE 1—Percentage of trips in urban areas made by walking and bicycling in North America and Europe, 1995.

Pucher and Dijkstra | Peer Reviewed
Promoting Safe Walking and Cycling to Improve Public Health: Lessons From The Netherlands and Germany
September 2003, Vol 93, No. 9 | American Journal of Public Health
Walking and cycling’s potential contribution to a low carbon transport system
Transport sector’s contribution to climate change

Road Transport contributes 23% of UK GHG emissions

An increase of 11% since 1990

Transport one of the few exceptions to downward trends in other sectors
Role of walking and cycling in reducing carbon emissions from transport

dioxide emissions. We calculate the reduction in oil consumption and carbon dioxide emissions possible in the United States if (1) obese and overweight conditions were eliminated from the adult population through the use of walking or biking for transportation, and (2) individuals between the ages of 10 and 64 adopted previously recommended levels of daily exercise by walking or biking instead of driving. Substantial co-benefits accompany widespread adoption of physical activity. Assuming substitution of cycling for driving, the reduction in gasoline demand is equivalent to 34.9\% of current domestic oil consumption. This constitutes considerably more oil than is recoverable from the Arctic National Wildlife Refuge. The concomitant reduction in US carbon dioxide emissions would constitute approximately 10.9\% relative to 1990 net US emissions and would be a substantial step toward satisfying the Kyoto Protocol.

Technological innovation on its own cannot bridge that gap even if there is a strong push on efficient vehicles and alternative fuels. The 60% target can be achieved through a variety of policy packages...but even here major change is required that combines strong behavioural change with strong technological innovation”. [p384]
‘Use car less for short trips’ is one of 12 headline behavioral goals identified by government that should be targeted to reduce carbon emissions (Defra, 2008).

Figure 10.1: People’s willingness and ability to act on 12 target behaviours including ‘use car less for short trips’ from Defra’s *Framework for Pro-Environmental Behaviour* (Defra, 2008).
Walking and cycling’s potential contribution to healthier lives
By 2050 60% of men and 50% of women could be clinically obese. Without action, obesity-related diseases will cost £50 billion per year.

The obesity epidemic cannot be prevented by individual action alone and demands a societal approach.

‘Tackling Obesities: Future Choices’
Dr Susan Jebb
Head of Nutrition and Health Research, MRC
The role of walking and cycling in tackling obesity & associated diseases

The recommendations for physical activity are supported by the scientific evidence. For general health, a total of at least 30 minutes a day of at least moderate intensity physical activity on five or more days of the week reduces the risk of premature death from cardiovascular disease and some cancers, significantly reduces the risk of type 2 diabetes, and it can also improve psychological well-being.

The research demonstrates that the 30 minutes of physical activity necessary for health benefit can be built up in bouts of 10 minutes or more. For example, it can be made up of three 10-minute brisk walks rather than catching the bus for short journeys.


This curvilinear dose-response curve generally holds for coronary heart disease and type 2 diabetes: the higher the level of physical activity or fitness, the lower the risk of disease. Curves for other diseases will become more apparent as the volume of evidence increases.
Obesogenic* environments

*defn: ‘Tending to make people fat’

Obesity Relationships with Community Design, Physical Activity, and Time Spent in Cars

Lawrence D. Frank, PhD, Martin A. Andresen, MA, Thomas L. Schmid, PhD

To evaluate the relationship between the built environment around each participant’s place of residence and self-reported travel patterns (walking and time in a car), body mass index (BMI), and obesity for specific gender and ethnicity classifications.

Land-use mix had the strongest association with obesity (BMI ≥ 30 kg/m²), with each quartile increase being associated with a 12.2% reduction in the likelihood of obesity across gender and ethnicity. Each additional hour spent in a car per day was associated with a 6% increase in the likelihood of obesity. Conversely, each additional kilometer walked per day was associated with a 4.8% reduction in the likelihood of obesity. As a continuous measure,
“Countries that rely heavily on walking and cycling have lower rates of obesity.”

had the highest rate of obesity using self-report data. The Pearson correlation coefficient between active transportation and obesity rates (based on self-report data) was $r = -.86$ ($P < .001$).
We must invest heavily in active travel

“...active travel is the magic pill: only by transforming our environment to make walking and cycling the natural choice for local travel will we be able to re-insert physical activity into people’s daily lives.”

Malcolm shepherd Chief Executive  Sustrans  http://www.sustrans.org.uk/
“the bike ...is actually really an important thing, it really gives children independence...”
The UWAC approach to researching walking and cycling
An Ecological Model Showing Environmental Correlates of Walking and Cycling

Environmental Correlates of Walking and Cycling: Findings From the Transportation, Urban Design, and Planning Literatures
Brian E. Saelens, Ph.D.
University of Cincinnati College of Medicine and Cincinnati Children’s Hospital Medical Center
James F. Sallis, Ph.D.
San Diego State University
Lawrence D. Frank, Ph.D.
Georgia Institute of Technology


**FIGURE 2** A proposed ecological model of neighborhood environment influence on walking and cycling. Double lines denote stronger relations; single lines denote weaker relations; dashed lines denote mediated relations. *Some examples of demographic variables are provided, but should not be considered comprehensive. **Psychosocial correlates of physical activity would include, but are not limited to, such variables as self-efficacy, perceived benefits, perceived barriers, social support, and enjoyment of physical activity.
Ways in which **travel decisions** are made remain **poorly understood** and this is especially the case in the context of complex and contingent **household** travel arrangements.

1. Positivistic approaches to understanding complex travel not well suited to examining micro-scale complexity of household decision making and associated travel strategies

2. Typically focused at the level of the individual person neglecting effects of situational household interactions

3. New World bias
Key aims

To develop better understanding of the complex ways in which households and individuals make everyday travel decisions about short trips in urban areas.

To provide new evidence of how different individuals make decisions about walking and cycling and how they respond to different interventions by focusing on neglected areas of micro-scale household decision making.
‘We believe that without more widespread use of qualitative techniques in travel behaviour research, we will make little meaningful progress towards improving our fundamental understanding of travel behaviour’.


UWAC research seeks to fill important research gap by providing an in-depth analysis of household decision making with respect to short journeys in urban areas using mainly qualitative methods.
research starting assumptions

• Walking and cycling are **distinct entities** even though they are frequently linked together in travel policies

• Much travel is **contingent on** the decisions and commitments of other family members

• Decision making about travel mode and route choice is dependent on a **complex interaction** of social, economic, cultural, environmental and psychological variables

• Walking and cycling needs as much (if not more) **planning** as travel by car
Conceptualization of the decision to cycle

### Some Questions to Guide the Research

<table>
<thead>
<tr>
<th>Question</th>
<th>Answer</th>
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</thead>
<tbody>
<tr>
<td>How are walking and cycling incorporated into everyday routines of families, households and individuals?</td>
<td>How do walking and cycling as everyday means of transport interact with other modes?</td>
</tr>
<tr>
<td>Do most individuals construct an identity of themselves and others as cyclists or walkers?</td>
<td>How are decisions about specific walking and cycling routes made?</td>
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<tr>
<td>How do specific interventions to promote cycling and walking affect everyday decision making about short-distance travel?</td>
<td>How is the particular complexity and contingency of travel decision making best conveyed to planners and policy makers?</td>
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</table>
overview of work packages
9 work packages

1. scoping
   Literature review, stakeholders, site selection

2. survey
   Travel behaviours, attitudes and perceptions

3. analysis of urban form
   More ‘objective’ measures of physical environment

4. Interviews
   In-depth household interviews

5. audio travel diaries
   Digital voice recorders and cameras

6. ethnographies
   Researchers embedded in households

7. integrated analysis & method appraisal
   Draw key themes, triangulate, interpret

8. develop user toolkit
   To inform transport planners and policy makers

9. final stakeholder discussions
   Workshops, to identify key policy issues, disseminate findings
literature review

walking

cycling

automobilities

built environment

neighbourhood

social capital

identities

household decision-making

risk

health
case study site selection

Rationale:

• selected sites to maximise diversity and inclusiveness in terms of size, population, demographics, characteristics, travel behaviour

• aim to generalise about the nature of processes, to allow inferences and theory to be developed

• not aimed at statistical representativeness, to estimate the distribution of behaviours or attitudes in the population
# Case Study Site Selection

<table>
<thead>
<tr>
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<th>Worcester</th>
<th>Lancaster</th>
<th>Leicester</th>
<th>Leeds</th>
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<tbody>
<tr>
<td>Population*</td>
<td>93,353</td>
<td>133,914</td>
<td>279,921</td>
<td>715,402</td>
</tr>
<tr>
<td>Index of Multiple deprivation **</td>
<td>185</td>
<td>135</td>
<td>23</td>
<td>114</td>
</tr>
<tr>
<td>Non-white British ethnic group (Eng ave = 13%)*</td>
<td>6%</td>
<td>5%</td>
<td>39%</td>
<td>11%</td>
</tr>
<tr>
<td>Connect2 intervention</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Sustainable travel town?</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Cycling Demonstration town?</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
</tr>
</tbody>
</table>

* 2001 census data
** English Indices of Deprivation 2007 rank of average rank, where 1 is most deprived and 354 least deprived
stakeholders

- stakeholders from key policy bodies and local authority members from case study areas invited to contribute to advisory board
- act as constructive advisors
- help obtain maximum outreach for findings
- not to change fundamental aims or methods of research, but to help shape it in ways to maximise its relevance to practitioners and policy-makers
overview of study methods
quantitative & contextualising
questionnaire 1: purpose & method

• to gather background data on travel behaviours, attitudes and intentions
• to identify households to participate in qualitative study
• postal survey of 4000 households at 4 case study sites
• sampling strategy: households within urban LSOAs (Lower Super Output Areas) stratified by Index of Multiple Deprivation
questionnaire 2: theoretical underpinning

Theory of Planned Behaviour

spatial network analysis

Configuration and topology, important context for qualitative stages of research

Importance of permeability and proximity: does a more compact, dense & diverse pattern of land use, with good street connectivity increase levels of walking and cycling for everyday activities?
multiple centrality assessment (MCA)

A set of theories and techniques for the objective analysis of spatial configuration and its impact on how people use spaces.

Based on the premise that the configuration of the urban street network is a key determinant of movement.
urban design qualities

Propensity to walk and cycle may be related to other features of the physical environment, land use mix and transport system characteristics.

Components of built environment: origin and destination points, routes and surrounding areas.

Variables: Spatiophysical and spatiobehavioural.

Data sources: government data (e.g. census), GIS datasets, fieldwork.
overview of study methods
qualitative & interpretative
Three **methods** applied to **10 households** in each study area
Total sample of **120 households** (@240 people)

I. in-depth household interviews
   - Individual & household interviews over 12 month period
   - Focus on decision making

II. the collection of audio travel diaries
   - Study periods (totalling 4 weeks) over 12 month period
   - Observation
   - Researcher led interpretation
   - Collected for four one week periods over 12 months
   - Route choice & experience whilst mobile and before & after the journey

III. detailed ethnographic study of the household decision-making process

On-going process of transcribing and analysing data in order to **triangulate** between different methods.

**Q-Methodology** employed as interpretative technique to analyse subjectivities and discourses.
The ethnographic toolkit

**Home**
- Mobilities inventories – acquisition of, access to, and conflicts over mobility resources, and indication of household’s mobility diversity/richness
- Network maps – interrogation of destinations and mode choice, households as trip-generators
- Mapping exercises – interrogation of routes and mode choice
- Travel diaries - where they go, when, why
- Interviews – attitudes (affective) to different modes of mobility, meanings, motivations, intentions, justifications
- All nested in participant observation (PO)

**Journeys**
- Neighbourhood tours – constraints and affordances
- Going-along – embodied experiences (experimenting with audio recorders and video cameras)
- PO of quantity and quality of journeys– social capital, local(ised) lives

**Networks**
- PO and interviews at destinations (e.g. playgrounds) – inter-relationships between mode choice and networks, other social practices, belonging (local/extra-local), identities. How different modes of mobility contribute to the construction of particular lives.

Courtesy Dave Horton and Griet Schelderman colleagues at University of Lancaster
Forthcoming outputs

Conference presentations
- Velo-City
- Walk 21
- RGS-IBG
- World Conference on Transport Research

Journal articles
- Methodologies
- Preliminary results
Final outcome

to develop a toolkit that helps planners, policy makers and others concerned with promoting more sustainable travel practices in urban areas to target policies and interventions more effectively
THANK YOU

Questions welcome
[& ideas/proposals for collaborative research]

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