

Understanding Walking and Cycling: A Multi-Method Approach to Investigating Household Decision Making in Relation to Short Journeys in Urban Areas.

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Abstract

It is widely recognised that an increase in walking and cycling for short journeys in urban areas could help to reduce traffic congestion, improve the quality of the urban environment, promote improved personal health, and contribute to a reduction in carbon emissions. However, there remains only limited understanding of travel behaviour in relation to short journeys where walking and cycling could provide a viable travel option.

This paper provides an overview of a 3-year EPSRC funded study titled 'Understanding Walking and Cycling' which aims to examine ways in which decisions about using cycling and walking for everyday trips in urban areas are embedded in the personal, family and life-course constraints and perceptions of individuals and households. It describes the rationale behind the multi-method approach being utilized in four different urban areas in England that differ with regards to their physical environment, social and cultural characteristics and the level of local intervention to promote sustainable travel. Drawing on this rich and informative dataset, a toolkit will be developed that will assist policy makers in their efforts to encourage a shift towards walking and cycling for short journeys in urban areas.

1. Introduction

This paper presents an overview of research titled 'Understanding Walking and Cycling' (UWAC) which is being co-ordinated by Lancaster University in partnership with the University of Leeds and Oxford Brookes University. The 3-year study which commenced in October 2008 is one of three studies¹ funded under the Research Councils' Energy Programme co-ordinated by the Engineering and Physical Sciences Research Council (EPSRC) that is investigating walking and cycling. The UWAC study brings together researchers with backgrounds in geography, sociology, anthropology, psychology, urban planning and transport studies with particular expertise in social scientific approaches to understanding human behaviour. A full understanding of why people do (and do not) walk and cycle is essential to the development of policies that can achieve more effective modal switch to sustainable travel and it is here that the UWAC research hopes to make a valuable contribution.

This paper is organised as follows. Section 2 highlights the challenges facing policy makers in encouraging modal shift for short journeys, draws attention to the sparse research evidence in this field, and argues the need to develop a better understanding of walking and cycling using a different approach to research than is typically the norm in the travel behaviour field. Section 3 provides an overview of the study objectives and the underlying assumptions about walking and cycling around which the study is built. Section 4 provides an overview of the research approach. Section 5 reflects on the challenges of analysis and interpretation of results. General reflections are provided in section 6 about the UWAC approach and how it will contribute to knowledge in this field and the likely beneficiaries.

2. The need to develop a better understanding of walking and cycling

It is widely recognised that an increase in walking and cycling for short journeys in urban areas could help to reduce traffic congestion, improve the quality of the urban environment, promote improved personal health, and contribute to a reduction in carbon emissions. This is demonstrated by a wider range of policy initiatives by national and local governments, by health authorities and a variety of non-governmental organisations, and a wide range of research literature on the health impacts of walking and cycling, on travel choices, and on the impacts of environmental interventions to promote sustainable travel. Many of these have been examined in a series of recent systematic reviews and bibliographies (Handy, 2005; NICE 2006; DfT 2006 and Ogilvie et al, 2004, 2007). However, ways in which travel decisions are made remain poorly understood, especially in the context of complex and contingent household travel arrangements. In particular there is only limited understanding of travel behaviour in relation to short journeys where walking and cycling could provide a viable travel option and more sustainable alternative to the private car. This section highlights the potential to increase everyday walking and cycling before highlighting the limited approach to understanding travel behaviour specifically in relation to these methods of travel.

The potential for everyday walking and cycling

The average number of trips² per person per year has remained fairly constant over time at around 1000 per person per year. However, the distance people travel and the time spent travelling has increased mainly due to the dispersal of activities and increased travel by car. Mackett & Robertson (2000) have conducted a useful in-depth analysis of the National Travel Survey to establish the potential for mode transfer of *short trips*³ from car to walking,

¹ The two other studies are *iConnect (Impact of COConstructing Non-motorised Networks and Evaluation of Changes in Travel)* led by University of Southampton and *Visions for the Role of Walking and Cycling in 2030* led by University of Leeds.

² The basic unit of travel, a trip, is defined as a one-way course of travel having a single main purpose.

³ The authors define a short trip as a distance of up to 8km (5 miles).

cycling and public transport. This confirms that the number of short trips is decreasing and being replaced by longer trips and that the car is being used more for *all* trip lengths. The trend, therefore, is towards fewer opportunities being available to conduct journeys on foot or by bicycle.

Despite this trend, however, a significant proportion of journeys are still within the range where walking and cycling offers an efficient mode of travel – see Table 1.1 below. For the period 1997 to 1999, of the 1046 trips made per person per year, 70% were below 5 miles. Moreover, one quarter of car journeys were under two miles and over half (57%) were under 5 miles.

Table 1.1: Percentage of journeys by main mode distance, 1997/99 (Source: Mackett & Robertson, 2000)

Per cent	All under 1 mile	All under 2 miles	All under 5 miles	5 miles and over
Car	8	25	57	42
Walk	79	96	100	0
Bicycle	24	53	82	12
Local Bus	5	23	73	28
Other	2	9	39	52
Total	27	44	70	30

Table 1.2 below shows the modal split for each trip length. Cycling represents only 2% of all journeys travelled under 2 miles and 2% under 5 miles compared with 35% and 51% (respectively) of all journeys over the same distances travelled by car. This highlights that short trips are dominated by the car except for very short trips of less than one mile where walking dominates. The authors clearly demonstrate the scope for increasing the proportion of trips by cycle for trips between one and five miles in length.

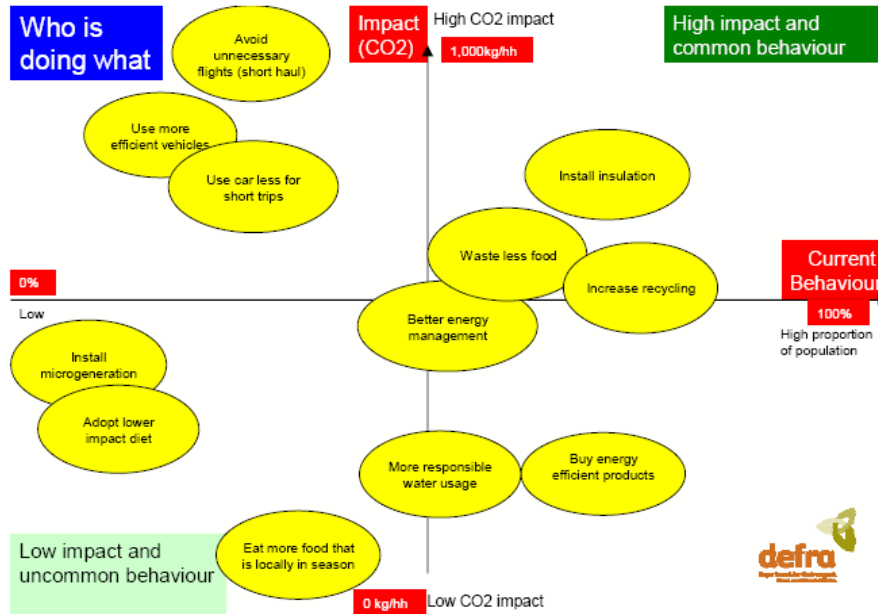
Table 1.2: Percentage of journeys by distance by each main mode, 1997/99 (Source: Mackett & Robertson, 2000)

Per cent	Total %	All under 1 mile	All under 2 miles	All under 5 miles	5 miles and over
Car	62	18	35	51	86
Walk	27	80	58	39	0
Bicycle	2	1	2	2	0
Local Bus	6	1	3	6	5
Other	4	0	1	2	7
TOTAL	100	100	100	100	100

Shifting behaviour from short car journeys to walking and cycling remains a significant challenge as highlighted by a study on pro-environmental behaviour by the Department for Food and Rural Affairs (DeFRA, 2008). This study identifies a range of headline behavioural goals⁴ ranging from low to high impact (in relation to carbon reduction) and easy to hard (in relation to individual's willingness and ability to perform the behaviour) and provides evidence on the potential for behaviour change. It reveals that the current take up of transport and travel cluster of activities is modest relative to other pro-environmental behaviours despite their high impact on carbon emissions (see Figure 1.1)

⁴ The 12 headline behaviour goals spanned across clusters including food and drink, homes and household products, travel and tourism and personal travel.

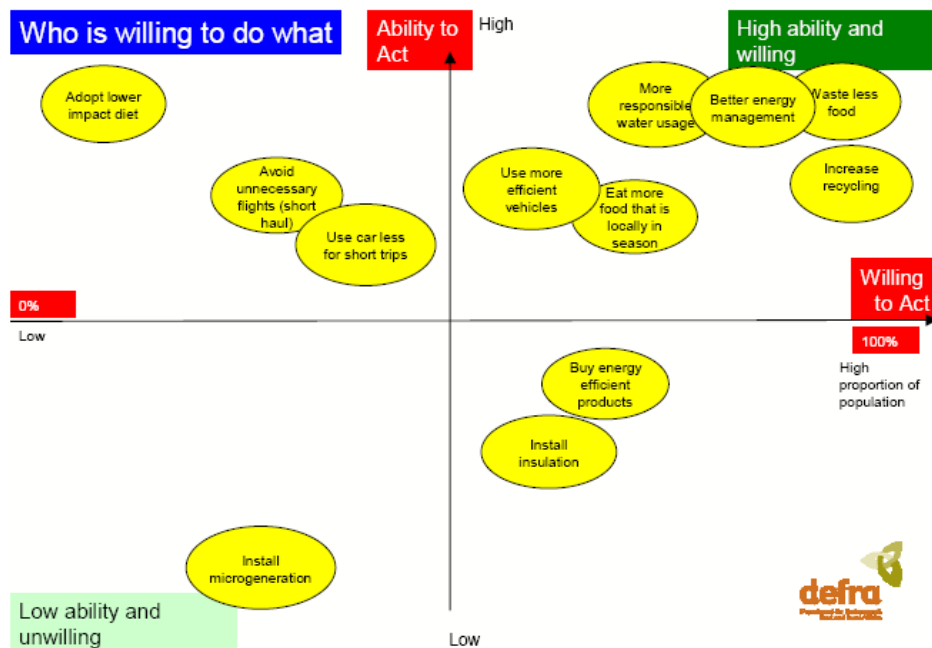
Figure 1.1: Current take up of behaviours and their impact (Source: DeFRA, 2008)



The specific behavioural goal of *using car less for short trips* could have a significant impact on carbon emissions but the apparent low willingness and low ability amongst the public to act is palpable (see Figure 1.2). The UK Energy Research Centre (2009) estimates that increasing the share of cycling in Britain to levels closer to those of our Northern European neighbours could yield emissions savings of around 2 MtC (7.3Mt CO₂) per year (approximately 6% of total transport emissions by source) if like-for-like mode switching was delivered. It has also been estimated that walking and cycling could cut demand for travel by car by 1.6% and 1.2% respectively in an ‘ambitious change scenario’⁵ and by 5% or more in the longer term using a more intensive package of measures (Sloman, 2003). Moreover, targeting short trips by car that could potentially be replaced by walking and cycling does not require a large investment by government (at least relative to other big infrastructure solutions) to make them an option for most people (Mackett, 2001; 2003). It is clear then that there is a large untapped potential to increase cycling (and walking) for short journeys in urban areas. Even modest success in increasing walking and cycling in British cities could have major health benefits for individuals, the economy society and the environment.

⁵ Sloman defines an *ambitious change scenario* as one where all large cities and metropolitan areas develop a programme covering half their population by 2010.

Figure 1.2: The public's willingness and ability to act (Source: DeFRA, 2008)



Limitations of current approaches to understanding travel behaviour in relation to walking and cycling

There remains only limited understanding of many aspects of travel behaviour. A systematic review of the effectiveness of interventions to encourage walking and cycling by the National Institute for Clinical Excellence (NICE, 2006; pp37-38) argued that travel behaviour theories do not address fully the range of factors operating at different levels and over different time periods. Policies and interventions to promote walking and cycling, therefore, are being developed which may lead to unintended effects and limited success.

The limitation of the dominant (logical positivist) approach to travel behaviour research in general and particularly the application of micro-economic theories to travel choice modelling has been highlighted (see for example Gärling, 1998). More recently Walker (2006) acknowledged, 'While there is elegance in simplicity, we are regularly faced with complex underlying processes that are driving reality resulting in failures of our parsimonious models to explain highly heterogeneous behaviour at the micro scale ...'. Indeed, much of the recent research and policy literature on walking and cycling focuses on issues such as journey purpose, time, distance, and the physical environment whilst neglecting the effects of personal and household factors or, at best, reducing them to a series of summary variables relating to personal characteristics such as age, household size and gender (for instance Alfonzo, 2005; Lockett et al 2005; Filion et al 2006; Handy et al, 2006; Salmon et al, 2007; Dawson et al 2007; Alton et al 2007; Kingham and Ussher 2007). This reductionist approach, however, is not well-suited to examining the micro-scale complexity of household decision making and associated travel strategies. Moreover, most of the existing literature relates to studies in North America and (to a lesser degree) Australasia, and again, much of it uses a mainly quantitative approach.

Notwithstanding the limited (and one-sided) research into the real (not hypothetical) potential for mode transfer for short trips from car to walking and cycling, some research is moving in this direction. The most relevant is the work of Mackett (2001, 2003) which uses qualitative techniques to explore why people use cars for short trips, and demonstrates the need for more research that focuses on everyday short journeys - Mackett estimates that with the

present infrastructure 31% of trips could be transferred from car to walking and 78% could be shifted to some alternative mode.

There is clearly need for more research at the micro-scale, particularly in relation to walking and cycling, and on the impacts of different forms of intervention. The UWAC research differs from most research in this area in that it deliberately focuses on the complexity of decision-making in relation to *actual trips* undertaken by individuals and households. It will provide new evidence on how individuals make decisions about walking and cycling and how they respond to specific interventions, by focusing on the neglected areas of micro-scale household decision making.

3. Objectives of study and underlying assumptions

The main objectives of the UWAC study are twofold:

1. To develop a better understanding of the complex ways in which households and individuals make everyday travel decisions about short trips in urban areas particularly in relation to walking and cycling.
2. To develop a 'toolkit' that helps planners and policy makers and others concerned with promoting more sustainable travel practices in urban areas to target policies and interventions more effectively.

The research is also designed to interrogate a key set of assumptions about walking and cycling:

- First; Walking and cycling are usually linked together in policy and analysis - typically referred to as 'non-motorised modes' or 'active travel' (and even 'slow modes' which is often not the case over shorter distances in congested urban settings!). *It is argued that in practice they are very different travel modes requiring distinct resources and decision making processes. The UWAC study will consider them as two separate entities.*
 - Second; Planning and policy frameworks tend to assume that walking and cycling have much more limited planning (and infrastructural) implications than other forms of transport. *It is argued that, in practice, both activities require complex planning decisions at the individual and household scale that may make them more difficult to achieve than (for instance) travelling by car.*
 - Third; Many short trips in urban areas will be relatively spontaneous and unstructured and thus subject to decision-making frameworks that differ more from regular or longer journeys. *It is argued that decision making frameworks developed for other forms of transport may thus not be appropriate.*
 - Fourth; Everyday travel is almost always contingent on the decisions and commitment of others (especially family members). Individuals rarely have an entirely regular or predictable pattern of behaviour. *It is argued that elements of contingency cannot be adequately captured by the predominantly quantitative models of travel behaviour routinely used.*
 - Fifth; Decision making about mode, route and other factors relating to short trips in urban areas is complex and involves the interaction of a wide range of individually situated social, economic, cultural, environmental and psychological variables. *It is argued that most existing (and largely quantitative) models of travel behaviour include only generalized personal characteristics (typically age , gender etc) and fail to capture this complexity.*
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4. The UWAC Research Approach

'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'.

Clifton, K.J. & Handy, S.L. (2001)

The UWAC research aims to bridge a (perceived) gap between qualitative and quantitative research on travel behaviour (see Burnett, 2007, for discussion on this divide). It will adopt intensive and innovative qualitative methods linked to established quantitative techniques to assess travel behaviour and the physical environment in which these are *situated* in order to develop a fuller understanding of how decisions about short-distance everyday mobility are made and about how these decisions – especially with regard to walking and cycling – are embedded in individual and household circumstances. The main emphasis however is on in-depth qualitative research (Silverman, 2006; Marshall and Rossman, 2006; Gibbs, 2007) in order to examine individual, family and household decision making.

The study adopts a similar approach to that adopted by Jarvis et al. (2001) in a study which specifically focused on local contexts of contemporary urbanisation and the dilemmas and solutions that people routinely find in the reproduction of their everyday lives. This work placed particular emphasis on the need to consider the household as a key unit of analysis in understanding household decision making in the context of residential location and travel to work. The UWAC study will also focus on the household as the basic unit of analysis. Walker (2006) notes that, '*Behavior is a result of higher level constructs beyond easily observable socio-economic variables. Behavioral constructs along this vein include various attitudes, perceptions and capabilities such as spatial cognition, lifestyle, environmental consciousness, technical proclivity, and risk aversion*'. The research will investigate precisely these *higher level constructs*. It will seek to uncover the ways in which economic, social, cultural, environmental and perceptual factors (amongst others) interact to construct different personal identities of walking and cycling and the implications these have for interventions designed to promote more sustainable travel.

The objectives outlined in the previous section will be explored through a series of research questions which have not been adequately addressed in the existing research literature (see Figure 1.3 below). In doing so, a much fuller understanding of why people do (and do not) walk and cycle for short journeys will be developed. This is essential for developing policies that can achieve more sustainable local travel.

Figure 1.3: Questions to guide research

- What is regarded as a 'short trip', in what context and by whom?
- How are walking and cycling incorporated into everyday routines of families, households and individuals, and how does this relate to journey purpose?
- How are decisions about specific walking and cycling routes made and how do these relate to the physical, aesthetic and social characteristics of the local environment?
- Do most individuals construct an identity of themselves and others as cyclists or walkers, and how do these 'cultures of cycling and walking' affect travel decisions?
- How do walking and cycling as everyday means of transport interact with other modes (for instance many trips are multi-mode and most involve some travel as a pedestrian)?
- How do specific interventions to promote cycling and walking (for instance Travel Smart, Connect2) affect everyday decision making about short-distance travel?
- How is the particular complexity and contingency of travel decision making with respect to cycling and walking best conveyed to planners and policy makers so that it can be incorporated into the development of policies and interventions?

The mixed methodology approach will be applied to households in four different neighbourhoods located in Lancaster, Leeds, Leicester and Worcester. These urban areas were selected because of practical issues of access to apply intensive research methods

over a protracted period. However, the rationale applied in selecting the broad case study areas (in conjunction with stakeholders) was first; that each has low to moderate existing levels of cycling and walking (based on limited existing data); second, each is relatively self contained (though of varying scale and character) and has a range of everyday facilities within about 3km (easy walking and cycling distance); and third, there is a mix of social groups and potentially different varieties of ethnic composition. In selecting the case study sites consideration was also given to the level of intervention in relation to encouraging walking and cycling. This could vary from no perceivable interventions, physical interventions such as Sustrans' Connect2 and high profile promotional measures such as the Sustainable Travel Towns initiative. Table 1.3 below provides a summary of the characteristics of these case study locations.

Table 1.3: Characteristics of selected case study locations

Case study location/parameters	Worcester	Lancaster	Leicester	Leeds
Population*	93,353	133,914	279,921	715,402
Index of Multiple deprivation **	185	135	23	114
Non-white British ethnic group (Eng ave = 13%)*	6%	5%	39%	11%
Connect2 intervention	Yes	No	Yes	No
Sustainable travel town	Yes	No	No	No
Cycling Demonstration town	No	Yes	No	No
*2001 census data ** English Indices of Deprivation 2007 rank of average rank, where 1 is most deprived and 354 least deprived				

Three distinctive (mixed) methodologies will be applied to the four case study areas and these are outlined below.

i) Survey of households across case study areas

A questionnaire survey of a sample of 4000 addresses across each of the four study locations is being conducted in September 2009. The 2007 Index of Multiple Deprivation (IoMD) was used to stratify a sample at the level of Lower Super Output Area⁶ (LSOA) to enable a representative sample to be drawn and to identify addresses only in urban areas. The questionnaire focuses on actual travel behaviour, travel preferences and perceived barriers and is theoretically underpinned using the Theory of Planned Behaviour (Ajzen, 1991). The main purpose of the questionnaire survey is to provide context of travel behaviour and preferences from which a sample for in-depth research can be drawn. However, there is also the potential for the survey findings to be generalised to each case study location and comparisons made *within* and *between* study locations. Moreover, there is the possibility to link geo-coded survey data to the spatial analysis which is now discussed below.

ii) Spatial analysis of study locations

The UWAC study is sensitive to context both at the household level and within the built environment through which travel takes place. Associations between aspects of the built environment and people's willingness to walk and cycle have been hypothesised and tested by researchers from the fields of urban design, planning, transport and more recently public

⁶ Each LSOA contains a minimum of 1000 people or 400 households.

health. So-called ecological models acknowledge the influence on walking and cycling behaviour of a wider range of factors such as individual, social, cultural, organisational, community, physical environment and policy (Saelens et al., 2003). A recent review of papers investigating built environment correlates of walking reveals a consistent set of conclusions on the significance of proximity, mixed land use and density on levels of walking (Saelens and Handy, 2008) but the evidence is less clear for cycling.

Data will be collected within each case study location on attributes of the built environment using a combination of secondary data sources, spatial network analysis and systematic audit approaches to assess urban structure and 'walkability' and 'cyclability' around the home and between the home and key destinations accessed over short distances. Lee and Moudon (2003) draw a distinction between three categories of measurement viz. spatio-physical (physical aspects of the environments), spatio-behavioural (types and intensity of human uses) and spatio-psychosocial (internal responses to being in a specific environment). It is anticipated that the spatio-physical (objective) data collected by the methods outlined above will be able to be compared with results from the spatio-psychosocial (subjective interpretations) and spatio-behavioural data (i.e. walking and cycling behaviour) collected from the questionnaire survey. Along with the rich set of qualitative data that will be collected using the methods discussed below, this will provide a basis on which to investigate subjective interpretations of the urban context in which travel takes place.

iii) Application of intensive qualitative methods

The core methodology used to explore attitudes to and experiences of short trips in urban areas will be a series of household ethnographies. A total of 20 families (five in each location) will be recruited. In each town all five families will live in the same area of the city to control for variations in urban structure and transport provision. Each family will be investigated intensively over a period of three months with up to five repeat visits. Each research area will be investigated sequentially, thus the Lancaster ethnographies will be conducted September-November 2009, with the other towns following at 3 monthly intervals. The ethnographies will use five main investigative tools: in-depth interviews, observations, mapping exercises, mobility inventories and 'go-alongs' (see Carpiano, 2008, for a full discussion of this method). In addition participants will be asked to keep a travel diary/activity inventory and participate in an on-line blog relating to their travel activities. The ordering of these interventions may vary depending on household circumstances and some (especially interviews) will be repeated during the research period. Together, these instruments will allow the construction of a very detailed picture of the complexity and contingency of everyday travel behaviour for 20 households.

In addition, less intensive qualitative data will be collected from a larger sample of respondents in each city. A total of 40 questionnaire respondents (10 in each town) will be selected for in-depth interviews about their everyday travel decisions, especially as they relate to walking and cycling. Each respondent (together with as many household members as possible) will be interviewed twice (with a period of at least six months between interviews). The first interview will focus on current travel activities and the second will examine change over time. A further sample of 40 respondents (10 in each location also selected from the questionnaires) will be identified for a series of 'go-along' interviews. These are designed to provide an audio account of one specific trip (20 walking and 20 cycling) focusing on the experience of the journey and the barriers encountered⁷.

In total qualitative data will be collected from 100 families (25 in each town) with multiple interventions and a range of different techniques.

⁷ 'Go-along' interviews have replaced the audio travel diaries mentioned in the original proposal as the research team considers that this approach will yield much more useful data.

5. Analytical and Interpretative Challenges

The UWAC study promises a very large qualitative data set which captures both the diversity and complexity of travel behaviour. Throughout the project there will be a constant process of transcribing and analysing data as they are collected so that the results from one study period can feed into the next. There will also be on-going triangulation between the different qualitative methodologies. The study team are sensitive of the need to be able to convince policy makers of the rigour and significance of qualitative data on travel behaviour (given that this literature is dominated by quantitative research as stated earlier).

A range of techniques will be used therefore, in the completion of analysis and interpretation of qualitative data. Q methodology will be used to apply some degree of objectivity to the analysis of textual data. Q methodology provides a rigorous framework for the analysis of subjectivity and it combines elements from both quantitative and qualitative approaches to research (Mckeown and Thomas, 1988; Brown, 1996; Shemmings 2006). The possibility of applying aspects of complexity theory to represent and convey these ideas will also be explored. Complexity theory applies scientific principles to the understanding of complex social systems and may provide a mechanism to develop a model or tool that sits comfortably within the framework of contemporary transport planning (Byrne, 1999; Law and Mol, 2002). A detailed appraisal of the mixed methodologies used which may be of use to organisations such as *Sustrans* in on-going monitoring and evaluation of their programmes will also be provided.

6. Conclusion

Flyvbjerg (2001, p166) argues that to re-enchant and empower social science we must do three things: first, resist trying to emulate natural science's success in producing cumulative and predictive theory; second, address problems that matter to communities at every scale; and third, effectively communicate research findings to fellow citizens. The approach of the UWAC study follows Flyvbjerg's logic and acknowledges the importance of context and complexity and the need to move beyond the analytical and technical towards a richer, more reflexive analysis of walking and cycling.

This paper has described how this will be achieved through the application of a mixed-method approach with emphasis on qualitative methods to understand the complexity of everyday social reproduction. It will address directly problems that matter in seeking to improve well-being and quality of the environment through promoting more sustainable travel in urban communities. To ensure that the output from the study is relevant to practitioners there is ongoing engagement with a stakeholder advisory group representing a range of organizations with an interest in walking and cycling.

Finally, in communicating results, not only will the research inform academic debates about the nature of travel behaviour and how it is embedded in communities and in everyday life, it will also better inform practitioners including transport planners, policy makers and pressure groups concerned with managing travel demand in urban areas and devising interventions to encourage walking and cycling for short journeys. The ambition is to make a contribution to existing knowledge that helps to facilitate radical change towards enhanced levels of everyday walking and cycling.

We hope to be able to report our findings at the next Cycling and Society Research Group Symposium in September 2010.

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