

# Understanding walking and cycling using a life course perspective

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## **ABSTRACT**

Understanding of how walking and cycling change over time has been restricted to looking at time series data that reveals aggregate change, and time-limited longitudinal studies of individual behaviour. This thesis presents a study of the change and continuity in individual behaviour over the life course as well as inter-generational influence of, and inter-cohort similarities and differences in behavioural pathways.

The behavioural trajectories of adults from two historically-separated birth cohorts, and parent-child dyads, were studied using biographical approach. Interpretive, visual biographies were produced that illustrated behavioural development through life events and transitions. Typologies were constructed to resolve common and distinct pathways in behavioural development.

Behaviour change often accompanied changes in residence, employment, family structure and mobility resources. Some distinctions in trajectories were apparent along the dimensions of gender and cohort. The life-long potential for behaviour change was demonstrated by some adaptive, restorative and negative changes that occurred in later life. There was empirical suggestion that earlier cycling experiences were generative of, and influential on, later outcomes, and that some aspects of macro-level social and structural change had brought about cohort distinctions in the opportunity structure for walking and cycling over the life course.

Findings were consolidated in a conceptual life course framework that proposed micro and macro-contextual influences of behaviour and addressed the temporal, gendered and inter-generational aspects of trajectory development. Emerging adulthood and, more tentatively, the work-retirement transition were periods of higher propensity for change that preceded periods of relative stability in the life course and behaviour.

The findings have applications in the pursuit of measures to support life-long walking and cycling. Some recommendations for policy are made in light of indications that life course experience had distinguished some gender and cohort groups in their ability and readiness to make restorative change in behaviour.

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# 1 INTRODUCTION

Health and travel surveys from population samples indicate that large proportions of the UK population report levels of physical activity that are insufficient to benefit health and low proportions of travel that are performed by active modes. Such signals have led policy makers and practitioners to identify promotion of active travel and lifestyles as a policy objective. However, understanding of individual behavioural change and continuity is limited given that much data collected on travel or physical activity does not follow individuals over time. As a consequence we have limited understanding of how walking and cycling, as modes of transport and forms of physical activity, increase, diminish, persist, cease, are restored or adapted through the life course. Such knowledge could inform efforts to support the promotion of walking and cycling as life-long practices.

This thesis presents research conducted in a UK context that sought to enhance understanding of the development of walking and cycling over the individual life course. This introductory chapter proceeds with clarification of this research interest in a public health and transport context, with reference to the contemporary position of policy in both areas. The sections that follow set out the theoretical orientation and overview of the study and structure of the thesis.

## 1.1 Why study walking and cycling over the life course?

### 1.1.1 Public health perspective

Physical activity is associated with reduced risk of many chronic health conditions including cardiovascular diseases, depression, diabetes, some cancers, hypertension, obesity and osteoporosis (Warburton *et al.* 2006). In addition to prevention, physical activity can alleviate the symptoms for many of these and other conditions including osteoarthritis, back pain, dementia and respiratory disease (Nelson *et al.* 2007). Many of these health benefits are realised in the long term, accrued from the cumulative

effect of regular activity. Some links have been revealed between physical activity in earlier life stages and later positive health outcomes, for instance delayed cognitive decline (Middleton, 2010), preserved physical function and delayed physical impairment (Pluijms, *et al.*, 2007; von Bonsdorff and Rantanen, 2011) and reduced risk of Chronic Obstructive Pulmonary Disease (Hirayama *et al.* 2010). Improved health and functioning can reduce or delay an individual's need for health and social care.

Despite unequivocal evidence of its preventative and therapeutic value, survey data indicates consistently that the majority of adults do not achieve recommended levels of physical activity<sup>1</sup>. Based on self-report data, the 2008 Health Survey for England (HSE) showed that only 39% of men and 29% of women reported this level of activity or higher (NHS Information Centre, 2009). HSE captures episodes of activity across four domains; domestic work, walking, sports and exercise and occupational activity. These are then summed to calculate an individual's total level of activity. Accelerometry is an objective measure of physical activity and has been conducted with a smaller sub-sample in the HSE. This has suggested that the proportions that are sufficiently active were as low as 6% of men and 4% of women.

As a large, population-based sample the HSE is an important source of information on time spent in multiple domains of physical activity, however self-reported measures are subject to recall and assessment errors and the perceived pressure to give a socially desirable response. The criterion validity of the self-report physical activity instrument in HSE has yet to be established unequivocally (Orrella, 2007). Accelerometry gives a more accurate reflection of volume of activity and energy expenditure however it does not capture activities such as swimming or cycling.

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<sup>1</sup> The Chief Medical Officer's recommendation is for adults to have 30 minutes or more of moderate or vigorous physical activity on at least five days per week (DH, 2004)

HSE also reveals differences in physical activity participation by age group across the adult population. In 2008 the proportion of men meeting the physical activity guidelines consistently diminished across age groups, with a more substantial decrease between age groups bordering retirement age (Allender, Foster and Boxer, 2008). There was a more significant decline in the twenties age group when occupational activity was excluded. The proportion of sufficiently active women is lower but more consistent across adult age groups until the sixties when again the decline between age groups is a more significant.

Physical activity is bodily movement produced by skeletal muscle that involves energy expenditure. This qualifies both walking and cycling as physical activity behaviours. Walking and cycling are similar in the respect that both are performed for transportation and leisure purposes. However, walking as a fundamental form of human movement is incidental to many activities of daily living. This means in the course of a day an individual will perform physical activity in numerous bouts of variable duration and intensity. From HSE it is difficult to assess the contribution of total walking and cycling to total physical activity. In 2008 HSE respondents reported, as a specific domain, bouts of walking activity of a 'fairly brisk' intensity. Only bouts that lasted over ten minutes were counted towards total levels of activity. Walking activity that was shorter, or not judged by the respondent to be of sufficient intensity, was not reflected. Further it has been recognised that self-report measures are likely to under-estimate routine or incidental walking (NHS Information Centre, 2009). Cycling activity was reported within the domain of sports participation and therefore cycling for transport is not captured. Men and women walked on average 2.2 and 1.9 hours per week, respectively (NHS Information Centre, 2009).

Using the HSE 2008 data Bélanger *et al.* (2011) described the physical activity profile of adults who met the CMO's recommendations. Walking was the most important contributor of physical activity for every age category among women, and most in men.

For women, across all age groups, domestic activities represented a large and relatively stable proportion of activity whereas the importance of such activities increased with age amongst men. Occupational physical activity was a relatively more important source of activity across middle age categories in comparison to the youngest and oldest adults. The importance of exercise and fitness and team sports decreased with age for both sexes. The contributions of non-team sports, outdoor and leisure pursuit activities were fairly stable but relatively small across age categories for men, and the least important contributors among women.

HSE permits analysis of population level changes in different physical activity domains over time. However due to differences in the way some questions have been asked between years the view on temporal trends is restricted to the period 1999-2004. Over this period Stamatakis *et al.* (2007) found a rise in levels of overall physical activity and walking and sports participation, while occupational activity and cycling as sport declined. However the authors emphasised the need to be cautious of interpreting this as an insight into the longer term picture. Firstly, a five year time series may be too shorter a duration for a temporal trend to be evident. Secondly, the observed increases in non-occupational physical activity, which concur with trends detected in other countries, are paradoxical to the contemporaneous rise in obesity prevalence. This lead them to speculate whether media attention to rising obesity has increased public awareness of physical activity recommendations with the effect of increasing the likelihood of a social desirable response to physical activity questions.

To reiterate then HSE can reveal a picture of physical activity levels in the population at a point in time, and change over time in average reported activity at a population level, albeit one that is affected by measurement issues. This does not illuminate change within an individual over time.

A basic tenet of health research is that people develop and change over time and that this is affected by cumulative experience of, or exposure to, various biological, social

and physical factors. Allender, Hutchinson and Foster (2008) found some evidence that physical activity declines between some life stages or at some life events. Health research tends to frame individual development as processes of growth, maturation and ageing, or by life stage, gestation, childhood, adolescence, adulthood and later life. An alternative longitudinal framework is offered by the life course perspective. This is a common theoretical perspective in the study of human development over time that amalgamated in sociology and psychology and has more recently been applied in the study of health behaviours. Individual behaviour is conceptualised as a dynamic process rather than a static risk category and is a framework oriented to explaining how earlier experiences shape later outcomes. As well as the fluidity of development the life course perspective emphasises the interaction of different life course domains, the interdependency of separate life courses and their situation within the historical context as important in understanding how the life course unfolds. A more detailed introduction to the life course perspective is given in section 1.3.

In summary there appears to be significant potential to improve the population health if individuals were more active over their life courses. Alongside significant gains in quality of life this could substantially reduce demand for health and social care which with an ageing population represents a significant challenge for the UK. As physical activity that can be achieved in the pursuit of travel and recreation there is potential to increase levels of activity through walking and cycling. The health benefits of active travel were demonstrated in a longitudinal study of Copenhagen residents where the mortality risk of people who cycled to work was 39% lower than those who did not over a fifteen year period (Anderson, *et al.*, 2000). However to understand how the population can be supported to increase, maintain, restore or adapt their walking and cycling through the life course requires long term, longitudinal study of these behaviours, a knowledge gap which is not being met by current research.

### 1.1.2 Transport perspective

Routine transport data can reveal secular trends in population level walking and cycling. Road traffic count data shows a long term change in distance cycled and driven in motor vehicles on roads in Great Britain (Figure 1 and Figure 2). Between 1949 and 1973 the annual distance cycled declined from 14.7 billion miles to 2.4 billion miles from which point forwards it has fluctuated below 4.0 billion miles. In the last ten years there has been a gradual increase in distance cycled to 3.1 billion miles (DfT, 2010). Meanwhile the annual distance driven by cars and taxis has increased from 12.6 billion miles to 240.7 billion miles in 2011 (DfT, 2010). These changes took place in a period of fairly steady population growth.

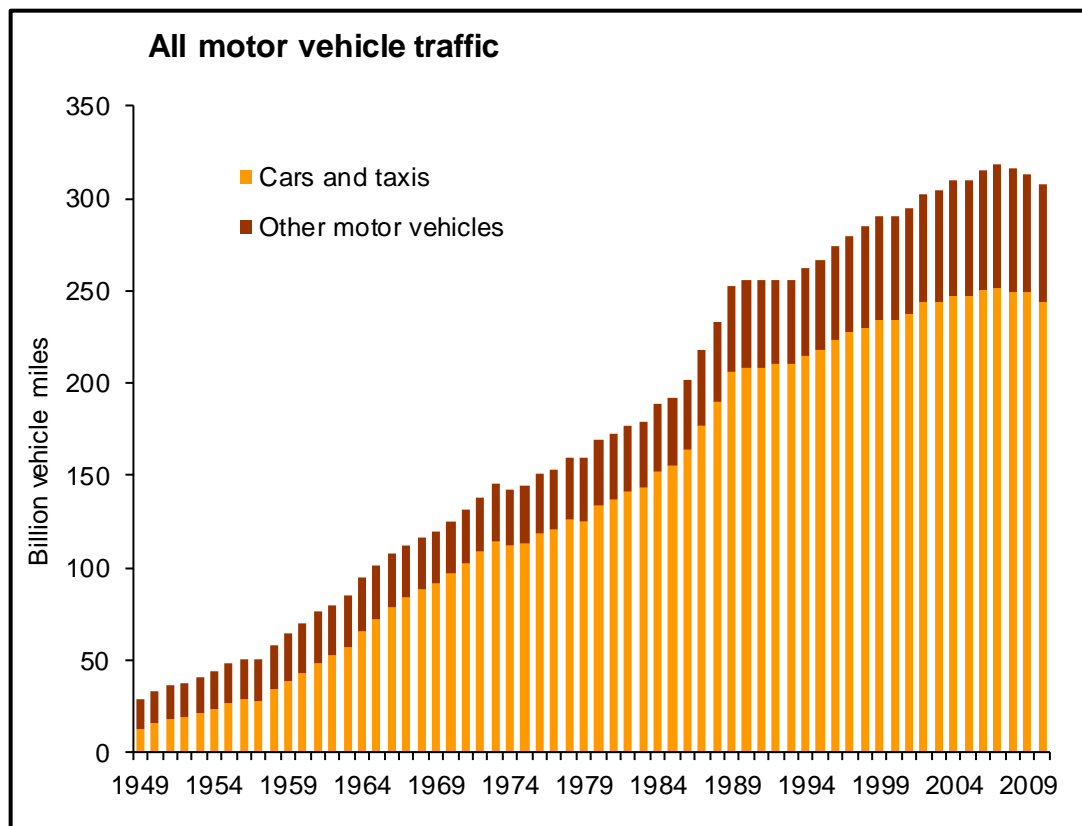
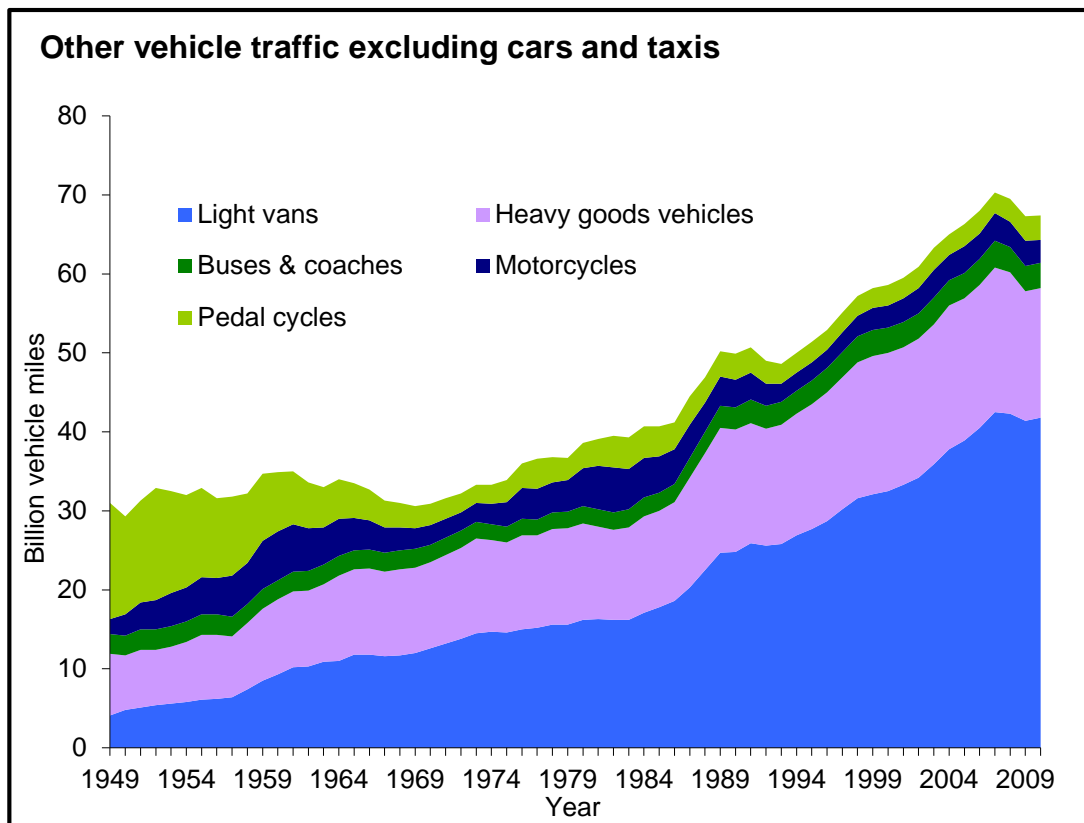


Figure 1 Vehicle traffic on roads in Great Britain, 1949-2009



**Figure 2 Other vehicle traffic on GB roads, 1949 - 2010**

Source: National Road Traffic Survey, DfT, 2010

The National Travel Survey (NTS) is an annual cross-sectional survey of personal travel in a population-based sample. It captures both walking and cycling activity undertaken for transport purposes. However until recently it has captured only journeys that begin and end in different places. It now includes walks that start and finish in the same place but not similar cycle rides. Despite the fact that NTS data relies on self-reported, unvalidated measures which require participants to recall trips and estimate trip distances, it is still considered the most comprehensive source of data on individual travel behaviour. The average annual distance cycled per person declined from 43 miles in 1995/7 to a low of 36 in 2005, returning to 43 in 2008/10 (Figure 3). Average distance walked has declined from 200 miles per person annually in 1995/97 to 190 miles in 2008/10<sup>2</sup> (Figure 3). Figure 4 shows that the average distance cycled and

<sup>2</sup> changes to the methodology undermine analysis of a longer time series.

walked by age group. This shows that distance cycled declined across adult age groups and walking increased into the forties before declining.

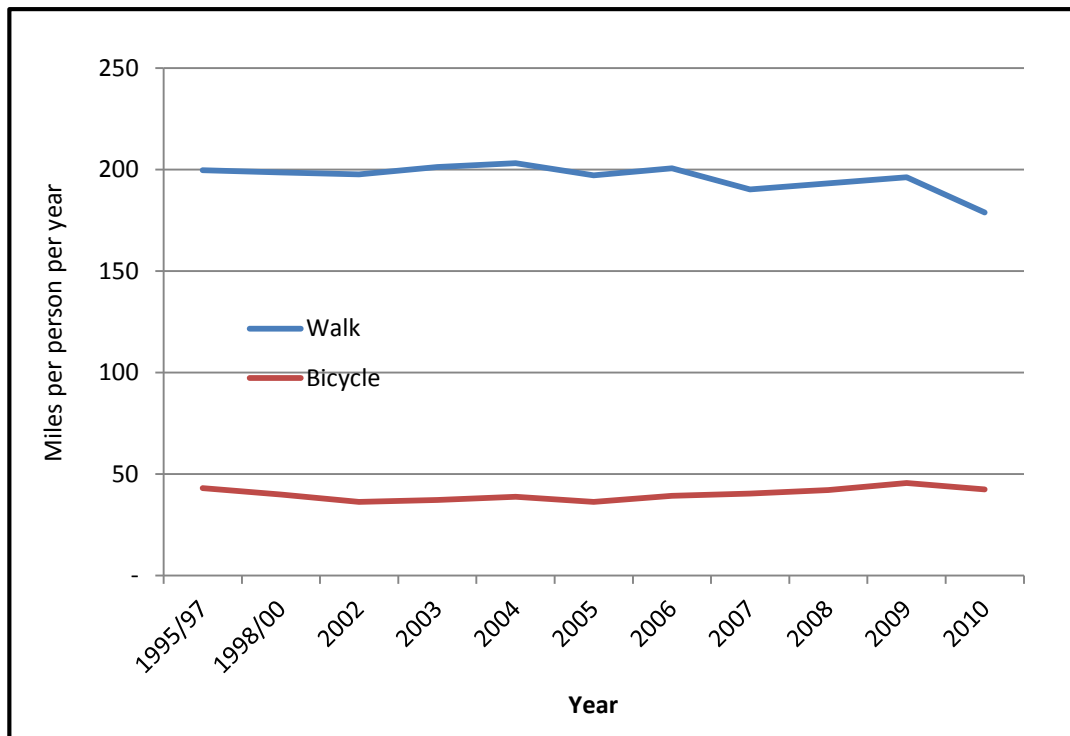


Figure 3 Average distance travelled by mode, GB 1995-2010

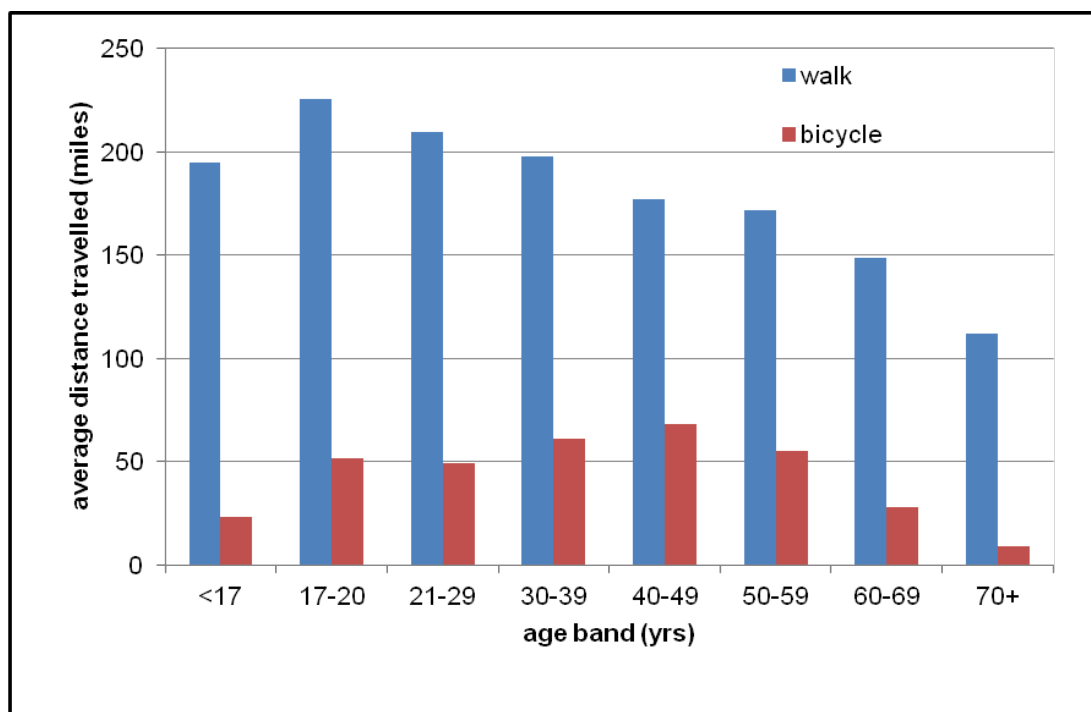
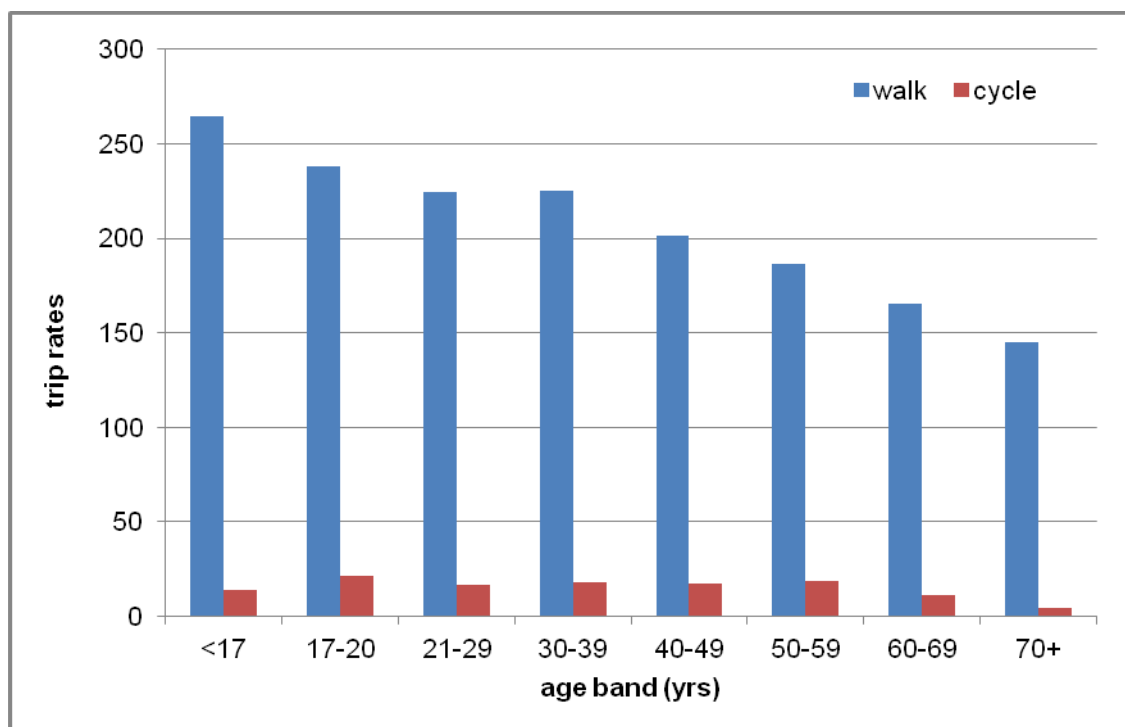


Figure 4 Average distance walked and cycled by age group, 2010

Source: National Travel Survey 2010, DfT



Figure 5 shows that average number of trips walked declined across adult age groups. Cycling trips declined slightly between the youngest and oldest adult age band although the trip rate is largely stable through the middle age bands.



**Figure 5 average number of trips walked and cycled by age group, 2010**

Source: National Travel Survey 2010, DfT

Once again these routine data sources cannot illuminate the course of individual behaviour over time. Aggregate data shows the net effect of manifold individual changes in behaviour over time. Disaggregate repeat cross-sectional data indicate trends in the average individual level of activity. It is an ecological fallacy to infer the course of individual behaviour from the aggregate trend in the group to which they belong. Neither should a typical course of behaviour over the life course be deduced from age-specific rates since this splices together observations on the behaviour of distinct cohorts at a point in time and is therefore liable to conflating age and cohort effects. Knowledge of how individual walking and cycling behaviour develops over time requires longitudinal data on individuals.

The methodological challenges to studying individual travel behaviour over time in transport and planning fields are similar to those encountered in physical activity research. There is a predominance of cross-sectional analysis of personal, social and environmental correlates of behaviour which has translated into explanations of behaviour that privilege the influence of current circumstances and overlooks the influence of past experiences and settings. There is also an over-reliance on measures that require respondents to summate their total activities which can be subject to inaccurate recall and social desirability bias. Subsequently the theorisation of processes and mechanisms that relate present walking and cycling behaviour to cumulative past experience is lacking.

The dynamic nature of individual travel behaviour was recognised in 1982 (Clarke, Dix and Goodwin) while prior to this, in the 1970s, time geographers were studying the mobility of individuals in time and space (Hägerstrand, 1970). Clarke *et al.* (1982) distinguished short term *micro-dynamics* that captured travel choices over a twenty-four hour period, *macro-dynamic modifiers* which concerned behavioural response to transitions and trigger events over a period of a few years and *macro-dynamic processes* which relate to ageing, life-cycle stages and cohort membership. This made apparent the limitations of considering travel behaviour as a static entity and the methodological challenges of conducting longitudinal research.

Jones (2009) summarised general insights that a dynamic perspective brought to understanding travel behaviour. These included, succinctly, that travel behaviour has considerable variability over different timescales; that travel behaviour responses to changing conditions and attitude formation are not instantaneous but instead develop over time; and that travel behaviour may be conditioned by previous experiences. Empirical work on individual travel behaviour dynamics has been engaged with micro-dynamics and, to a lesser extent the impact of life events on travel behaviour.

Goulias (2009) and Scheiner (2006) have articulated the need to understand the development of various aspects of travel demand over the life course and have advocated for further application of the life course perspective within travel behaviour research. For Scheiner (2006) explanation of travel behaviour will only be built upon understanding the inter-relation of long term biographical processes and short term travel choices. The proposal of the mobilities biography framework (Lanzendorf, 2003), which imported the life course concept of a trajectory, made an important theoretical contribution that underpins a developing seam of research exploring travel behaviour changes in the course of key biographical moments in employment and family domains (Scheiner, 2006). These studies, which have examined travel mode choice, travel distances or car ownership in relation to particular life events, are detailed in the literature review in the next chapter. Such studies consider travel behaviour in either segments of the life course or life events in isolation, rather than as part of an unfolding life course. Whilst the concept of trajectory was a direct import from the life course perspective, these studies have not utilised the other principles and concepts of the perspective, as will be introduced in the following section.

To summarise there is some understanding of the patterns of physical activity and travel behaviour within the population and how average levels of activity are changing over time. However there is limited knowledge of how individual behaviour changes over time. Such understanding could inform efforts to support life-long engagement in walking and cycling with associated benefits to population and individual wellbeing.

The case for a life course perspective to advance understanding in this area is developed further through the literature review in chapter two.

## **1.2 Contemporary position of policy**

At the time of project inception (October 2009), the UK Government had in place a cross-government strategy on obesity (Department of Health, 2008). This recognised

the role of Government, together with business, communities and other organisations, to support the creation of environments where walking, cycling and other forms of physical activity were “accessible, safe and the norm”, and announced investment in cycling infrastructure and training. Contemporary transport policy (DfT, 2008) stated goals to improve health and quality of life through the promotion of active travel modes, with explicit recognition of the imperative to prevent obesity.

The change of administration in UK national government in 2010 brought some shift in emphasis but as yet no significant change of direction in policy. The Coalition Government’s 2011 local transport White Paper retained commitments to increase the share of active modes for shorter journeys, but generally placed a stronger emphasis on transport measures that would support economic growth and local delivery. Funding commitments on school travel measures and cycle training were retained in the short term. Some cycling programmes were discontinued and new ones announced, for instance new funding for Bike-Rail integration. Promotion of active travel modes was made one of twelve criteria for funding local sustainable transport schemes. In 2010 a cross-government framework for health improvement was outlined that structured the approach around the stages of life and key transitions (DH, 2010). The contribution of physical activity and active travel to better health was recognised at most life stages.

The Coalition Government has espoused an approach to behaviour change that has been described as libertarian paternalistic (Rainford and Tinkler, 2011). This holds that since individual’s sometimes make decisions counter to their best interests it is legitimate to design environments and contexts, referred to as “choice architecture”, to nudge people to make the healthier choice. Nudges should not be obtrusive or involve compulsion or restrict choices. Whilst a precise operational definition of nudging has not been put forward, it has been suggested that schemes like city bike hire modify the choice architecture for active travel by increasing the visibility of cycling.

The benefits to society of increasing levels of walking and cycling and supporting people to be active throughout life were outlined in section 1.1.2. This reflects the fact that as a society we judge it to be in our collective interests to live in good health and preserve our environment. It serves these aims to understand how walking and cycling changes in the life course of individuals, with a view to developing interventions to support life-long engagement in walking and cycling. However this is a value-laden position and does not constitute an academic rationale for such a study. In terms of an academic contribution, a study that centres on the intra-individual processes of change and continuity over the life course will enable findings from the relative wealth of cross-sectional analyses, and the smaller collection of time-limited longitudinal studies, to be integrated into a better understanding of how these behaviours develop over time and how variations between individuals emerge.

### **1.3 Life course perspective: principles and concepts**

The life course perspective is a theoretical perspective for the study of human lives that emphasises the importance of the wider social and historical influences, human agency and the bi-directional relationship between individuals and their settings (Fehring and Bessant, 2009). Pioneers of life course research Giele and Elder (1998, p19) considered the perspective as significant in advancing the study of human lives from a concern with discrete developmental stages to a position where any point in the life course was “viewed dynamically as the consequence of past experience and future expectation as well as the integration of individual motivation with external constraint”. The hallmark of life course studies is a focus on long-ranging developmental trajectories and an assumption that later biological, social and behavioural outcomes are the product of earlier experiences. The first articulation of life course research, *Children of the Great Depression*, was published in the 1970s (Elder, 1974). It used longitudinal data from a cohort study to understand how historical context, specifically the 1930s economic depression, had shaped the lives of American children born in the

1920s (Elder, 1974). Elder's project importantly introduced principles of developmental psychology into sociological inquiry on human lives. The life course perspective has since been taken up in the fields of marketing, education, criminology, health and social gerontology. A fuller appreciation of the perspective and its potential for this research is perhaps gained from being acquainted with how it coalesced and diffused through fields of social research. Empirical foundations were laid between the World Wars in a sociological study of the lives of immigrant Polish farmers in America. This used life history and archive data and took a qualitative approach (Thomas and Znanieki, 1958). This established both the pattern of ordinary lives as a topic that merited research and the potential of biographical methods as a longitudinal approach to understanding lives. Not long after, Mannheim hypothesised that society was transformed through the succession of cohorts which implied (social) generations<sup>3</sup> were historically-specific collective agents of change (Mannheim, 1928; 1952).

Through the 1940s and 1950s age differentiation as a structural category was primary theme in the sociological inquiry on human lives. In the 1960s the need to understand rapid social change and the implications of an ageing population drove the field and advanced longitudinal projects that were more recognizably the forerunner of life course research today. Data sources proliferated in the form of longitudinal panels and retrospective and prospective cohort studies (Mayer, 2009). Age-event matrices were developed as an instrument to collect retrospective life history data along with techniques to analyse such data (Mayer, 1990). By the 1970s and the arrival of Elder's landmark study, longitudinal data had become the 'gold standard' of quantitative social science. Around the same time the biographical research methods of Thomas and Znanieki were revived amidst of a more general return of qualitative approaches. Later

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<sup>3</sup> The term generation is used in different ways. The correct usage is in the genealogical sense to denote kinship descent (Giele and Elder, 1998, p267). This is the usage observed in this thesis.

life course studies examined the distinct legacies of other historical changes on specific cohorts, for instance cohorts of American men conscripted to fight in Vietnam. From the 1980s the field has engaged with the increasing individualization of the modern life course and the impact of macro-level factors including welfare state, the economy, labour markets, population structure, historical events and changes on individual and collective life courses (Li *et al.*, 2009).

Three concepts which are central to the life course perspective trajectories, transitions and turning points are now introduced in turn.

### 1.3.1 Trajectories

Long-ranging developmental trajectories chart the course of biological, behavioural, psychological or social states. Trajectories can be described on the basis of timing (when changes of state occur), sequencing (the order in which different states occur), duration (how long a particular state endures), spacing (the amount of time between experiences) and density (the number of experiences within a bounded time period (Li *et al.*, 2009).

Segments of trajectories of health behaviours have been found to be characterised by inertia where behaviour is resistant to disruption. For instance, future physical activity behaviour has been found to be predicted by past behaviour directly, and by psychosocial factors indirectly. Behavioural inertia has been equated to habituation (Li *et al.* 2009; Wethington, 2005).

### 1.3.2 Transitions

Transitions refer to abrupt or gradual changes in state or role that impose inflections on trajectories. Role transitions are often accompanied by the endowment or relinquishing of responsibilities and movement in or out of social settings (Settersten, 2003). An

example of an abrupt change could be entering the labour market whilst becoming a carer may be a gradual transition as a relative's health gradually declines.

### 1.3.3 Turning points

Turning points impose a more marked and distinct inflection on a trajectory. Wheaton and Gotlib (1997) identify turning points as a point when the probability of future outcomes is altered. An individual may identify a turning point whilst reviewing their life as a point which clearly demarcates the trajectory as 'before' and 'after'. Alternatively turning points can be identified by a researcher examining a trajectory. Turning points are not characteristic of all behavioural trajectories. For instance, food choice trajectories have been found not to be characterised by radical modifications in consumption but instead show more gradual inflections that are ascribed to life course transitions (Devine *et al.*, 1998).

Leading scholars of the perspective purport that four core paradigmatic principles enshrine the primary analytic themes (Giele and Elder, 1998). These can also be understood as key sets of influences of the development process. These are human agency, linked lives, location in historical time and space and timing.

### 1.3.4 Human Agency

Individuals possess agency within their own life course, constructing their life course through choices and actions (Elder, 2002). Using cognitive, social and psychological resources individuals decide and pursue courses of action within the opportunity structure of their personal circumstances. Individuals may negotiate a similar life course transition differently in order to pursue different goals. For instance some individuals could make employment and location choices which facilitate active travel for routine trips, whilst others do not make this a consideration of these decisions.



### 1.3.5 Linked lives

Inter-personal relations and social integration in family, school, workplace and community influence how an individual life course unfolds. Inter-generational relationships within families, specifically parent-child relations, can be significant and longstanding forms of inter-personal relation. Parents transfer to their offspring various forms of resources which influence development. The most direct form of transfer is genetic inheritance whilst cognitive, social and psychological resources are transferred in the acquisition of behavioural and emotional styles and attitudes. Material, cultural and economic resources are also transferred. Socialisation has been proposed as a mechanism through which social norms regarding specific behaviour are transmitted via socialising agents (Haustein, 2009). In this way societal norms surrounding walking and cycling could be transmitted through interpersonal socialising agents, for instance parents socialise their offspring into walking and cycling behaviour that is consistent with social norms.

Inter-generational relationships also give rise to interdependencies which can entail opportunities and constraints for behaviour. A life event or transition in the life course of one member of a parent-child dyad can often have implications in the life course of the other. For instance, when a woman enters motherhood her mother simultaneously becomes a grandmother, or when the last child leaves home their parents become 'empty-nesters'. There are some indications that parenthood restricts opportunities for physical activity. However, some opportunities for being active might arise from parenting; for instance, walking children to school, and therefore the effect may lessen or reverse as children become more independent. This suggests the impact of inter-generational relations on trajectories needs to be considered over the life course of the relationship not just at the inception.

### 1.3.6 Location in historical time and space

Pioneers of life course research note the framework has a dialectical perspective that relates social history and individual biography (Giele and Elder, 1998, p.293). This emphasises that the life course is embedded in, and shaped by, historical time and geography. Individuals alive at the same time will encounter the same historical events and conditions; however birth cohorts are united by an experience of those events at the same age. So for instance the rise in road traffic over the last half a century is a common historical change; however when a person was born will determine at what stage of motorization they were born and the level of motorization they have encountered over their life course. Individuals in older cohorts may have encountered lower traffic flows and car access during their childhood and adolescence. This may have translated into an opportunity structure that was more conducive to mastering walking and cycling in early life than for cohorts who came later.

### 1.3.7 Timing

The determinants and impacts of a life event or transition may vary according to their timing in the life course. For instance older survivors of breast cancer were found to be less likely than younger survivors to report a positive impact of their illness on their levels of physical activity (Ganz *et al.* 2003). The experience of a transition at an unusual time according to normative life course patterns may be more problematic than if the transition occurs as expected. For instance individuals who become parents before they can legally drive may be disadvantaged in this respect.

Different birth cohorts encounter different societal contexts for walking and cycling over the course of their lives due to macro socio and structural changes. To understand whether life course patterns of walking and cycling are changing in the succession of cohorts requires longitudinal data on individuals from different cohorts.

## 1.4 Overview of the study

This thesis presents a study which applied a life course perspective to understand the life course development of walking and cycling behaviour. A framework proposed for the life course study of food choice was adapted as a preliminary conceptual framework. The four research objectives and their accompanying questions were;

Objective 1: to examine and explain change and stability in walking and cycling over the life course of individuals.

Questions: How are trajectories characterised by change and continuity over the life course? Under what circumstances do trajectories change or stay stable? What is the timing of changes in walking and cycling trajectories?

Objective 2: to examine the inter-generational influence of walking and cycling over the life course.

Questions: Is an individual's walking and cycling over their life course influenced by events in the life course of their parent/child? If so what form does this take?

Objective 3: to explore and interpret similarities and differences in the life course development of walking and cycling between different birth cohorts.

Questions: Are the patterns of change and continuity and timing of changes consistent between cohorts or are life course patterns changing over time? What links may be made between these differences and macro-level social and structural changes?

Objective 4: to engage in a deliberative dialogue with policy makers and practitioners on the findings and the implications of a life course perspective for policy and practice and to derive recommendations from this.

Questions: What are the implications of the findings and of a life course perspective for policy and practice?

Retrospective, qualitative interviews using life history calendars were used to elicit accounts of walking and cycling over the life course. Interviews were conducted with participants from two, historically-separated ten-year birth cohorts; the older group living through their sixth and seventh decades, the younger in the third and fourth decades. This group simultaneously comprised parent-child dyads. The interview outputs were transformed into visual and interpretive biographies that represented the walking and cycling trajectories. These were then considered holistically to identify intra-individual change and continuity. The biographies of dyads were similarly examined to identify inter-generational impact of life events. Emerging insights on the timing and circumstances of change and continuity from single cases were considered for their support in other cases. A typology was constructed separately for walking and cycling trajectories through a grouping process. Insights emerging from single dyads were similarly considered for applicability across dyads. A workshop was conducted with practitioners and academics working in this area to develop policy relevant insights. The original conceptual framework was developed with the findings emerging from the biographies.

## **1.5 Structure of the thesis**

This section summarises the eight chapters of this thesis. Supplementing this thesis is an appendix which presents supporting materials from the primary research, to which reference is made within the main body of the thesis.

### **Chapter two**

The literature review served to scope research on walking, cycling and physical activity that is located broadly within the transport, planning and health literature, and to identify and discuss limitations of the knowledge base. Critical review of theoretical inputs of both fields established that there was no formal theory to explain individual walking and cycling behaviour over time. Life course research on food choice was

introduced as an operationalization of the life course perspective to an analogous health behaviour that offered a transferable preliminary conceptual framework for the research. The review moved on to consider and integrate key findings of empirical studies of walking, cycling and physical activity, noting the strengths and limitations of different methodologies. The chapter closed with a summary of the key findings of the review and an outline of the established gaps in the knowledge base.

### **Chapter three**

This chapter details the deliberations and decisions of research design. It begins with a discussion of the philosophical position of the research, which is that walking and cycling trajectories exist in independent reality and are therefore knowable indirectly through observable experience. Research objectives and questions are outlined pertaining to intra-individual change and stability, inter-generational influence and inter-cohort similarities and differences. These were developed in consideration of the knowledge limitations and in light of the principles of the life course perspective. A conceptual framework, adapted from life course studies of food choice, was introduced that identifies and maps preliminary concepts and interactions for the study. The justification for a qualitative, retrospective life history methodology was put forward before detail of the development and piloting of life history interview method and life history calendar. Credibility, confirmability and relevance were identified as evaluation criteria compatible with the assumptions and objectives of the study, to establish the trustworthiness and contribution of the research. A purposive approach to recruitment was selected to put together a participant group of older and young adults, whose life courses intersected with the historical context at different points, thus differentiating the macro contextual conditions of their unfolding trajectories. Parent-child dyads were also recruited within this group. The chapter closes with a discussion of the ethical considerations of the study and how these were addressed.

## **Chapter four**

This chapter details the processing of the life history interviews and the analysis of the subsequent biographies. Analysis had three domains; intra-individual change, inter-generational influence and inter-cohort differences. It was a flexible, data-led exercise which proceeded from consideration of individual cases to the visual inspection of biographies in collectives of cohort and gender-cohort groups. Subsequent steps involved more focused consideration of the changes in mobility and other life domains that occurred during the transition to adulthood, and the development of trajectory typologies. The chapter closes with details of corroboration procedures and scrutiny of the analysis conducted by research supervisors and colleagues.

## **Chapter five**

This chapter presents the findings from the analysis of thirty-three interpretive and visual biographies. This includes empirical descriptive insights on intra-individual trajectory developments through the life course and the impact of life events within parent-child dyads. Trajectory typologies that were resolved into spectrums of arrested-restorative-resilient for cycling, and diminished-restorative-resilient for walking, are presented and explained. The chapter closes with a summary of the findings which draws out the gender and cohort similarities and differences between the trajectories.

## **Chapter six**

This chapter explains the development and conduct of a knowledge exchange workshop held with policymakers and practitioners, and a summary account of the discussions. A summary, interpretive account is presented of the discussions on the emerging insights from the biographies. These discussions served to inform finalisation of the findings and formulate implications for policy and practice. The panels' assessment of relevant changes in macro-level conditions for walking and cycling was

used as input, together with the literature review, in resolving the influence of the changing macro context in individual trajectories and differences between the cohorts.

### **Chapter seven**

This chapter presents an integrative discussion that draws together the findings from the biographies and workshop, and places them in the context of the current literature. The principal output was an enhanced conceptual framework for the life course development of walking and cycling, that represents a synthesis of the research findings. The framework comprises macro and micro contextual influences and sensitive periods which pertain to the temporality of trajectory development. Inter-individual variation in trajectories was resolved through development of longitudinal typologies. Three perspectives on human development are presented as candidate theories to integrate with the life course framework, to elaborate longitudinal processes and mechanisms in trajectory development. Potential is found with the construct of embodied intelligence to theorise an apparent latent generative tendency within restorative cycling trajectories. The chapter closes with a discussion of how the findings and the framework could inform policy and practice.

### **Chapter eight**

This chapter presents reflections on the research process including a critical review of the methodology, analysis, recruitment and workshop. Several directions for future research are discussed. Finally a concluding summary outlines the theoretical, methodological, empirical and practical contribution of the research.

## 2 LITERATURE REVIEW

### 2.1 Chapter introduction

This chapter presents the literature review that was undertaken to understand where a life course study would contribute to current knowledge on walking and cycling behaviour. There were two objectives for this review. Firstly, the review sought to gain an overview of the broader field of walking and cycling research and understand what the extant literature reveals about behavioural influences and development of behaviour over time. Secondly, the review sought to understand the extent to which a life course framework has been used in the study of walking and cycling and the contribution to knowledge this has made.

Searches of bibliographic databases were conducted using combinations of the terms 'walking, cycling, physical activity, active travel and life course perspective'. Mobility biographies were identified as a concept applied in travel behaviour research that was developed from the life course framework. Further searches were then conducted using this term. Primary studies were followed up from review articles on the topic. The literature review was revisited towards the end of the project and added to with relevant studies that had been published in the intervening period. This also provided the opportunity to focus the review in light of the findings that had emerged.

The literature covered originated broadly from the fields of public health, transport and planning, incorporating studies from the disciplines of sociology, psychology, anthropology and epidemiology.

The first section examines some of the theoretical perspectives from social psychology, economics and ecology that have framed research in fields of health and travel behaviour and details the limited extent to which life course theory has been introduced. Section 2.3 moves on with a critical review of empirical cross-sectional findings on correlations between walking, cycling and physical activity behaviours and



physical, social and individual factors. Section 2.4 considers longitudinal research that has examined the development of walking, cycling, other aspects of mobility and physical activity behaviour in relation to life events and over time, including a small number of studies which have drawn on the life course perspective. A penultimate section examines a limited selection of studies which have considered physical activity and mobility behaviours in the context of macro-level structural and social changes. Each section concludes with a précis of what is revealed and what is left unknown about individual development of walking and cycling over time. These summaries develop the case for a life course study of walking and cycling. The chapter closes with an account that distils the potential for a life course study to address limitations of the knowledge base.

## **2.2 Theoretical approaches in health and travel behaviour research**

### **2.2.1 Economic choice theory**

Economic theory of consumer choice has been a prominent theoretical approach in the transportation field. Accordingly travel mode choice is considered a rational economic choice made to maximize net utility, one that is based on preferences and the relative, generalised costs of different mode options for a particular trip (McFadden, 1974; Ben Akiva and Lerman, 1985). For instance, a choice to walk may reflect an individual's evaluation of walking as a comfortable, convenient and cheaper mode for a certain trip.

Working within this framework of utility maximisation, travel behaviour researchers have made the assumption that the generalised costs of travel are at least partly influenced by the physical environment. This has stimulated a wealth of studies focused on the relationship between characteristics of the built environment and travel behaviour. The dimensions of density, diversity (land use mix) and design and, more recently, route characteristics have been advanced as a framework to conceptualise the different aspects of the built environment that influence travel behaviour (Lee and Moudon, 2006).

Whilst research based on the premise of utility maximisation has revealed a myriad of associations between built environment characteristics and travel behaviour it has proved less enlightening on what underpins these relationships and indeed other relationships between travel choices and individual characteristics, cognitions or social environment factors.

### 2.2.2 Social Psychology

Travel behaviour research has drawn on social psychology to theorise the behavioural processes of travel demand. Theory of Planned Behaviour (TPB) is a common theoretical input to travel behaviour and physical activity research. TPB proposes that behaviour is predicted by behavioural intention when resources and opportunities allow. Intention corresponds to a combination of perceived behavioural control (PBC) (the individual's perception of how easy a specific behaviour is to perform and the extent to which it is under their control), attitude (global evaluation of the consequences of performing behaviour), and subjective norms (perceived social pressure to perform a behaviour) (Fischbein and Ajzen, 1975). The influence of external factors such as from the built or social environment is assumed to be wholly mediated through these cognitive constructs, that is to say there is not considered to be an effect of the environment beyond that perceived by the subject.

The premise that human behaviour is always reasoned has been contested both generally within psychology and specifically in respect to travel behaviour (Aarts *et al.*, 1998). Challengers argue that some temporal stability of behaviour can be explained by a habituation process i.e. that behaviour performed repeatedly in stable contexts becomes automatic and less reasoned. The evidence for a mediating role of habit in behavioural stability is based on the demonstration that behavioural outcomes are predicted by measures of the frequency of past behaviour. However, some have

questioned whether the proxy measure of frequency of past behaviour captures adequately the construct of habit (Bamberg, Azjen and Schmidt, 2003).

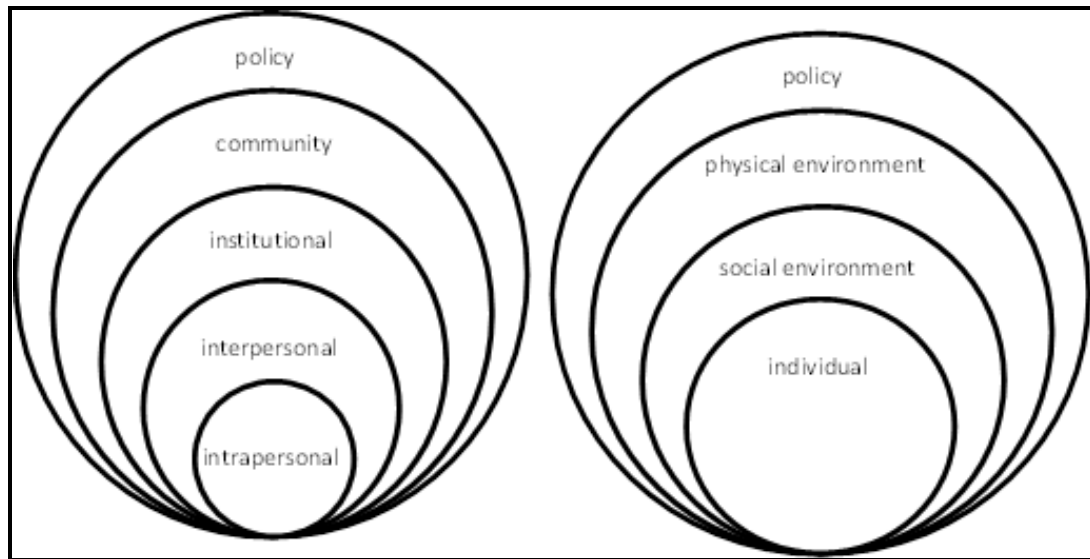
Earlier physical activity research in the health field focused on the psychology surrounding the individual and their choice to be active. Such work was oriented to the development of interventions to promote physical activity. A solely socio-psychological perspective physical activity and other health behaviours came to be abandoned on the basis of poor prediction of behaviour and the modest performance of interventions to change behaviour (King *et al.*, 2002) in preference for a broader ecological perspective.

### 2.2.3 Ecological models

An ecological perspective brought a person-context relational view on human development and directed attention to multiple layers of behavioural influence, thus accommodating insights from earlier study of psycho-social factors. Development is theorised as the consequence of dynamic relations between an individual and their complex, integrated and changing ecology. This ecology is conceived as nested levels or micro, meso, exo, macro and chronosystems (Bronfenbrenner, 2005, pp xvii). In a later elaboration titled the Person-Process-Context-Time (PPCT) model, time was promoted as a fundamental dimension to development (Bronfenbrenner, 2005). At the individual level a temporal dimension concerns both what happens in the course of a specific activity or interaction, and the periodicity of these episodes in broader time frame of the life course. At a macro-level there are factors that change over the time frame of the individual life course and between cohorts. The later iteration further expounded developmental relations as complex, reciprocal interactions between the evolving individual and the persons, objects, and symbols of their proximal settings.

Translations of the original person-context ecological model for health behaviour/outcomes, depicted multiple levels of influence extending from individual characteristics towards the social, physical and policy environment (**Error! Reference**

**source not found.**) (McLeroy (1988) and Stokols (1992; 2003). Specific models followed for physical activity (Sallis, Bauman and Pratt, 1998), active living (Sallis, *et al.*, 2006) and walking and cycling (Pikora, *et al.*, 2003). For some, prediction and understanding of physical activity behaviour will be improved with models that are behaviour-specific and context-specific, for instance a model specifically of recreational walking (Giles-Corti, *et al.*, 2005).



**Figure 6 Ecological models of health behaviour and health promotion**

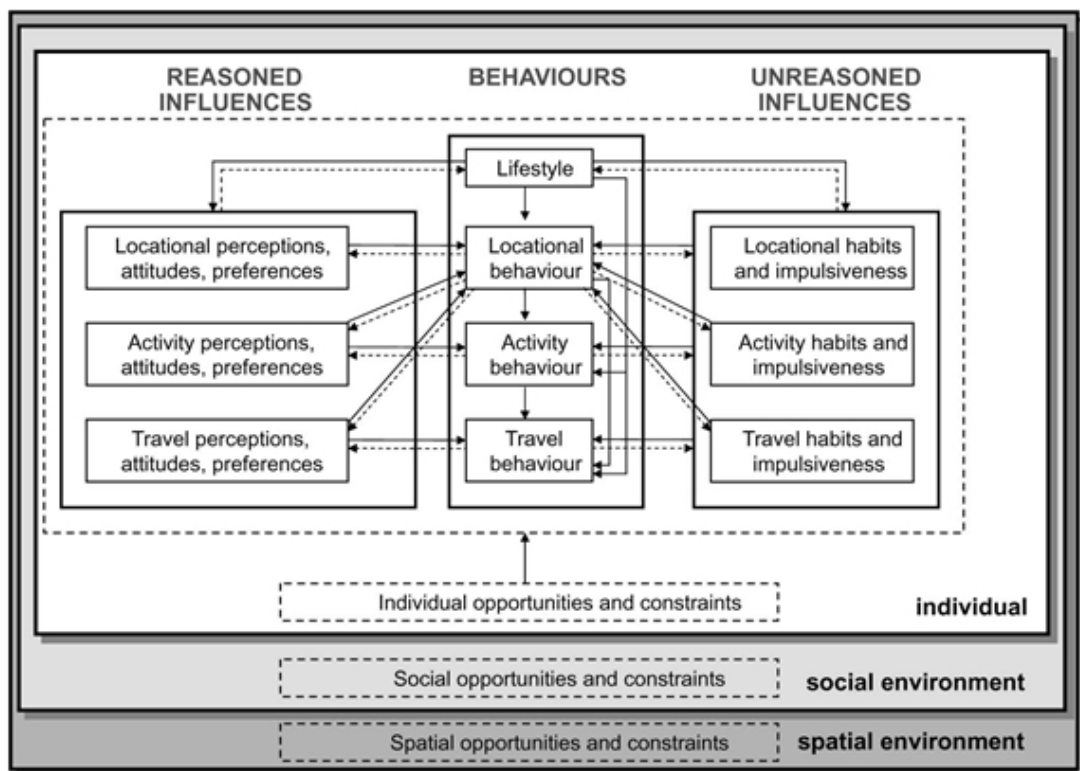
Source: McLeroy 1988 and Stokols 1992; 2003

A notable omission in these models is the chronosystem. Indeed the later PPCT model has not featured in physical activity research. King *et al.* (2008) asserts that time is recognised as fundamental dimension to understanding walking behaviour, but acknowledged that it has been afforded little attention due to the logistical and conceptual challenges of longitudinal methodologies.

The transtheoretical model of behaviour change, or stages of change model, concerns the process of behaviour change. More specifically it theorises the readiness of the individual to make a specific behaviour change through a series of stages of disposition (Prochaska *et al.*, 2008). It has been applied to cycling (Gatersleben and Appleton, 2007), walking (Mutrie, *et al.* 2004) and exercise (Plonitkoff *et al.* 2001). Though the

model concerns progress towards behavioural change, and therefore implies a longitudinal dimension, time is not accommodated in a natural, ontogenetic sense of individual development. On the basis that both continuity and change is expected to characterise individual pathways of walking and cycling this is not considered to offer a suitable framework to theorise activity over a life time.

Van Acker *et al.* (2010) put forward a conceptual model of individual daily travel behaviour that integrates intrinsic and extrinsic behavioural influences that have been visited previously within the field, and the relationships between them (Figure 7).



**Figure 7 Conceptual model of individual travel behaviour**

Source: Van Acker *et al.*, 2010

At the centre, the model depicts a hierarchy of behavioural choices about lifestyle, location and activity, operating on different timescales that combine to structure travel behaviour. Daily travel behaviour is influenced in the short term by the spatio-temporal distribution of daily activity for which travel is performed, in the medium term by

locational decisions which influence the spatio-temporal distribution of activity and in the longer term by an individual's lifestyle. Lifestyle theory defines the concept of lifestyle as an individual's expressed preference for a way of living that concerns a long term outlook on life and motivations, beliefs, interests and general attitudes. A multiplicity of reciprocal relationships is proposed between the core behavioural hierarchy and reasoned perceptions, attitudes and preferences, and unreasoned habits and impulsiveness pertaining to travel, activity, location and lifestyle. Travel choices take place within social and spatial environments that present opportunities and constraints.

A temporal dimension is apparent in the acknowledgement that the components evolve over time and decisions affecting daily travel behaviour operate at different temporal scales. For instance relocation may be triggered following a reasoned evaluation that available and potential opportunities do not meet current needs. Previous experiences can inform later behaviours through feedback mechanisms.

The model neither elaborates on the opportunities and constraints within these spheres nor on the nature of particular processes. There is however recognition that the influence of these spheres may be through both objective and perceived characteristics. Further, whilst the model is oriented towards the longer term dynamics of individual travel behaviour, there is no consideration of the evolution of the hierarchy and opportunity structure in the course of life course events and transitions.

The mobilities biography framework, through its inclusion of the conceptual tool of the life course trajectory, is oriented to the examination of travel behaviour development at a life course timescale and through biographical processes (Lanzendorf, 2003). The formulation of the mobility biography emerged as a theoretical response to recognition of life events and the progression of the life cycle as relevant individual developments for travel behaviour.

#### 2.2.4 Social practice theory

Social practice theory offers a different perspective for the study of walking and cycling. It eschews conventional individualistic and rationalistic conceptualisations of behaviour, and, instead, attends to the social and collective organization of practices as broad cultural structures that shape an individual's actions within the world. Practices are iteratively reshaped through successive moments of performance. Individuals are considered as carriers of practice that may be recruited to or defect from 'careers' of different practices over the life course.

Schwanen *et al.* (2012) critiqued the psychological construction of habit in travel behaviour and proposed an alternative construct that is consistent with human actions as social practice. Drawing on cultural sociology and geography travel behaviour habits were conceived as "... as propulsive and generative tendencies rather than as behaviours" (Schwanen *et al.*, 2012, p.526). These are open-ended and non-deterministic phenomena which can endure as a latent force that, once contracted, can be re-activated at a later point in time. This, in their view, calls for a less hierarchical, more distributed perspective on the organisation of behaviour. Social groups hold collective habits which constitute customs or institutions; personal habits are contracted under the conditions set by prior customs. In this view, the challenge of affecting a systemic shift to less carbon intensive travel is not the widespread displacement of automaticity in the individual, but rather it concerns shifting collective customs and embodied dispositions and abilities to act in a particular way (Schwanen *et al.*, 2012).

Watson (2012) recast the dominance of motorised travel as a product of systemic competition between the socio-technical systems of automobility and velomobility. Automobility, he argues, has proved superior in recruiting carriers of driving practice and instrumental in the defection of carriers from cycling. Schwanen *et al.*, (2012) advocated as a longer term approach to shifting travel behaviour to more sustainable practices policy that supports the development of embodied intelligence for walking,

cycling and use of public transport early in life which may, as latent tendencies, be resurrected later in life. This demonstrates that social practice has engaged with the concept of life course careers or pathways in the field of travel behaviour research. It also offers embodied intelligence as a mechanism operating over the life course to influence travel behaviour (Schwanen *et al.*, 2012).

### 2.2.5 Life course research

As discussed in chapter 1 the life course perspective has made an initial, limited impression on the theorisation of travel behaviour dynamics through Lanzendorf's (2003) formulation of the mobility biography framework. This translated the concept of life course trajectory but overlooked the other principles of the perspective. Life course research is being carried out in the proximal field of migration research.

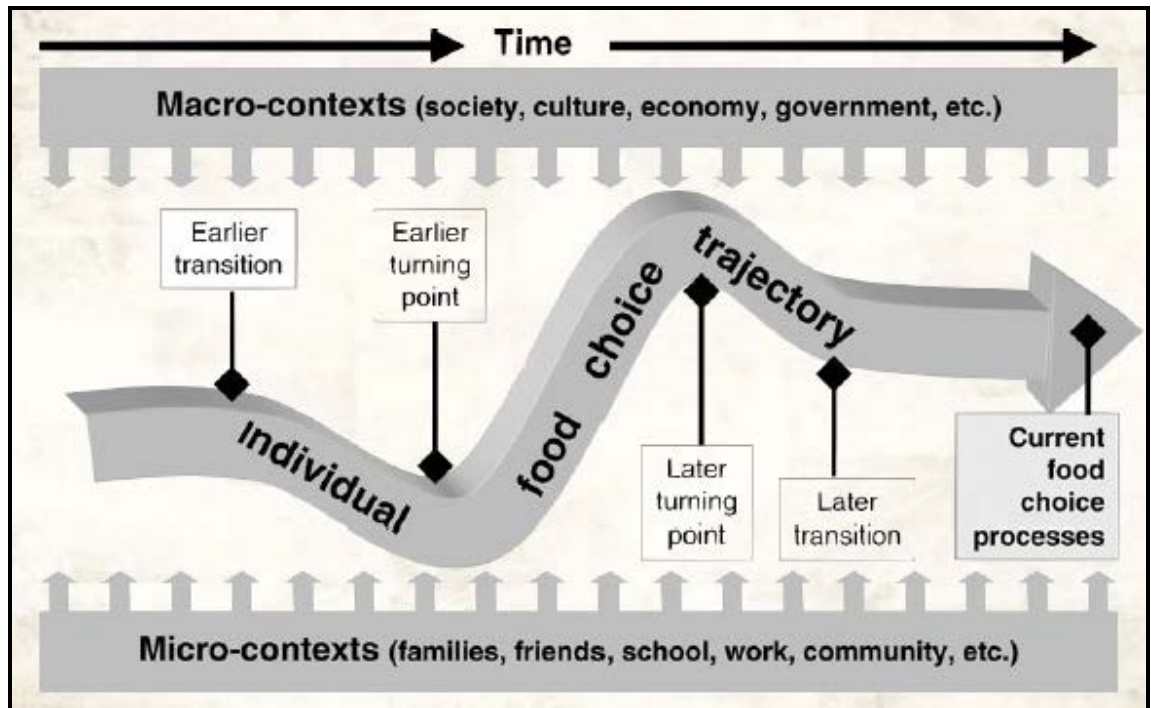
The life course perspective has been a relatively recent theoretical import to health research. As an alternative to established developmental perspectives that have been used to theorise the physiological, psychological and social processes of growth, maturation and ageing, it offers a framework that accommodates the complex and dynamic interactions of biological, behavioural or psycho-social pathways that lead to health outcomes. Within epidemiology it has been applied to study cumulative advantage or disadvantage (differential exposure to risk factors and protective resources) as mechanisms operating in the production and inter-generational transmission of socioeconomic inequalities in health (Lynch and Davey, 2005).

The application of the life course perspective to the topic of physical activity has been limited in policy (Foster *et al.*, 2005) as in research. Li *et al.* (2009) petitioned for it to be more widely adopted in the field, considering it to be an obvious extension to the ecological model that, whilst retaining the individual-context component, would bring time-related matters to the fore.



### 2.2.5.1 Life course research on food choice

Given the limited demonstration of a life course approach in both fields, examples were sought of its application and findings in similar topics. This unearthed life course studies in food choice and nutrition research. Sobal (2006) developed, from in-depth interviews on food choice, a framework that conceptualises how a food choice trajectory is shaped through the life course (Figure 8).



**Figure 8 Conceptual framework of life course food trajectory**

Source: Sobal (2006)

This conceived of food choice trajectories as constructed by the individual, with each new food choice experience adding to the trajectory and shaping subsequent food choices. The trajectory advances through the individual making food choices within a personal food system, in which the individual translates influences on their choice into selection in particular situations. The personal food system is dynamic and evolving over time as they respond to life course experiences and changing influences and situations they encounter. Sobal (2006) considered the influences on food choice to be 'diverse and extensive', encompassing:

- *ideals* learned through socialisation and acculturation
- *personal characteristics* including physiological, psychological and relational factors
- the *resources* possessed for food choices, including tangible and intangible capital e.g. money, equipment, time, knowledge and emotional support
- *social factors* concerning roles and social units e.g. families, groups, networks and organisations are an origin of opportunities and obligations for food choices
- *contexts* represent the environments within which the life course evolves including social structure and policies, economic conditions, historical eras and changing physical environments.

A life course perspective has brought to light insights on how food choice evolves over time at both individual biographical and historical time scales. Some studies have looked at how the process of ageing and changes in health status influenced individual trajectories (Harrison *et al.*, 2011; Delaney and McCarthy, 2009). Others have attended to the historical context and the multiple changes that have meant that the trajectories of individuals born at different times develop in vastly different cultures and systems for food choice. Such changes include social and economic changes, for instance women's increased participation in employment, changes in working schedules, developments in nutritional guidelines and food technologies (Devine, 2005).

Life course studies have also revealed the implications of shifting social identities for food choice. Resources, opportunities, expectations and perceptions around food choice are structured along dimensions of class, gender and ethnicity. Changes in these parameters then have implications for the trajectories of different social groups (Devine, 2005). For example, older cohorts had grown up in times when cultural norms dictated food preparation to be primarily a female role but had gone on to encounter more equitable division of responsibility for food in adulthood. In the food choice trajectories of older adults in Ireland, Delaney and McCarthy (2009) found rising

standards of living and increased affluence to be relevant macro level changes over the life course. Early experiences and cultural norms around food consumption had a long-standing influence as individuals negotiated an increasingly sophisticated food system. Perceptions of modern, processed food as unhealthy were framed by early experiences of home-produced food. However, increased availability and affordability normalised the consumption of foods that had been previously scarce and presented participants with new dietary challenges in later life.

### 2.2.6 Section summary

There are some common inputs to the theorisation of walking and cycling behaviour within physical activity and transport research. Both have taken from social psychology to speculate on the role of internal cognitions, and the ecological perspective to identify potential external influences. Economic choice has operated as a broad framework within travel behaviour research. Providing an alternative to rationalistic behavioural models, social practice theory considers individual actions as part of collective, social practices that are shaped by broad cultural structures.

A person-context relational view of the ecological perspective is the dominant theoretical foundation to physical activity research, and some travel behaviour research has incorporated the notion of an ecology of behavioural influence. Both social psychology and ecological models ostensibly consider behaviour as a fixed entity and have advanced explanations of behaviour as the product of contemporaneous factors. Such views overlook the influence of past contextual factors on behavioural outcomes.

The view was taken for this study that adequate explanations of behaviour should take account of, and be consistent with, the pathway of intra-individual continuity and change from which they have emerged. The life course perspective offered a broad longitudinal framework with which to reveal dynamics of behavioural change and continuity in the course of developments across functional life course domains.

Through the accommodation of longer term time frames it was intended to reveal how earlier life experiences influence later outcomes.

### **2.3 Demographic, physical, social and psychological factors**

This section gives an overview of empirical work that has considered individual, social and physical factors as determinants of behaviour.

#### 2.3.1 Demographic characteristics

Table 1 summarises findings from a selection of studies that have analysed how walking, cycling, active travel and physical activity vary in relation to age, gender and socio-economic status. This is followed by an account which highlights some key findings and different approaches to studying these relationships.

Behaviour	Reference	Research design	Measure	Variable	Population	Principal findings
Cycling	Pucher and Buehler, 2012	National travel surveys – annual cross-sectional surveys	Mode share of all trips	Gender	UK, US	More cycle trips are made by men than women across all age groups Gender split is more even in countries with a higher modal share
				Age	UK	The mode share for declines across age groups
	NTS0705 DfT, 2012	UK National Travel Survey	Mode share of all trips and distance	SES - income	UK	Correlation between income and trips and distance
	De Geus, 2008	Survey of working population	Cycling to work	Education	Belgium	Cycling higher in those with higher levels of education
	Kemperman and Timmermans, 2009	Cross-sectional household questionnaire and travel diaries	Mode choice	Education	Netherlands	Amongst older adults cycling was higher amongst those with higher levels of education
	Kamphuis et al., 2008	Population-based survey	Recreational cycling	Education	Australia	Recreational cycling higher amongst groups with higher levels of education
Walking	Pucher and Buehler, 2012	National travel surveys – annual cross-sectional surveys	Mode share of all trips	Gender	UK, US	More walking trips are made by women than men U-shaped graph - mode share declines across the age groups with slight increase in oldest group. This is more pronounced in some northern European countries.
				Age		
	NTS0705 DfT, 2012		Mode share of all trips and distance	Income	UK	Inverse correlation: trips and distance are highest in the lowest income quintile
	Giles-Corti and Donovan, 2002		Walking as recommended; Any walking for transport; Any walking for recreation	Area level SES	Australia	Similar overall prevalence between SES areas. Walking for recreation higher in higher SES area; Walking for transport higher in lower SES area

	Ball <i>et al.</i> , 2007	Community-based survey	Walking for leisure; walking for transport	Education level	Australia	Walking for transport and recreation were lower amongst women with lower levels of education
	Cole <i>et al.</i> , 2006	Population-based survey	Moderate or brisk-paced walking for transport; recreation	Education level Employment	Australia	Those with higher levels of education walked more for transport. Women in employment walked more for transport and recreation than those without. Women with lower levels of education did less walking for recreation.
Physical activity Active travel	Berrigan, 2006	Population health survey	Adherence to physical activity recommendation Duration of active travel in previous month	SES - education, income	US	Leisure PA correlated with level of education and income. Inclusion of active travel reduced these disparities
Nonmotorised mode choice	Ryley, 2006	Segmentation analysis of mode choice data from household survey	Mode choice	Propensity to use non-motorised modes	Edinburgh, UK	Propensity to use nonmotorised modes varies by life stage.
Active travel	Tudor-locke, 2005; Adams, 2010	Time use surveys mined for data on walking and cycling	Time spent walking and cycling	Age, Gender, Socio-economic status	UK, US	Women were more likely to report active travel than men. Prevalence generally decreased with age, with an increase in 65+ age group. Affluence shows negative association but education positive association with active travel

**Table 1 Selection of studies examining variations in behaviour in relation to individual socio-demographic characteristics**

National travel surveys consistently indicate men cycle more for transport than women (Krizek, *et al.* 2005; Emond *et al.* 2009) whilst women are more likely to walk than men (Pucher and Renne, 2003). Gender differentials in cycling are more pronounced in countries where cycling has a low modal share, and more balanced in countries with a higher modal share (Pucher and Buehler, 2008; Smith 2005). In the UK, cycling mode share falls by age group: cycling accounts for 2% of trips in the age groups 0-16 years, 17-29 years and 30-59 and 1% in age groups above this (Pucher and Buehler, 2008).

Higher socioeconomic groups in the UK consistently report higher levels of physical activity (NHS Information Centre, 2009). Walking and cycling show opposite relationships with income; walking distance and trips are highest for the lowest income quintile and decrease across the spectrum, whilst cycling trips and distance increase with income (NTS0705, DfT 2012). In a deprived urban area in the UK, Ogilvie *et al.* (2012) found active travel was associated with being young, not having access to a car, living close to work and living in owner-occupied accommodation.

Studies from the US, Australia and Europe indicate inconsistent relationships between socioeconomic status and walking, cycling and active travel by SES indicator and domain of activity. In an American context individuals with lower SES reported higher levels of active travel (Berrigan, 2006). An Australian study showed prevalence of total walking was similar between the areas of high and low SES. However, residents in the more affluent area walked more for recreation while the residents of the low SES area walked more for transport (Giles-Corti and Donovan, 2002). Lower levels of walking for transport and recreation were found in groups with lower levels of education (Ball *et al.*, 2007; Cole *et al.*, 2006). Higher levels of education predicted cycling to work among Belgian adults, (De Geus, *et al.*, 2008) and recreational cycling in an Australian population (Kamphuis *et al.*, 2008). Amongst a population of older Dutch adults levels of walking and cycling were lower amongst those with lower levels of education (Kemperman and Timmermans, 2009).

Cerin *et al.* (2009) looked at SES differentials in walking for transport and proposed a complex network of mediation, involving common and distinct and sometimes opposing pathways of individual, social and physical environment factors. Positive attitudes for active lifestyles, sense of community and opportunities to adopt an active lifestyle explained the link between educational attainment and higher levels of walking. A negative association between income and walking was mediated by household car ownership but to an extent this was mitigated by more active lifestyles and fewer neighbourhood barriers to walking. The positive effect of area level income was mediated by a greater sense of community, aesthetics, residential density and again active lifestyles and fewer barriers to walking.

Ryley (2006) analysed the propensity to use non-motorised modes of persons in different life stage segments using Edinburgh-based respondents to the Scottish household survey. Students, those between jobs and part time workers without children were most likely to use non-motorised modes whilst retired persons and high earners without children had the least propensity to cycle. A strong relationship was shown between flat-dwelling and active travel.

Time use surveys have been used to gauge how much time individuals commit to physical activity or active travel, and how this is changing at a population level over time. Time use surveys collect a retrospective record of a respondent's time use over a twenty-four hour period in ten minute bouts, which can then be mined for a particular activity. This has the advantage over self-reported physical activity data that respondents are not tasked with reporting any specific activity and are therefore less likely to give socially desirable responses. Shorter bouts of incidental walking are less likely to be missed, because respondents are asked to account for every ten minute portion of their day and it does not require respondents to interpret what constitutes physical activity (Tudor-Locke, 2005 and 2007; Adams, 2010).



In the 2005 UK time use survey less than one third of cases reported any active travel and less than one-fifth met recommended physical activity levels solely through active travel (Adams, 2010). Whilst this reflects low levels of active travel, it does also demonstrate the contribution active travel can make to activity levels. Women were more likely to report active travel than men and prevalence generally decreased with age. There was an increase in the 65+ age group which may reflect increased time and opportunity for active travel post-retirement.

Physical activity behaviour in young people living in rural Australia (Lee and Macdonald, 2009) and the gender, ethnic and class identities of people cycling in London (Steinbach, *et al.*, 2010) have been analysed using Bourdieu's theory of social reproduction. Eschewing rationality, Bourdieu considered individual actions within a particular social field to be informed by acquired internal schemes of perception, thought and action; a set of cognitive and embodied dispositions he termed habitus.

Steinbach *et al's* (2010) sought to explain why the dominant characteristics of London cyclists were young, white, affluent and male. Their thesis was that the different affinities population groups demonstrate for cycling reflect the locally-constituted accomplishments embedded within cycling. The choice to cycle makes evident a fit between the acquired dispositions for mobility or physical activity and the potentialities of cycling. For instance, the association of cycling with certain health and environmental challenges is unproblematic for professional white males because it accords with their broader ethical and aesthetic disposition. However, for groups less visible in the cycling population the bourgeois associations of the bicycle are unavailable and cycling instead signifies low-status or a deviant activity of youth. Individual aspirations are unconsciously shaped by an evaluation of what is socially accessible or inaccessible. This way habitus works to exclude behaviours that would be negatively sanctioned.

### 2.3.2 Physical environment characteristics

Table 2 summarises a selection of studies which have examined variations in walking and cycling in relation to characteristics of the physical environment. In summary, there is a plethora of studies which have used multi-variate modelling techniques to reveal associations between characteristics relating to design and infrastructure, proximity of destinations, density and diversity of land use, and measures of behaviour. The bulk of these studies were conducted in North American and Australian contexts. Some studies have shown relationships for certain built environment characteristics differ by purpose of walking or cycling or physical activity (Handy and Clifton, 2005; Hoehner *et al.*, 2005; Forsyth, *et al.* 2008; McCormack *et al.*, 2008). Others have indicated an influence may involve perceived as well as objective characteristics of the built environment (Kaczynski and Troy, 2012). Some have focused on particular population groups highlighting, for instance perceptions of safety and security as important predictors of cycling in students and school children (Titze, 2007; Trapp, 2011).

Most physical environment effects in multi-variate modelling are found to be moderated by socio-demographic characteristics (Cevero and Duncan, 2003; Ogilvie, *et al.* 2008; De Bourdeaudhuij *et al.* 2005; De Geus *et al.* 2008; Moudon, *et al.* 2005).

Behaviour	Reference	Research design	Measure	Population	Principal findings
Cycling	Moudon <i>et al</i> 2005	Population-based survey- multi-variate modelling	Mode choice	US urban area	perceived and actual proximity to trails, offices, health facilities and food outlets showed moderate associations but grocery stores and schools showed a negative association
Walking and cycling	Krizek and Johnson, 2006	Multi-variate modelling based on household travel data from diaries and questionnaires	Mode choice	US urban area	Proximate destinations increased the likelihood of walking or cycling.
Cycling	Winters <i>et al</i> 2010	Travel data from population-based survey	Mode choice	Urban area Canada	Flatter terrain, increased density of intersections, fewer highways and arterial routes, greater land use mix, increased population density and more bicycle signage, traffic calming and cyclist activated signals increased likelihood of cycling, effects which persisted after adjustment for trip length and socio-demographic factors.
Cycling	Titze, <i>et al.</i> , 2007	Survey of student population	Mode choice	Austria	Regular cycling was negatively associated with perception of safety from traffic and positively associated with safety from bike theft, friends who cycled. Irregular cycling was associated with low effort and attractiveness.
Cycling	Trapp, 2011	One week travel diary and questionnaire on travel habits and attitudes	Cycling to school	Australia	In boys, but not girls, cycling was associated with neighbourhood design. Perception of safety was associated with cycling for both genders and this was possibly mediated by parents' confidence in child's cycling ability and perception of convenience of driving over cycling.
Walking and cycling	Cevero and Duncan (2003)	Population based travel survey	Mode choice	Urban area, US	Land use diversity strongest predictor of walking. Land use diversity, density and design were equally important predictors of cycling. However all effects modest relative to socio-demographics and some climate factors
Walking	Forsyth <i>et al.</i> , 2008	Seven day travel /walking diary ,	Self-reported walking and	Urban area US	Total walking was modestly correlated with sidewalks, traffic calming, street lights and smaller block size but not mixed use.

		physical activity questionnaire	physical activity behaviour and accelerometry		Walking for transport and leisure showed some contradictory associations with some design features. No significant associations were revealed between environment characteristics and total physical activity.
Walking and physical activity	McCormack, <i>et al</i> 2008	Physical activity questionnaires	GIS-linked self-report data on walking and physical activity	Australia	Proximity and mix of destinations strongly associated with walking for transport but not recreation of vigorous activity. Each additional destination type added approximately five minutes of walking per week indicating diversity of destinations was also important.
Walking for transport.	Ogilvie, <i>et al.</i> , 2008	Physical activity, health and neighbourhood questionnaires	Self-reported active travel and physical activity	Deprived UK neighbourhood	After adjusting for individual characteristics neither neighbourhood perceptions nor proximity to motorway junction accounted for much variance in active travel behaviour. There was a positive association for proximity to shops that was independent of individual characteristics.
Walking and cycling	Van Cauwenberg, <i>et al</i> (2012)	Travel survey	Mode choice	Older Belgian adults	Urban residents walked more for transport than rural or semi-urban residents but were less likely to cycle for transport than semi-urban residents.
Walking and cycling		Travel survey – latent class analysis	Mode choice	Older Dutch adults	More likely to be walkers in urban areas and car users and cyclists in less urban areas
Walking	Giles-Corti, 2005	Modelling of associations between accessibility and attributes of public open space and walking	Walking as recommended; high levels of walking	Australia	Proximity to open space as well as size and attractiveness explained variance in walking.
Walking	Lee and Moudon, 2006	Observational study,	Questionnaires on active travel; walking by purpose	US	Proximate utilitarian destinations were positively associated with walking for transport but recreational destinations were not correlated with any walking. Density correlated with both walking purposes. Hills negatively

					correlated with transport walking but positively correlated with recreational walking. Sidewalks correlated with recreational walking only.
Recreational and transport-related physical activity	Kaczynski and Troy (2012)	Observational study	Reported physical activity for recreation and transport; perceived social connectedness and walkability	Canada	Perceptions of walkability and social connectedness were correlated across most socio-demographic groups. Activity in both domains were higher in areas rated more positively for walkability and social connectedness. Compound effects those who perceived neighbourhood favourably on both attributes reported highest activity. Participants who perceived high walkability but low social connectedness reported higher active travel than those who perceived high social connectedness but low walkability, who in turn had higher recreational activity
Walking	Saelens and Handy, 2008	Review	Literature searching	English-language publications, mainly studies from Australia and US	Consistent evidence for positive associations between walking for transport and residential density, land use mix and proximate destinations but equivocal evidence for connectivity, parks, pedestrian infrastructure and for recreational walking in general.
Active travel	Panter and Jones, 2010	Review	Literature searching	English language publications	Consistent positive correlations reported between active travel and proximate destinations and walkability. Evidence for aesthetic factors found to be inconsistent.
Walking	Ewing and Cervero, 2010	Meta-analysis		English language publications	Factors related to design and land use diversity showed the strongest associations with walking, in particular intersection density, employment-residential balance and proximity to retail.
Cycling	Fraser and Lock, 2010	Review		English language publications	No consistent evidence for a general effect that was independent of socio-demographic factors
Walking, cycling,	Van Holle, 2012	Systematic review		European studies	Convincing evidence that; physical activity, transport walking and transport cycling are

physical activity					<p>positively associated with walkability.</p> <p>transport -cycling is positively associated with proximate destinations and degree of urbanisation; Physical activity is negatively associated with degree of urbanisation but positively associated with quality of environment.</p> <p>recreational walking and cycling is positively associated with safety from traffic</p> <p>Possible evidence was surmised for positive associations between transport -cycling and presence and quality of walking/cycling infrastructure; total physical activity and proximate recreational facilities;</p> <p>recreational physical activity and aesthetic factors.</p> <p>Overall associations between the physical environment and active travel were more established than for recreational activity. Some associations found in previous, reviews for access to recreation facilities, aesthetics, crime and traffic safety were not substantiated in this European specific review. Interpretation of causality in these relationships is still precluded by lack of longitudinal study.</p>
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**Table 2 Selection of studies examining variations in behaviour in relation to characteristics of the built environment**

Given the quantity of studies examining physical environment effects, review level evidence is essential for understanding the strength of evidence for such effects. Saelens and Handy (2008) concluded there were consistent positive associations reported between walking for transport and residential density, land use mix and proximity of destinations, but findings for street connectivity, parks and open space, pedestrian infrastructure and personal safety were more equivocal, as were associations for recreational walking. A meta-analysis of the built environment-travel behaviour literature found mode share and likelihood of walk trips were most strongly associated with the design and diversity dimensions of built environments, with intersection density, jobs-housing balance, and distance to stores demonstrating the greatest elasticities (Ewing and Cervero, 2010). Panter and Jones (2010) found studies were consistent in demonstrating a positive correlation between proximate destinations, walkability and active travel, but evidence for the influence of aesthetics was inconsistent.

A systematic review (Fraser and Lock, 2010) of studies of cycling and the built environment concluded there was no evidence for a general effect that was independent of socio-demographic factors and that overall the methodological quality in the field was weak or moderate.

Generalisation of the conclusions to the UK or European countries would be equivocal given some fundamental differences in the density and design of the built environment between the contexts. Addressing this shortcoming and illustrative of the burgeoning interest in this area, a more recent systematic review of European-based work retrieved sixty papers published since 2005. The majority originated from the UK, Belgium and the Netherlands (Van Holle *et al.* 2012).

A central and unresolved question about the influence of the physical environment on travel and physical activity behaviour is whether any effect observed is independent of individuals self-selecting themselves into a location according to preferences for active travel/lifestyle. To claim an effect a study must demonstrate that the influence of self-

selection has been suitably accounted for. A review of nearly forty studies, using nine different approaches was unable to resolve this issue (Cao *et al.* 2009). They concluded that the literature contains both studies which report influence of built environment measures after controlling for self-selection, and those that demonstrate these effects diminish substantially after controlling for self-selection. It is not implausible that these effects are simultaneous; a process of persons sorting themselves into areas according to preferences may be operating at the same time as persons are being influenced by their physical environment. Another unknown is the magnitude of any autonomous influence of built environment. It was speculated could be small relative to the contribution of socio-demographic variables. The authors echoed calls for more longitudinal studies which could support inferences regarding causality.

There is the prospect that life course research on residential mobility in the field of migration may advance understanding of locational decisions and be useful to understanding the life course influences of mobility behaviour in general; Chen and Lin (2011) demonstrated that prior location experience influenced later residential location. Residential choices were characterised as a life-long, dynamic, self-revising, cumulative process incubated in the individual's social embedding.

### 2.3.3 Social influence of walking and cycling

Table 3 presents a summary of studies which revealed variations in walking and cycling and characteristics of the social environment. Fewer studies were retrieved that had looked at the relationship between walking and the social environment.



Behaviour	Reference	Research design	Measure	Population	Principal findings
Active travel	De Bourdeaudhuij <i>et al.</i> , 2005	Population survey		Portuguese and Belgian adults	Social support and modelling of behaviour by friends and family was positively associated with active travel
Cycling	de Geus <i>et al.</i> , 2008	Population survey			An individual is more likely to commute by bike if they have relatives or a partner who cycles, external self-efficacy and an employer that offers financial support for cycling
Cycling	Dill and Voros, 2007	Population survey		US	Individual is more likely to cycle to work if the colleagues do.
Cycling	Titze <i>et al.</i> , 2007	Population survey		Austria	Individual is more likely to cycle if peers do.
Cycling	Titze <i>et al.</i> , 2007	Population survey		Austria	Individual is more likely to cycle if perceive community to be supportive of cycling
Cycling	Moudon, 2008	Population survey		US	Found social influence, neighbourhood social support and social norms not to be predictive of cycling

**Table 3 Selection of studies examining variations in behaviour in relation to social factors**

Support from friends and the modelling of behaviour within social groups was positively associated with active transport in Portuguese and Belgian adults (De Bourdeaudhuij *et al.*, 2005). Having relatives or a partner who cycled, external self-efficacy and an employer that offered financial support for cycling made it more likely an individual cycled for transport (de Geus *et al.*, 2008). An individual was more likely to cycle for transport if their colleagues (Dill and Voros, 2007) or peers did so (Titze *et al.*, 2007) or perceive their community to be supportive of cycling (Titze, *et al.*, 2008). Conversely, Moudon (2008) found cycling not to be predicted by social influence, neighbourhood social support and social norms related to cycling.

These studies suggest that there is some influence of walking and cycling behaviour by inter-personal relations and broader social settings. However as cross-sectional studies these do not illuminate the longitudinal dimension of such effects. For instance, it could be that individuals locate themselves within social settings that support their preference for active travel and leisure, or instead that being exposed to these sorts of relations and settings can induce such behaviours. Static approaches also leave opaque the mechanisms or processes of social influence on behaviour and whether the outcome of social influence is differentiated by its timing within the life course. Understanding how the life course is shaped by proximal, interdependent lives as well as wider social-cultural settings over the life course is a primary analytical theme of a life course approach.

#### 2.3.4 Psychological processes in walking and cycling

Table 4 summarises studies that looked into the psychological processes of walking and cycling behaviour.

<b>Behaviour</b>	<b>Reference</b>	<b>Research design</b>	<b>Population</b>	<b>Principal findings</b>
walking	Handy <i>et al.</i> , 2006	Observational study	US	People with a positive attitude to walking are more likely to walk
Cycling	Emond <i>et al.</i> , 2009	Observational study	US	People with a positive attitude to cycling are more likely to cycle
cycling	Heinen <i>et al.</i> , 2011	Review	English language publications	People with a positive attitude to cycling are more likely to cycle
cycling	Gatersleben and Appleton, 2007	Observational study	UK	Non-cyclist perceived more barriers to cycling than cyclists.
	de Geus 2007	Observational study	Belgium	Correlation between attitude and cycling
	Bopp <i>et al.</i> , 2011	Observational study		Positive disposition towards active commuting corresponded to more active commuting and higher self-efficacy for it.
	Titze <i>et al.</i> 2010	Observational study	Australia	Positive correlation between attitude and PBC and cycling.
	Panter, <i>et al.</i> , 2011	Observational study	Older adults	Positive correlation between attitude and PBC and cycling.
	Titze <i>et al.</i> 2007	Observational study	Student population	Positive correlation between attitude and PBC and cycling.
Active commuting	Limieux and Godin, 2009	Observational study	Student population	Intention and habit predict a greater proportion of behaviour than physical environment variables. Some built environment effects are mediated by cognitions.
walking	Joh <i>et al</i> 2012	Observational study		Attitude disposition differentiated influence of the physical and social environment such that individual with a negative attitude to walking were less influenced by a favourable walking environment than someone with a more positive attitude.
	Ball <i>et al.</i> (2007)	Observational study	Australia	Self-efficacy, enjoyment and intention almost entirely mediated education differentials in recreational walking and partially mediated those in walking for transport
	Bamberg 2012	Review		TPB constructs explain between 20-30% of behaviour variance and up to

				50% of variance of intention to cycle. TPB a useful but not sufficient model to explain intrinsic processes of cycling behaviour.
walking	Darker <i>et al.</i> 2010 Scott, <i>et al.</i> , 2007; Hardeman, <i>et al.</i> , 2011; Murtagh, <i>et al.</i> , 2012	Observational study		TPB constructs explain modest proportions of behavioural and intentional variance. TPB a useful but not sufficient model to explain intrinsic processes of walking behaviour.
Active travel	Bamberg and Schmidt 2003 Murtagh, <i>et al.</i> , 2012	Observational study	Student population School children	Inclusion of measure of frequency of past behaviour as an indicator of habit explains a larger proportion of behavioural variance.
Cycling	De Bruijn, 2009	Observational study		Habit is the strongest predictor of adult bicycle use and the relationship between intention–behaviour is moderated by habit strength such that the influence of intention to cycle diminishes as the habit becomes stronger
	Heinen <i>et al.</i> , 2011	Observational study	Netherlands	Those who cycle on a daily basis and over longer distances register stronger habits for cycling

**Table 4 Selection of studies examining variations in behaviour in relation to cognitive factors**

Psychological studies have attempted to reveal the cognitive and motivational processes involved in the decision to walk or cycle and change of behaviour.

Walking (Handy *et al.*, 2006) and cycling (Emond *et al.*, 2009; Heinen *et al.*, 2011) are associated with positive attitude for these behaviours. More specifically, positive correlations have been shown between attitude and cycling (Gatersleben and Appleton, 2007; de Geus 2007) and active commuting (Bopp *et al.*, 2011). Cyclists have a more positive profile of perceived barriers and motivations for cycling than non-cyclists (Gatersleben and Appleton, 2007). Further Bopp *et al.* (2011) found positive disposition towards active commuting corresponded to greater active commuting behaviour and higher self-efficacy for the activity. Others reported positive correlations between attitude and PBC and cycling both for transport and recreation in an Australian population (Titze *et al.*, 2010), amongst older adults (Panter *et al.*, 2011) and students (Titze *et al.*, 2007).

The associations between psycho-social factors and walking, cycling or physical activity are generally stronger than those with built environment characteristics. For instance, psycho-social factors were stronger predictors of cycling in Belgian adults than access to destinations (De Geus *et al.*, 2008), and in models of student active commuting individual cognitions (intention and habit) were stronger predictors of behaviour than environmental variables (Limieux and Godin, 2009). Further, the significant effect of some built environment characteristics (residential density, land use mix and car accessibility) were found to be mediated by some cognitions (PBC).

Joh *et al.*, (2012) found that attitudinal disposition could differentiate influence of the built and social environment such that individuals with a negative attitude to walking were less influenced by a favourable environment than someone with a more positive attitude. The authors identified attitude formation as a focus for future research and speculated that influences could include previous walking experiences, inter-personal relations and cultural norms.

Ball *et al.* (2007) investigated cognitive, social and physical environment variables as mediators of education differentials in walking. Cognitions (self-efficacy, enjoyment and intention) almost entirely mediated differentials in recreational walking and partially mediated differentials in walking for transport (Ball, *et al.* 2007). Again this raises questions of how variations in attitudinal disposition arise (Ball, *et al.* 2007). A potential explanation could be that educational settings foster facilitating cognitions, so that individuals who spend longer in these settings have greater self-efficacy, enjoyment, intention to walk. A life course perspective could prove enlightening on how earlier experiences (walking to school, positive attitudes of parents, experiencing positive social norms towards walking) translate into later attitudinal disposition.

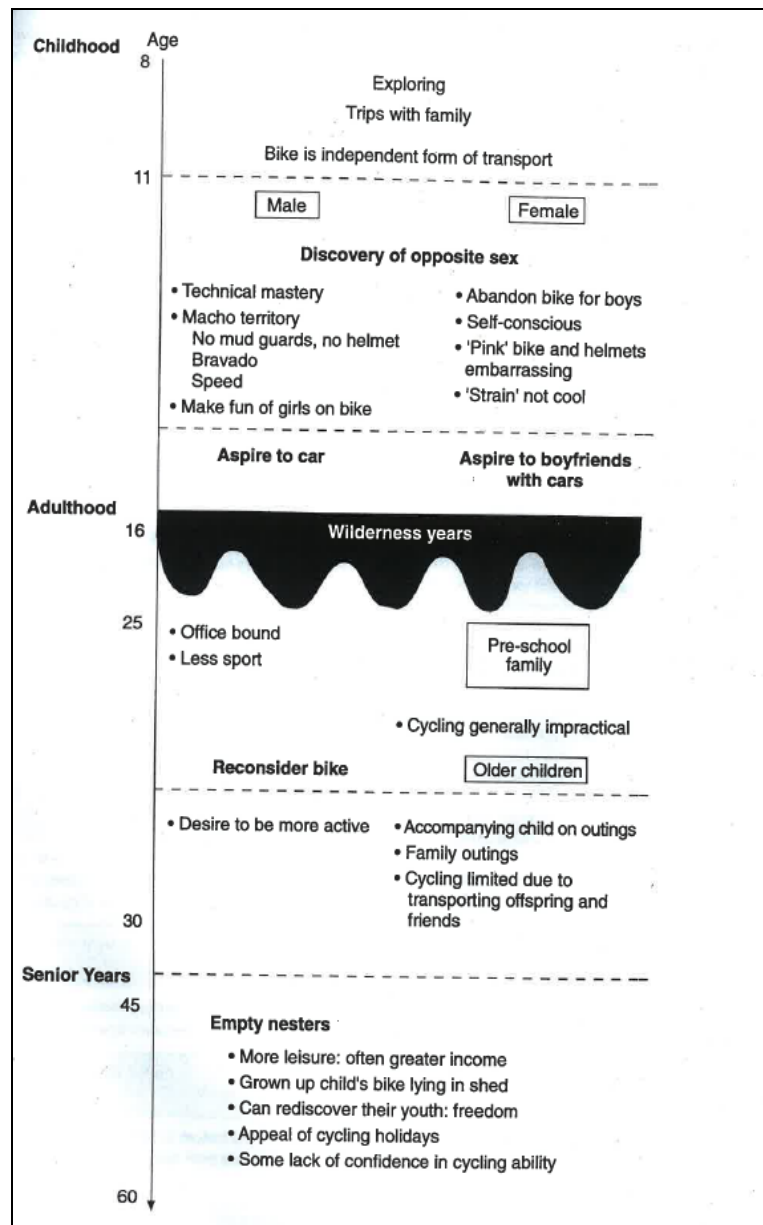
Studies of cycling tend to report that between 20-30% of behavioural variance and up to 50% variance of intention to cycle is predicted by TPB constructs (Bamberg, 2012). On this basis Bamberg (2012) argues that TPB is a useful, but not sufficient, model to understand the psychological processes of cycling behaviour. Studies of walking have found TPB explains similar levels of intention and even lower proportions of behavioural variance (Darker *et al.* 2010; Scott, *et al.*, 2007; Hardeman *et al.*, 2011; Murtagh *et al.*, 2012).

Habit in travel behaviour research is understood as automatically-elicited behaviour triggered by particular cues in the performance context. Deliberated behaviours that prove effective become habitual when repeatedly performed in stable contexts because this is cognitively-efficient. There are a number of studies that show that inclusion of a measure of frequency of past behaviour as a proxy for habit improves prediction of variance in travel behaviour over and above TPB constructs (Bamberg and Schmidt 2003; Murtagh, *et al.*, 2012). Habit has been shown to be the strongest predictor of adult bicycle use whilst the relationship between intention–behaviour is moderated by habit strength such that cycling intention becomes less relevant as habit strength increases (De Bruijn, 2009). Amongst cycle commuters the influence of habit is

stronger amongst those who cycle on a daily basis and over longer distances (Heinen *et al.*, 2011). Similarly, Murtagh *et al.* (2012) found that together walking and car/bus habit increased the prediction of intention and behaviour for children's travel to school. It was concluded from this that there were independent effects of intentional and habitual cognitive processes further challenging the conceptualisation of travel behaviour choices as wholly conscious and rational.

According to this construct of habit, everyday behaviours are difficult to change because they are performed with little conscious intention in stable contexts. This leads to the hypothesis that disruption of performance cues suspends automaticity, prompting the individual to think consciously about behaviour. This line of reasoning has been applied in practice to change behaviour towards more sustainable consumption patterns, including nutritional or mobility behaviour. Transport interventions, which modify the cost of habitual or alternative behaviours or infrastructure changes, have been trialled to reduce car-based travel. Positive short term results have been reported (Matthies *et al.*, 2006). However, evidence of long term effects is lacking.

Moving on from habit, a qualitative study into attitudes towards cycling in the UK was conducted in the mid-1990s with the aim of identifying strategies for promotion of cycling (Davies *et al.*, 1997). Case histories of cycling were constructed from seven depth interviews with people of different ages and gender. These informed focus groups that were held in areas that varied in conditions for and levels of cycling. It was concluded that attitudes around cycling were varied, complex and influenced by life stage, gender, peer pressure and societal norms. Beyond situational factors, deterrents to cycling were found to be competing modes, danger, concerns about image and status. Personal safety and bike security were reported as major deterrents. Ownership of a bicycle was common but many saw no reason to consider alternatives to the car. A model was constructed to illustrate the findings (Figure 9).



**Figure 9 Life Stage and cycling**

Source: Davies *et al.* 1997

This is an attempt at characterising typical opportunities and life course patterns of engagement with cycling that is based on a small collection of case histories and collective discussions of cycling. This was found to be novel in the literature. However the process of constructing the model and case histories was not well described and therefore the extent to which it reflected individual cases or was an amalgam of different cases is not clear. Amalgamating the histories of a mixed age group would splice together the cycling histories of people born at different times and overlooks the



fact that different cohorts would have encountered different macro-level contexts for cycling over their life courses. The life course perspective considers individual life courses to be historically-embedded and therefore shaped by the macro-level structural and social changes.

Some research has explored the experiential dimension of walking with qualitative methods (Darker *et al.*, 2007; Van Cauwenberg, *et al.*, 2012). Such work found walking with an extreme or challenge aspect were more salient aspects of walking while routine, mundane walking were rarely volunteered as a topic without prompting. However, on this topic the functionality of walking was emphasised whilst constructions of walking as exercise were opposed. Time, distance and efficiency permeated attitudes to walking. Older people identified feelings of safety, opportunities for social contact, maintenance of walkways and provision of crossings meant a more pleasurable experience in walk-along interviews (Van Cauwenberg *et al.*, 2012).

### 2.3.5 Section summary

There is reasonable evidence that people walk and cycle for transport more where there are proximate destinations and higher land use density and mix. Evidence for an effect of aesthetics, connectivity and safety is more equivocal. There are indications that physical environment correlates differ by walking purpose and fewer relationships have been established for recreational walking. Objective and the perceived characteristics of the physical environment seem to be associated with behaviour independently. Physical environment effects can be substantially moderated by socio-demographic characteristics and diminish after controlling for self-selection. Some studies are starting to measure interaction effects of social and physical environment factors on behaviour.

Cognitions generally account for more variation in behaviour than physical environment variables, although the strength of prediction of actual behaviour, as opposed to

intention, is actually quite low. There is evidence to suggest that cognitions are mediators of some physical environment effects and socio-economic differentials in behaviour. The demonstration that measures of past behavioural frequency improve prediction of behaviour reinforces the claim that there are un-deliberated aspects of behaviour choices which need to be accounted for in explanations of behaviour.

Methodologically, the current knowledge base is dominated by quantitative studies and cross-sectional research designs. This means insights on behaviour are largely based on the interpretation of statistical analyses of cross-sectional associations between pre-defined variables. This has uncovered a myriad of relations between contemporaneous contextual factors and behaviour at a point in time, but left unexamined the association of these factors over time. The field is thus oriented towards explanations of behaviour that assume the past has no influence and privileges present circumstances as determinants of behaviour. However, it is possible to take from this collection of studies that location choices, attitudes and habits can enable or inhibit certain travel and physical activity behaviours. These are personal factors with an inherent temporal dimension and connection to personal history. Understanding how these components have arisen is surely pertinent to any explanation of behavioural outcomes.

## **2.4 Longitudinal studies**

The chapter now moves on to deliberate research that has examined walking and cycling through time and more broadly, physical activity and travel behaviour. Section 2.4.1 leads with discussion of studies on the stability of individual physical activity.

### **2.4.1 Studies of physical activity over time**

A relatively small proportion of physical activity research has studied behaviour through time, and has done so at varying scales. For instance, accelerometry and pedometers has been used to monitor physical activity over days or weeks (Tudor Locke *et al.*, 2010) whilst the tracking of behaviour over transitions between life stages has been

studied with self-report data. Research where the temporal frame approaches or extends to the entire life course is uncommon.

Barnett *et al.* (2008) used three time points of prospective data, collected over 22-years, to construct behavioural trajectories of leisure time physical activity (LTPA) in a cohort of Canadian adults. Four types of trajectory were distinguished. The distribution across these types is indicated by the percentage reported in parenthesis, these were, consistently inactive (56.0%); consistently active (11.7%); increasing (25.2%) and decreasing (7.1%). Class membership of inactive or decreasing trajectories was predicted by being female, older, having low income or lower educational achievement.

Tracking studies use prospective data to determine the degree of stability of an individual's relative rank within a group over time to determine the extent to which the behaviour tracks through life. A review found that in general there was low or moderate tracking of self-reported physical activity across childhood, adolescence and young adulthood and tracking was lower through the transition to adulthood than in adulthood itself (Telama, 2009). Some gender differences in strength of tracking were also evident. Tracking of physical activity is weaker in comparison to other biological markers, for instance Body Mass Index (Herman, 2009) and musculo-skeletal fitness (Fortier, 2001). This could be a reflection of the unsuitability of a single item measure to accurately measure a complex behaviour like physical activity. More accurate measurement could reveal stronger tracking.

Despite the opaque findings on behaviour tracking four hypotheses have been outlined as mechanisms through which earlier experiences might predict later outcomes (Telama, 2009). These are firstly, a carry-over value hypothesis whereby individuals continue to participate in activities they engaged in when they were younger; secondly, an ability and readiness hypothesis wherein earlier experiences equip individuals with the motor skills, attitudes and motivation that make it easier to maintain or restart physical activity; thirdly habit formation hypothesis that considers that physical activity

acquires a degree of automaticity; and finally, a self-selection hypothesis that holds that hereditary disposition towards physical fitness and motor performance activity inclines individuals to perform more of these behaviours through the life course.

Such mechanisms could operate in behavioural trajectories of walking and cycling; for instance, individuals might carry over or return to walking or cycling because earlier experiences equipped them with the physical capabilities or social contacts which incline or enable them to do so, or they acquired a habit or possess the genetic predisposition so to do.

A common occurrence of longitudinal analysis on walking and cycling is in the evaluation of interventions. Rose and Marfut (2007) evaluated a mass participation event promoting cycling to work using the stages of change model (Prochaska *et al.*, 2008) as a conceptual model of behaviour change. Six months after the intervention, one in four event participants were cycling at least once a week. People who cycled prior to the event increased the frequency with which they cycled and 85% were found to be at a more advanced stage of change at a twelve month follow up. In some cases this was progression to more advanced pre-cycling stages, for instance between contemplation and preparation.

The objective for such studies is to reveal the impact of an intervention on the participants' behaviour. Behaviour change is usually assessed as the change between two or more time points with subsequent effects being attributed to the intervention, after suitably controlling for confounders. Such analysis does not concern the underlying course of behaviour, general processes of change over time, or potential influence of cumulative past experience on current behaviour.

In an anthropological contribution Whitaker (2005) interviewed older Italian males who had been engaged in long distance cycling for sport and recreation throughout their life course, continuing into quite advanced years of life. Whitaker argues that these men

demonstrated that it was not biological limitations but social factors that made cycling into older age the exception rather the rule.

#### 2.4.2 Physical activity and travel behaviour changes in the course of life events

The notion that some behaviour change is brought about through contextual disruption prompted by life events is common to both fields, and has been the basis for some research. The focus of inquiry has spanned both fairly standardised life events e.g. transferring from primary to secondary school, and non-standardised events, for instance leaving home and subsequent residential relocations. This section details the primary studies that have examined change in travel behaviour and physical activity in associations with life events.

Cooper *et al.* (2012) looked at changes in school travel behaviour and physical activity in a prospective study of a contemporary cohort of UK children over their transition from primary to secondary school. The mode share of walking was respectively 77.0% at primary school and 60.7% at secondary. The mode share of cycling showed a slight increase over the transition but was overall much lower at 3.2% and 3.5% for primary and secondary, respectively. Mode transitions indicated that cycling had a resilient but far smaller mode share in school travel. In contrast walking had a far larger mode share but one that declined at the primary-secondary transition with shifts principally to car and bus travel. Mode transitions between active and passive means of travel did result in changes in overall levels of physical activity as expected. Distance travelled to school increased for all mode transitions with the exception of the 6% who changed from car to walking.

In a prospective study having children, but not marriage, incurred a loss of physical activity that was in the order of three hours per week of physical activity in Finnish adults. Mothers but not fathers were adversely affected by the arrival of subsequent children (Hull *et al.* (2010).

In a systematic review of studies on the effects of life events on leisure physical activity, the transition to university, having a child, and remarriage were associated with decreased physical activity levels, while retirement was associated with increased physical activity (Engberg *et al.* 2012). Another review reported numerous events that were associated with positive and negative changes in leisure activity in women during young, middle and later adulthood (Brown *et al.*, 2009). Emerging adulthood emerged as a critical phase for change due to the number of events occurring during this time.

The transition of retirement can enforce changes in discretionary time and time use as well as spatial mobility. The transition of the largest living cohort, the cohort born during the post-World War Two fertility spike, into this post working life stage has brought research attention to the changes in behaviour that are associated with this transition. A thirteen-year prospective study of older Dutch adults showed retirement was associated with a decline in physical activity and loss of work-related active transportation that were not compensated for by other changes in activity (Slingerland, 2007). Chung *et al.* (2009) found that working older Americans were more likely to be physically active than their retired peers. However, the effect of retirement varied widely by occupational type and income with individuals retiring from physically demanding jobs became less active, whereas retirees from sedentary job became more active on average.

A systematic review concluded that leisure physical activity increased after retirement, an effect moderated by socioeconomic status, but findings on total physical activity were inconsistent (Barnett, van Sluijs and Ogilvie, 2012). Poor methodological quality was noted. A parallel review of qualitative studies found that while health was a motivation to increase or adopt recreational physical activity this did not guarantee long term maintenance (Barnett, Guell and Ogilvie, 2012). Older adults, who had always participated in recreational physical activity, expressed a motivation to continue or increase activity after retirement, and it was common for retired persons to perceive

that they had made a conscious effort to establish a new routine. Older males focused on the personal challenge, while older females spoke of the opportunity for social interaction. Those who were inactive and those who retired from manual occupations often placed a low value on recreational physical activity, perceiving it as unproductive.

A seam of travel behaviour research has focused on life events as the basis for context disruption and conscious deliberation of behaviour that may result in behaviour change. Stanbridge (2007) considering travel mode choice and distance in the course of residential relocation found that, while level of car use remained relatively stable, walking and cycling both increased, apparently at the expense of public transport. Cycling demonstrated the highest aggregate increase over relocation in terms of the proportion cycling to work. This was, however, from a low base and continued to have the lowest modal share. It was also found that behaviour could become consciously deliberated in the course of relocation before automaticity resumed with no change in behaviour. Verplanken *et al.* (2008) found that car commuting was more likely to be reduced following a residential relocation in individual with pro-environmental values.

Two articles were published in the course of this project that reported longitudinal analysis of changes in walking and cycling over relocation to a new neighbourhood. These concerned a natural experiment of people moving to green-field housing developments located on the urban fringe of Perth, Australia. Prospective data was collected on transport and recreational walking and cycling, perceived and objective built environment and social environment characteristics, before and after relocation, and reasons for neighbourhood choice. In the course of the move five per cent took up cycling for transport and seven per cent took up cycling for recreation (Beenackers *et al.*, 2012). Multi-variable regression, adjusted for socio-demographic factors, showed predictors of transport and recreational cycling differed. Greater objective residential density, increased access to a park and more recreation-related destinations, higher baseline self-efficacy and more social support were positively associated with take up

of transport cycling. Decrease in objective connectivity, increased access to services, and more pedestrian crossings showed marginal associations. Recreational cycling was positively-associated with an increased objective connectivity, higher baseline social support and intention regarding cycling.

Overall it was found that following relocation transport walking declined and recreational walking increased (Giles Corti *et al.*, 2013). This appeared to be because most participants (89%) experienced a decline in transport-related destinations but an increase in public open spaces. Still, and consistent with cross-sectional evidence, the small proportion who did gain access to more neighbourhood destinations showed positive changes in minutes of walking. Improved perceptions of neighbourhood after relocation were associated with moderate increases in both types of walking; an effect which remained after adjustment for objectively-measured changes in the environment. This study provides preliminary longitudinal evidence that access to destinations increases recreational walking where findings from previous cross-sectional studies had been equivocal. Further, on the basis that nearly 90% of participants cited 'affordability' as their main reason for their choice of location, it was claimed that the changes in walking were not the result of self-selection. This can be viewed as more robust control for self-selection than retrospective recall of reason for neighbourhood choice.

In a qualitative study of residential or work relocation, cost, speed, convenience and reliability emerged as motivating factors in the selection of commute mode (Jones and Ogilvie, 2012). Health benefits did not motivate individuals to initiate active commuting but were sometimes recognised as a benefit and a motivation to maintain active commuting. Only participants who commuted actively at their previous location described a preference for active commuting at their new location. However, competing priorities, often distance, could prevent them from commuting according to this preference. This was interpreted as incompatible with a straightforward self-selection



hypothesis i.e. that people relocate to areas that enable them to commute according to their preference. Further, individuals with prior expectations regarding their new commute were amenable to change. Some travel behaviour changes associated with a move lagged the actual event of relocation indicating that there may be an extended window of opportunity for behaviour change around relocation.

#### 2.4.3 Mobilities biography framework

Explorative studies have been conducted using retrospective questionnaires to discern life events which influence travel behaviour (Van der Waerden *et al.* 2003; Klockner, 2004). Changes of residence, starting work or changes of employment were events that most often precipitated a change in the mode choice set and mode switching between motorised and active modes (Van der Waerden *et al.*, 2003). These events often altered characteristics of travel choices and attitudes towards modes.

Much attention in the study of travel behaviour dynamics has been afforded to car ownership (Prillwitz *et al.* 2006; Yamamoto, 2008; Oakil *et al.* 2011). Oakil, *et al.* (2011) found car ownership changes were common in the course of household formation and dissolution, childbirth was associated with an increase in car ownership which were often made in anticipation of the event, and residential moves were associated with car ownership changes in either direction. The probability of a car ownership change was higher in the year following a job change.

Some travel behaviour studies have been underpinned by the mobilities biography framework (Lanzendorf, 2003). Harms and Lanzendorf (2007) identified automobile-dominated and environmentally-friendly pathways of mode choice change over the transition from university to working life. Some attitudinal and behavioural variables showed correlation with mobility pathways while some inter-individual variation was predicted by perceived social norms of the work place.

Beige and Axhausen (2011) studied the dynamics of long-term and mid-term mobility decisions, i.e. residential and occupational location changes and mobility tool ownership (car and public transport pass), using a retrospective survey that covered a twenty year period in Switzerland. Changes in residence, employment and education were significantly more frequent than changes in car ownership. Although the temporal ordering of events was evident, the authors were reluctant to specify direction of causality because it was clear some events were anticipated in advance. For instance, a household move made in advance of having a child. For this reason the authors endorsed the protocol of asking respondents for the reason behind a life event. The study also revealed patterns in the occurrence of mobility-relevant events across the life course. In general, those aged between fifteen and thirty-five moved, changed occupations and changed car ownership and pass-holding most frequently, beyond this age range they became relatively more stable. Male respondents were more stable in their locations and mobility tool ownership than women. Children appeared to stabilise household long-term and mid-term mobility decisions.

Lanzendorf (2010) studied changes in travel mode choice and travel distances around entry into parenthood using retrospective qualitative interviews that elicited an account of travel behaviour over a fifteen year period. These accounts contextualised change within the developments of the life course and revealed the participants reasoning of their past decision-making. This methodology also uncovered interactions between events and their impact on travel behaviour which might not have been uncovered with a quantitative survey. Life events that shaped the travel behaviour of new parents were grouped as those that involved changes in mobility resources and those that did not. The former group included acquisition of licence, acquisition or loss of car and partnering, and the latter having children, residential relocation, job or education related events and incidents. Mobility resources, the urban form, the quality of transport modes and mediating factors like time and financial resources influenced behaviour change.

The authors emphasized the complexity of reasons for travel behaviour stability or change, concluding that it was too simplistic to characterise the change in mobility behaviour for new parents as inevitably increased car usage.

#### 2.4.4 Studies applying life course concept of trajectory

Three studies of cycling were found that were connected conceptually to life course theory (Bonham and Wilson, 2011; Underwood and Handy, 2012; Chatterjee *et al.* 2013). These studies used a biographical approach in which changes in cycling were identified through respondents' accounts of developments in their cycling rather than a behaviour change that was defined *a priori*.

Chatterjee *et al.* (2013) conducted interviews with individuals who had undergone a change in cycling behaviour during a period of major bicycle investment in their local area and put forward a model of turning points triggered by contextual change. A turning point was defined as a significant change in the cycling trajectory and contextual change constituted either a life event or change in the external environment. Events implicated with turning points were employment changes, changes in familial role or social networks and events which alter peoples' values or the context for travel or physical exercise. However, it was noted that behaviour change did not always follow the occurrence of these events. Turning points also took place in the context of, but were not attributed to, the following life transitions: new entrants to the workplace; changing the nature or location of work; parents of young children, especially mothers; people recovering from ill health; and retirement. Personal history as well as intrinsic motivations including fitness, and saving time and money, and facilitating conditions mediated the outcome of contextual change. This work contributes a dynamic model of cycling behaviour change developed from interpretation of individual's accounts of turning points. This identified intrinsic motivation and personal history as mediators

however it does not elaborate longer term influence of such factors or the cumulative impact of multiple changes.

Sherwin *et al.* (2012) discussed the role of social influence in individuals' returns to cycling. Close social contacts or surrounding visibility of cycling were commonly cited as factors in these returns, in some cases as the central factor and in others they were one among a number. Social influence was categorised as direct, less direct and indirect coming from, respectively, partners or family members who encouraged or facilitated cycling, less immediate contacts such as colleagues and social networks and the wider social and cultural context.

Bonham and Wilson (2011) studied the experience of cycling across the life course of women who had made a return to cycling and currently cycled at some level, through in-depth interviews. Case histories were produced with women of different age groups. From these it was apparent that many had engaged with cycling at multiple occasions along their life course, with at least half having returned to cycling several times since childhood. Changes in cycling were often related to changes in housing, employment, family and health status. The mutability of cycling across the life course and the myriad pathways that could unfold were emphasised from these accounts.

Underwood and Handy (2012) explored the formation of attitudes and practices relating to cycling using a biographical approach. Cycling experience throughout the life course was elicited through a combination of questionnaires and open-ended interview questions. Analysis focused on the participant's retrospective view of their cycling in adolescence and suggested that abandonment of cycling during adolescence had been common. Participants, especially females, considered that their high school selves had been susceptible to negative images of cycling. It was speculated that the sensitivity of adolescents to travel mode choices as a form of self-presentation meant individuals could be deterred by perceptions of cycling as 'uncool'. Related to this, cars and driving

were prominent in participants' retrospective discussions of their adolescent attitudes and practices of cycling.

In spite of Li *et al.*'s (2009) entreaty for use of a life course perspective in physical activity research, few studies were found that has used the life course framework to underpin empirical work. Scanlon-Mogel and Roberto (2004) conducted depth interviews with older Americans who exercised at a health and fitness centre to elicit retrospective qualitative accounts of physical activity and exercise over the life course. This descriptive study showed that gender differentiated opportunities for exercise over the life course. In early adulthood, sources of exercise for women were walking and cycling for transport due to lack of access to a car, whilst their male peers identified formal exercise including running and weight lifting. In mid-adulthood, women regarded domestic work and care of children as their main source of exercise, whilst for men it was occupational labour, gardening, DIY and playing with their children. In later adulthood, exit from the labour market and departure of children increased discretionary time and these, together with the onset of chronic health problems, had been triggers to engage in formal exercise. Roles held in mid-adulthood were viewed to have previously inhibited this. It is recognised that the potential to generalize from the physical activity histories of exercising older Americans to a general UK population is limited. However, it is also noted that the emphasis of gender roles and family and employment transitions resonates with some studies of mobility biographies.

#### 2.4.5 Section summary

To summarise section 2.4 some attention has been given to intra-individual change and stability in behaviour as well as identifying life events which are associated with changes in level of physical activity. In the latter life events have generally been considered for their effects in isolation rather than in the context of an unfolding life course. Behaviour change has been identified through self-reported measures of

physical activity and has concerned domains of activity for instance leisure or vigorous activity rather than being behaviour-specific e.g. walking or cycling. Finally the insights of these studies are generally limited to revealing the timing and direction and association of changes to life events and do not illuminate the circumstances and mechanisms of change. Without understanding of the latter it is problematic for change to be attributed to the accompanying life event.

Studies of travel behaviour dynamics has been restricted to ownership of a car or public transport pass, commuting mode choice and locational changes, as mobility-relevant decisions. The potential to reveal individual change and continuity in walking and cycling with this approach then has been restricted to the role that they play as a main commute mode. This leaves unexamined their dynamics in travel for other purposes or indeed walking and cycling not undertaken primarily for travel. As relatively inexpensive items that may also be acquired just for occasional recreational use, the dynamics of bicycle ownership is unlikely to offer a similar proxy for cycling activity, as car and public transit pass ownership do<sup>4</sup>. Further, as predominantly supplementary modes that are often performed only occasionally, irregularly or incidentally, it is difficult to define and identify discrete changes in behaviour.

Like the studies of physical activity over time, study has been limited to understanding the temporal association of events and behaviour change. As some researchers have noted incorporating the reasoning of travel behaviour changes into analysis offers the prospect of understanding processes of change and causal relationships and avoids events being linked spuriously to effects, or lagged effects being overlooked.

The life course perspective has had limited and partial application in both fields. In the form of the mobilities biography framework the perspective has been reduced to the concept of trajectory leaving most of the other paradigmatic principles neglected.

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<sup>4</sup> significant attendant costs are taken as a commitment to use

Pioneering studies have explored cycling trajectories through biographical interviews. The most notable in respect of the aims of this project was Bonham and Wilson's (2012) elaboration of the whole life cycling histories of women who had made returns to cycling. No studies were found that brought a life course perspective on walking. In general the temporal frame of studies adopting the mobility biographies approach has been limited to study only sections of the life course. This nullifies the inherent orientation of this perspective to theorise about longer term dynamics, and the evolution of later outcomes from cumulative earlier experiences. Further most studies have neglected to conceptualise behavioural trajectories as socially and historically embedded. Hence, the potential to elaborate in a longitudinal framework indications of inter-personal influence that have originated from cross-sectional studies is limited. Similarly, there has yet to be consideration within this seam of whether mobility biographies show constancy through historical time or whether life course patterns of mobility are being shaped by macro-level changes in the social and structural conditions.

## **2.5 Macro-level structural and social changes**

The life course perspective emphasises the historical context of the life course. Successive birth cohorts intersect differently with the historical context and, in so doing, encounter an altered and shifting context through which their life course develops, subject to new and continuing influences. Drawing on sources from sociology and social history this section highlights significant and inter-related social, cultural and economic changes which have had an impact on the structure and content of life courses, and shaped the macro context for individual trajectories of walking and cycling.

The period since the end of the Second World War has been characterised as a period of 'rapid and extensive' social, economic, policy and scientific and technological change (Wadworth and Bynner, 2011) in which a post-industrial society emerged. Key

economic changes were economic prosperity, the rise of mass consumption and the expansion of free time. Labour market changes accompanying a structural shift from manufacturing and industry, to a service-based economy, have been an increase in women's economic activity, including a shift from career breaks to have families to maternity leave, and a more general shift towards part-time and flexibilised employment.

Experiences of entering the labour market of successive birth cohorts have been distinguished through the expansion and extension of education to produce a more highly qualified workforce. Where previously young people followed fairly defined routes from education to employment, these transitions have become more individualised, extended and non-linear as successive cohorts have been inclined to gain more advanced qualifications in order to compete for higher status but less secure employment (Ashton and Bynner, 2011). Routes to employment for young people with few or no qualifications have become increasingly difficult. Amidst focus on education and establishing careers, younger cohorts have delayed partnership and family life. Increasing economic participation of women has been accompanied by an increase in dual income families and an increasing proportion of children with a mother in paid employment. Real incomes rose whilst socioeconomic inequalities within the population increased. The average size of nuclear families has decreased whilst increased longevity has made three and four generation families increasingly common, giving rise to the description of 'beanpole families' (Clarke and Roberts, 2011). This means people are likely to spend a greater proportion of their lives in caring roles for relatives and children are increasingly likely to have living grand-parents and great-grandparents. Increased prevalence of relationship dissolution and reconstitution has made family structures increasingly diverse.

Economic shifts have also distinguished cohorts in their transition from work to retirement. Labour market participation amongst older adults has steadily increased in



the last decade following longer term decline (ONS, 2012); retirement has increasingly become a gradual transition (Berry, 2010). This trend is likely to continue with less generous pension provisions in future, as well as better health, increased expectations of post-retirement longevity and measures to accommodate an older workforce (Berry, 2010). Conversely, care of elderly relatives could be a reality that forces older people out of the labour market.

Whereas, in industrial society, the individual was regarded as subordinate to the collectives of family, community and society, in the post-industrial era a new cultural ethos has emphasised individualism and positioned the body as the locus of self-fulfilment and expression. Improved living standards and advances in prevention and treatment of ill-health have resulted in long term increases in average life expectancy and years lived in good health. However, this has also been accompanied by increased years living with some level of chronic, degenerative health impairment. Faced with significant increases in the cost of health care the state has increasingly sought to place responsibility for accumulation of risk or protective influences on health on the individual. Better understanding of risk and causes of ill-health have undermined notions of health as a matter of fate, and instead health and wellbeing has come to be seen as a life-long project bringing prominence to exercise and lifestyle.

Pooley *et al.* (2005) presented a social historical account of changes in daily mobility in Britain over sixty years since the 1940s. This was based on analysis of reconstructed 'mobility histories' of individuals and aggregate trends in mobility from NTS data. NTS data shows the substantial increase in daily distance travelled and narrowing of gender differentials over this period. Most of this increase was travel undertaken by car, with travel on foot and cycling declining. Reasons for travel diversified, so that travel to work accounted for a declining proportion of all trips. The mobility histories were considered as consistent with a population that was becoming increasingly affluent, achieving wider car ownership, saw a reduction in working hours and a dispersal kin networks

through long-distance residential mobility. Mobility histories were characterized by continuity and change, reflected personal circumstances, as well as broader societal influences, and highlighted that individuals' mobility experience can vary significantly. One mobility history which was presented as an unremarkable case of a women born in the 1930s illustrated how, after the constraints of motherhood and being a housewife, this cohort of women achieved a greater degree of mobility later in adult life, largely through access to cars.

Analysis of the daily distance travelled by older people over time shows this section of the population has become more mobile (Tilley, 2012). This could be the result of the maturation of the more highly motorized cohort moving in to this life stage, in particular, as pointed out by Shergold and Parkhurst (2012), the greater proportion of females within this age group who are driving. This could portend a future older population with higher levels of mobility, or this cohort could prove to be unique in its mobility behaviours.

### 2.5.1 Section summary

This section has sought to identify macro-level changes in social and structural conditions that could have relevance for life course development of walking and cycling. Significant, inter-related historical changes that it would appear have made an impact on the structure and content of life courses, and are therefore deemed relevant for life course patterns of walking and cycling are;

- economic changes: which include increased participation of women in paid employment, increased affluence including increased car ownership and use,
- social and cultural changes: extension of education, later family formation, long distance dispersal of families, changing beliefs about health and body image.

## **2.6 Limitations of knowledge base**

Research on walking and cycling is multi-disciplinary and resides principally within the research fields of transport and health. A sizeable research literature has been generated in pursuit of understanding optimal contextual conditions for active travel and active lifestyles, underpinned by the rationale that this can be applied to promote walking and cycling.

Research to understand the determinants walking and cycling behaviour has been dominated by cross-sectional studies. This has brought about a knowledge base which illuminates a myriad of associations between walking, cycling and physical activity and independent variables selected to quantify characteristics of the contextual conditions, or individual circumstances at a point in time. The variables considered concern the physical environment, social environment, individual characteristics and psychological constructs. The restriction of the body of work in both fields which studies individual behaviour as a dynamic entity is likely to reflect the lack of suitable theoretical and methodological bases for the task. The life course perspective was identified as a longitudinal framework that could underpin a study of intra-individual change and continuity in walking and cycling that was oriented to understanding how outcomes relate to earlier experiences over the longer term.

The notion that behaviour change can be triggered by contextual change invoked by life events was common to both fields and has been explored by identifying behaviour change in association with isolated life events. This was taken to imply a model of behavioural development in which life events are an unforeseen and exogenous disruption to behaviour, and that subsequent behaviour changes are clearly demarcated and permanent. The view was taken here that this would be too reductive a framework to conceptualise life course trajectories of walking and cycling on the basis that not all trajectory developments would be reducible to discrete step changes, and that some life course events and their consequences can be anticipated. Thus, an approach that could accommodate both significant step changes and more gradual

inflections and open-ended changes was deemed necessary to capture life course development of walking and cycling. The work of Lanzendorf (2010), Bonham and Wilson (2011) and Pooley *et al.*, (2005) and Frändberg (2006), which incorporate longer term retrospective horizons and participants' qualitative retrospective explanations of past behaviour, were taken as demonstration of alternative research approaches. Further, it was felt that such approaches had conveyed, through more naturalistic accounts of walking and cycling, the exercise of human agency in unfolding trajectories.

Through consideration of the research topic in light of the principles of the perspective it became apparent that, with the exception of Pooley *et al.*'s (2005) social history study, studies of mobility biographies have not considered life course development of walking and cycling with respect to their historical context. For instance, the studies of cycling trajectories included participants of different age groups but did not consider how their trajectories might have been distinguished by their distinct historical locations. The social structure and norms, economic conditions, physical environment through which an individual life course unfolds are specific to the historical period they are born into, and the proximal settings in which individuals live and interact with others are structured by macro-level conditions. This review found only limited sources that discussed individual development in respect to macro level social and structural change. For this study, it was hypothesised that the collective walking and cycling trajectories of people born at the same time would be marked by their particular time in history and taken that understanding of the influence of macro level changes on life course patterns of walking and cycling could be advanced by examining cohort differences.

Cross-sectional studies have pointed to influence of walking and cycling behaviour through inter-personal contacts but study of how these relations influence behaviour over time has yet to be undertaken. The inter-dependency of travel behaviour has been

pursued in mainstream travel behaviour research with some analysis of household travel behaviour patterns. A household is an impermanent collection of co-residing individuals which may or may not involve familial relations, where interdependency in travel behaviour arises as the consequence of shared resources, tasks, schedules and decision-making (Timmermans and Zhang, 2009). The life course perspective conceptualises the life course as linked to other life courses through familial and other social relations. This brings the potential for developments in one life course to influence the other. Linkage of two life courses is not be limited to periods of co-residence but extends over the duration of the relationship. Mobilities biography studies so far have considered only the impact of life events on the travel behaviour of an individual. It was hypothesised that an individual's walking or cycling trajectory may be impacted by events and transitions that primarily reside in the life course of another. For instance a grown-up child becoming a parent, or an ageing parent experiencing functional or cognitive decline, may resonate in the life course of adjacent generations and, therefore, influence physical activity and travel behaviour. To address this gap, it was decided that this study would focus on the intra-familial influence of walking and cycling over the life course, looking specifically at inter-generational influence in parent-child dyads.

To summarise, it was determined that this study could respond to knowledge gaps by conducting a life course study that;

- explored how behavioural outcomes are shaped by the cumulative interaction of contextual and personal factors through earlier life stages
- was not restricted to a segment of the life course but took a whole life view
- provided empirical insights on *walking* as well as cycling trajectories
- explored both male and female perspectives
- did not select subjects on the basis of the present activity status but included subjects who ranged in respect to current and previous behaviour

- considered how behavioural trajectories were influenced by proximal life courses, over the duration of the relationship
- explored the impact of macro level changes on the behavioural trajectories of individuals born at different times.

## **2.7 Chapter summary**

This chapter has outlined the contemporary understanding of the determinants of walking and cycling behaviour. This made apparent that methodological and theoretical shortcomings have hindered progression to understanding the dynamic confluence of personal forces and contextual factors in shaping individual behavioural development. The review provided a critique of how the life course perspective has been utilised in the study of travel behaviour and physical activity and argued that application has been partial. The chapter closed with a discussion of the limitations of the research reviewed and outlined specific knowledge gaps that this study set out to address with the application of a life course framework.

As was observed through the review, the prevailing approach in research of walking, cycling and physical activity has been quantitative. The smaller seam of research oriented to the life course perspective has shown slightly more balance in approach. Some studies used biographical methods to understand behavioural trajectories through individual's recollection and reasoning of earlier experiences and to capture changes that did not constitute discrete events. This point is returned to in chapter three as the thesis continues with discussion of the research design process.

### 3 RESEARCH DESIGN

#### 3.1 Chapter introduction

This chapter presents and justifies the research design, and is divided into eight sections. Section 3.2 outlines the ontological and epistemological position of the research. This is followed by a statement of the research objectives, and supporting questions, that were derived from knowledge gaps identified in the literature review. The conceptual framework is introduced and explained in section 3.4. Section 3.5 sets out the considerations involved in selecting a qualitative retrospective methodology and the development of the method for the first stage of the primary research. A second stage is presented in chapter 6. Section 3.6 discusses the selection of appropriate research evaluation criteria and section 3.7 explains the sampling and recruitment strategy. The chapter closes with a discussion of the ethical considerations of the study and how these were addressed. Figure 10 is a schematic illustrating how the different components of research design relate to each other.

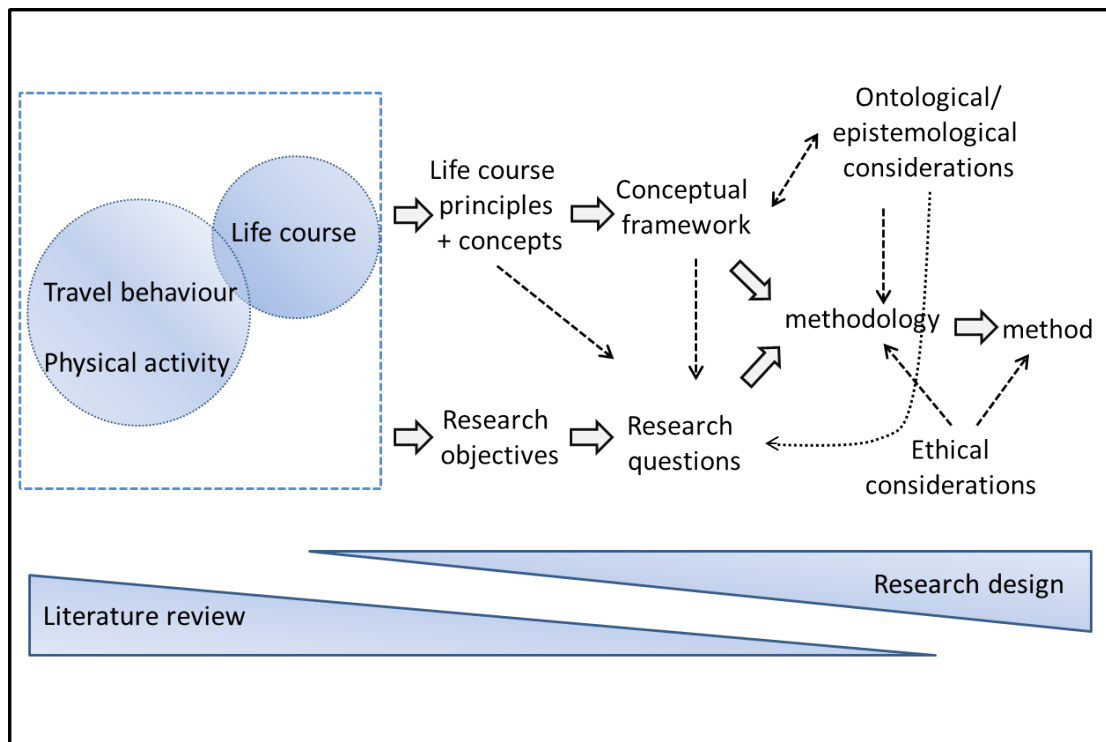


Figure 10 Schematic of research design process

### **3.2 Ontological and epistemological position of the research**

A range of philosophical positions can underpin research. One approach to social research is for the researcher to assume, up front, a philosophical position on ontology and epistemology which then frame what research questions are deemed possible and the selection of methodological approach to answer them. In the present study there was not such a strictly linear progression from ontology and epistemology to methodology and empirical work. Instead, the position evolved in the course of the research design as the researcher acquired knowledge and perspective on these issues. Some aspects of the research design were then revisited and refined according to this position.

The predominant position in transport studies, reflecting its origins in engineering is positivist. The positivist epistemological assumption is that reality can be directly apprehended through observation (May, 2001) and that the research endeavour consists of generalizing from identified empirical regularities to laws about transport phenomena. For instance, the majority of research on walking and cycling can be considered as uncovering static empirical regularities between environmental, socio-demographic and psychosocial variables and indicators of walking or cycling. This supposes it is possible to separate these variables from the human meanings and perceptions of them, a view this researcher does not share.

In this study, extreme philosophical positions of positivism and constructionism were rejected. Instead, the researcher took the pragmatic position that there was reality and social phenomena that existed independently of us, and our attempts to know about them. There were no direct, incontrovertible way of gaining knowledge of reality outside of the meaning-making structures used in our cognitive deliberation and communication of the social world. An individual's walking or cycling trajectory was considered to exist independently of attempts to know about it. What a person can report about their trajectory was taken as a reasonable, though not infallible, foundation



for knowledge. It was then for the researcher to reflect this partiality in their presentation of the findings as well as establishing the credibility of the knowledge contribution.

### **3.3 Research objectives and questions**

The literature review established that understanding of walking and cycling was severely limited by a lack of knowledge of the intra-individual change and stability in these behaviours over the life span. The life course framework was identified as a suitable theoretical orientation to address this research lacuna. This orientated the study to consider how later outcomes are shaped by earlier in life experiences.

Consideration of the life course principles highlighted other dimensions and scales of temporality at which it would be useful to understand the dynamics of walking and cycling behaviour. Specifically these were inter-generational influence of walking and cycling over the life course and whether life course patterns of walking and cycling were consistent between cohorts or whether they change through the passage of historical time.

The knowledge gaps identified in the review of the literature were refined into a set of objectives and questions consistent with the philosophical position of the research.

These were;

**Objective 1:** to examine and explain change and stability in walking and cycling over the life course.

**Questions:** how are trajectories characterised by change and continuity over the life course of individuals? Under what circumstances do trajectories change or stay stable? What is the timing of changes in walking and cycling trajectories?

**Objective 2:** to explore the inter-generational influence of walking and cycling over the life course.

**Questions:** is an individual's walking and cycling over their life course influenced by events in the life course of their parent/child? If so, what form does this take?

**Objective 3:** to explore and interpret similarities and differences in the life course development of walking and cycling between different birth cohorts.

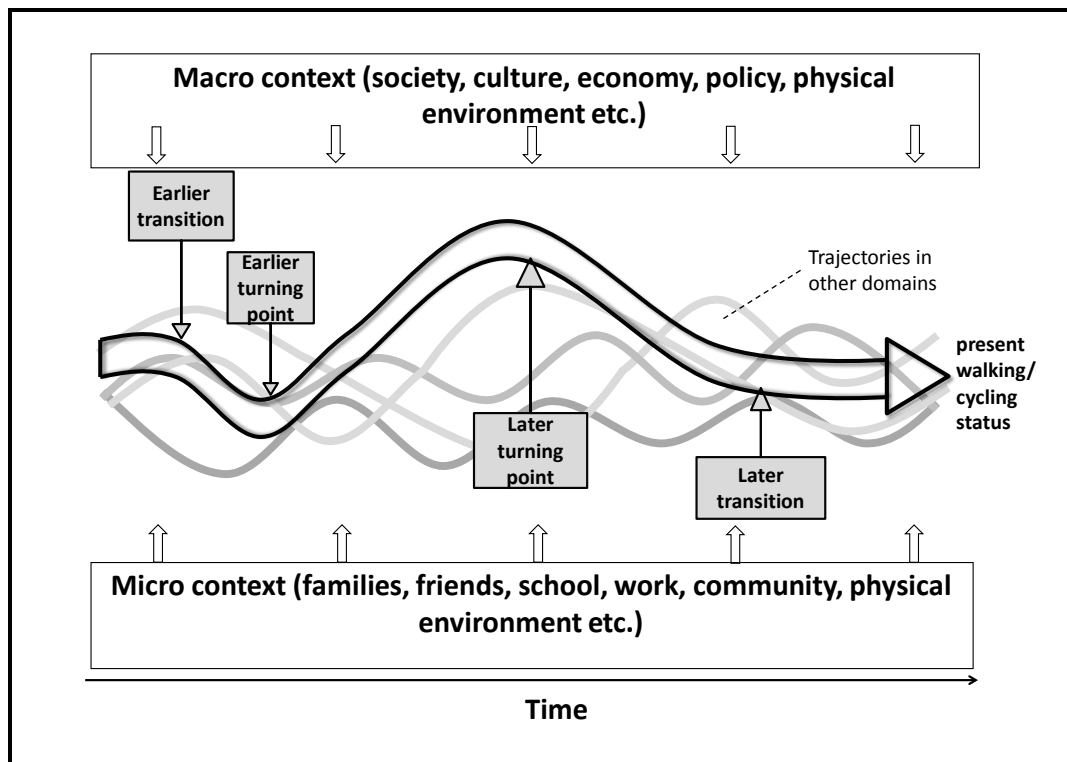
**Questions:** Are the patterns of change and continuity and timing of changes consistent between cohorts or are life course patterns changing over time? Can these be related to historical changes in social and structural conditions?

In addition, and given the novelty of the research perspective in this area, a further knowledge gap was identified concerning how life course insights on walking and cycling behaviour could be translated for policy and practice. The final research objective was then to present the empirical findings to members of the policy and practice community and deliberate with them their implications for current approaches to walking and cycling promotion, and the contribution of a life course perspective for the transport and health field more generally.

### **3.4 Conceptual framework**

A conceptual framework was adopted as a means to map disparate concepts that were identified *a priori* as relevant to the life course development of walking and cycling. The framework served to translate the principles of the perspective to the study area and conceptualise the walking and cycling life course trajectory. This provided a basis for the selection and design of an appropriate set of methods (Clifton and Handy, 2001).

In the absence a formal theory of walking and cycling behaviour over time, and only partial application of the life course perspective in the mobilities biography framework, a conceptual framework for the research was adapted from a framework used in life course research of food choice and nutrition (Sobal, 2006; Devine and McCarthy, 2009). This is shown in Figure 11.



**Figure 11 Conceptual framework adapted from Sobal, 2006**

This is consistent with Baranowski's (2004) call for greater exchange between the fields of physical activity and food choice research in theory and research design on the basis of certain complementarities between these fields. As essential activities of human functioning food choice and walking involve frequent and routinely-performed behaviours. In some lives, cycling is a frequent behaviour that can serve higher goals of recreation or transport. There are commonalities in the theoretical landscape of food choice and physical activity behaviour, both encompassing Social Cognitive theory and ecological models.

The framework conceptualises the pattern of walking or cycling over the life course as a behavioural trajectory and the life course itself as multiple, interwoven trajectories, each pertaining to development in different life domains. Developments in these other domains can impact on the walking and cycling trajectories. The life course is embedded within a socio-historical context which is changing over time, both at the macro-level concerning the broader physical environment, culture, structural conditions and policy, and at a micro-level in the proximal settings of the individual concerning the

social networks of family, friends, work and community. The individual possesses agency to shape their walking and cycling trajectories within the opportunities and constraints of their personal circumstances. Changes in behaviour that alter the course of the trajectory significantly are known as turning points, while lesser changes are known as transitions. The research is oriented to consider how the present cycling and walking activity has arisen in through past events and experience (transitions and turning points).

The presence of a conceptual framework did not premise the study on a purely deductive approach, with the objective to confirm or disprove the framework. However, nor did the study aim to generate an entirely new theory of walking and cycling dynamics from the data without preconceptions of these phenomena. Given the limited attention afforded to change over time in walking and cycling, the life course patterns of these behaviours were considered largely unknown phenomena. It was therefore deemed appropriate to pursue an explorative approach, one in which the life course perspective constituted a high level theoretical framework, but was neither wholly deductive, nor inductive.

### **3.5 Methodological approach**

The research objectives necessitated a methodological approach which could accommodate a whole-view. It quickly became apparent that a) there were no existing multi-purpose panels that could be mined for longitudinal data on walking and cycling and b) setting up and allowing a purpose-built panel to mature was unfeasible within the time scale and resources of the project. It was therefore necessary to reconstruct developmental trajectories using retrospective methods.

The greater body of life course research in social sciences is grounded in a quantitative logic and concerns examining the timing, duration and rates of change in status and the resultant longer term patterns of stability and change in individual life courses

(Giele and Elder, 1998, p.3). This requires data in the form of event histories. Analysis of such data typically involves statistical analyses which link time-to-event with putative explanatory variables. Biege and Axhausen (2008) used such an approach in their study of long and medium term dynamics in mobility decisions. The research centred on a retrospective survey of a twenty year period collected with use of a self-completion Event History Calendar<sup>5</sup> (EHC). Data is thus elicited in a prescribed format which anticipates and frames relevant life course events. Causal explanations are constructed from the relations between trajectory inflections and antecedent or contemporaneous events revealed through statistical analyses.

The timing and sequence of behavioural changes in relation to life course events and transitions were deemed essential attributes to capture in order to build descriptive and explanatory insights on walking and cycling trajectories. However, it was felt that trajectories reconstructed through individual's identifying and report discrete changes in their behaviour for the entirety of their life course would lack credibility given the lack of success other researchers have had at establishing the validity of self-report measures of distant past physical activity (Dawson *et al.*, 2003). Some shifts in behaviour might be perceived more by participants as gradual processes rather than discrete changes and indeed participants' might fail to recognise and recall some changes. Further, it was considered that eliciting trajectories in such a prescribed format as an event history calendar was not consistent with the epistemological or explorative stance of the research and would overstate the objectivity of the exercise.

In light of these considerations, the view was taken that behavioural trajectories would be better apprehended in retrospection, through the individuals' qualified and contextualized representations of the change and continuity in their walking and

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<sup>5</sup> EHC is an instrument that uses a graphical time frame to elicit retrospective data on the occurrence, timing and sequencing of a variety of life events. EHCs can be self-completion or used within interview-scenarios.

cycling. In adopting this approach, the aim was that the knowledge of walking and cycling trajectories that emerged would reflect what participants consider meaningful and salient about their trajectories.

Before moving on to detail the method used it is worthwhile giving consideration to the implications of retrospective over prospective data for the outcomes of the study.

It was understood that recall accuracy and bias presented significant methodological considerations (Dex, 1991, p6); however using retrospective data was not an inferior, pragmatic option. The prospective approach is commonly perceived to produce more reliable data because the length of recall period is reduced. However, comparison of panel and retrospective surveys for the study of occupational mobility<sup>6</sup> highlighted risks of imprecise measurement for both designs (Solga, 2001; Manzoni *et al.*, 2011); panels were prone to over-estimate employment changes, whilst retrospective methods tended to under-estimation.

A retrospective method permits a continuous record of the walking and cycling trajectory to be constructed at a single-time measurement occasion. This reduces respondent burden and avoids the potential selective loss of members of the panel (Manzoni *et al.*, 2011) which can be detrimental to its representativeness of a population (Solga, 2001). A single measurement occasion also means the respondents have a single frame of reference with which to interpret questions and formulate responses. With multiple measurement occasions the respondent's understanding of key research constructs e.g. walking and cycling behaviour, behaviour change or life event may alter. Potentially their report of status could reflect a change when their true position was unchanged, or vice versa. To access a continuous history from panel data requires discontinuous information, about statuses, events and transitions, from separate waves to be resolved into a continuous record when it is possible for artificial

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<sup>6</sup> when an individual experiences a change in employment

changes in a history to be introduced (Manzoni *et al.* 2011). Conversely, retrospective designs are prone to the 'smoothing out' of trajectories due to the omission of short episodes or transitions that are not very marked (Manzoni *et al.*, 2011).

### 3.5.1 Biographical methods

The decision to use retrospective, qualitative accounts of walking and cycling locates the study within the wider area of biographical methods. Broadly speaking, biographical research explores, in diverse methodological and interpretive ways, individual accounts of life experience within their contemporary cultural and structural settings. As well as illuminating the content of individual lives this also serves to reveal how social change plays out in the lives of individuals and groups within society (Roberts, 2002, p5). Discussion of the different approaches and classifications of approaches in biographical research are provided by Miller (2000), Bornat (2008) and Nilsen and Brannen (2010).

Nilsen and Brannen (2010) perceive two broad approaches. In one tradition, a narrative approach, the emphasis in analysis is on how the story is formed, its narrative structure, meanings deployed and the collaboration between teller and the researcher, often within single stories (Roberts, 2002, p.7). The other is a contextual approach where the focus is not how a story is told but what multiple individual accounts can reveal about the wider social phenomena under scrutiny.

The latter approach was found to fit the objectives of this study. This led to a decision to adopt an approach that observed a distinction between the chronological sequence of the developments in the trajectory elicited through the accounts (the lived experience), and the story participants told about their walking and cycling over their lives (Bornat, 2008). Biographical research that focuses on what biographies reveal about social phenomena is generally underpinned by assumptions of reality beyond language, whereas researchers conducting analysis of narratives would contend that

the only reality that exists is the reality expressed in language. Acknowledging the existence of the 'realist-constructionist' debate within biographical research the researcher maintained the pragmatic orientation of the former approach. This acknowledged the intellectual merit of understanding the narrative forms in accounts of walking and cycling biographies but the emphasis remained on revealing life course processes of change and stability in behaviour through multiple biographical accounts.

### 3.5.2 Piloting the interview

A series of pilot interviews were conducted in order to understand and optimise the research method. Pilot interviews were conducted with four adults aged in their sixties. This was an iterative process conducted with reflection and modification of the interview protocol. The insights gained and the refinements of this process are detailed in Table 5. The outcome was the selection of a semi-structured interview format, facilitated with a life history calendar (LHC). Semi-structured interviews were considered preferable to a more structured approach so that the interview was not confined to a scheduled questioning route. This gave both interviewer and interviewee the flexibility to reveal and pursue experiences that they deemed relevant to their walking and cycling biography. It was considered that this flexibility reduced the potential for the interview to be shaped solely by *a priori* research expectations and made it more likely that unanticipated factors in the development of trajectories would be uncovered.



1 narrative form	<p>The interviewee was asked “please tell me your life story focusing on the walking and cycling you have done over your life.”</p> <p>The interviewee explained their circumstances of their early life with references about their walking and cycling they had done as a child and teenager. Some references were made to discontinuation of walking and cycling activity in the context of life course transitions. The interviewee concluded their narrative at the point they got married and had children. When the interviewer asked them to tell her about the period between becoming a parent and the present – a period of four decades - the interviewee provided a general description of their participation in walking and cycling in adulthood but a general sense of a chronological narrative was lost. This interview made apparent that a lot would be required of the interviewer in the course of the interview. The interviewer would need to become acquainted with an unfamiliar life history in the course of the interview. As the interview progressed, some memories of walking and cycling were recalled out of chronological order when later discussions prompted the recall of earlier memories. It was challenging for the interviewer to process this new information and consider whether it fitted or conflicted with earlier material and ultimately be confident that a coherent account of the development of walking and cycling was emerging.</p>
2 pre-interview life history questionnaire followed by in-depth interview	<p>The interviewer was familiarized with some aspects of the life history prior to the interview. This meant the interview could be more focused on understanding walking and cycling at different periods in the life course and changes between states. The interviewee’s awareness that the interviewer had their life history data from the questionnaire seemed to undermine the flow of the narrative and instead the interview took on a more structured format in which the interviewee reported walking and cycling activity at particular life stages in response to questioning from the interviewer.</p>
3 interview structured	<p>The conceptual idea of trajectories that charted the state of walking and cycling through the life course seemed to be better</p>

<p>around completion of a life history grid</p>	<p>conveyed to the interviewee through use of the life history grid. The grid structure made it easier to elicit the duration of states of walking and cycling. The interviewee used the visual of the emerging life history to locate further events in their life history and recall contemporaneous walking and cycling activity. The perception was that more information was elicited because the grid highlighted 'gaps' which the interviewee was prompted to fill. The grid was both a literal and metaphorical focus for the interview. In the metaphorical sense this helped to initiate the interview and develop rapport around a collaborative task. In a literal sense it meant the interviewee and interviewer did not have to look at each other which could put some interviewees more at ease particularly in dealing with life events that are more sensitive. After the completion of the grid the interviewee was able to provide an overview of their walking and cycling across the stages of their life. The interviewer felt that the task of generating a coherent life history of walking and cycling was too complex a task to complete in one interview and that the interviewer needed to be able to process and consider the account in order to compose insightful explanatory questions.</p>
<p>4 two interviews 1<sup>st</sup> using life history calendar, 2nd semi-structured</p>	<p>After the 1<sup>st</sup> interview the life history grid was reviewed and changes in walking and cycling were identified. The second interview was then structured around questions to clarify points of uncertainty in the account and probe for more in-depth explanations of how changes had arisen. The interviewee brought some new information to the interview having, unprompted, had a discussion with her mother to 'jog her memory' about her childhood and reflected on some aspects of the first interview.</p>

**Table 5 Researcher reflections on pilot interviews**

### 3.5.3 Improving recall

Accuracy of recall is generally considered to be specific to the type of information being retrieved (Verhoeven, 2008; Dex, 1991). Life events which are important to the unfolding life history have been found to be recalled reliably (Lanzendorf, 2003; Harrison *et al.*, 2011).

As an activity that is fundamental to living, walking has been demonstrated as a highly automatic, mostly incidental behaviour, performed in the pursuit of higher goals that is at other times volitional (Scott *et al.*, 2007). Being frequent and incidental would suggest that it has weak encoding in memory (Schacter, 1999). This seems to be borne out in the poor correlation between self-reported frequency-duration measures of walking and objective measures (Scott *et al.*, 2007). Cycling, by comparison, is performed with greater intentionality and is often practiced in pursuit of the higher goal of mobility but also for its own purpose. Being less frequent it was expected that memory traces of generalised cycling behaviour would be stronger. Johnson-Mazlow *et al.* (2004) demonstrated that whilst self-reports of walking correlate poorly with objective measures, even over short intervals of retrospection, walking was more accurately recalled when reports were elicited in contextualised domain-specific formats. Being influenced by Dawson *et al.*'s (2003) finding that it was possible to establish the reliability but not validity of recall measures of distant past exercise the aim here was not to quantify past activity but rather understand transitions and turning points in the trajectory. Recall accuracy was therefore not considered prohibitive because developments in the trajectory were anticipated to be more salient than day to day walking and cycling activity. The connection of transitions and turning points to life course events was also expected to aid recall.

A LHC was integrated into the interview format to improve recall. LHCs, like the EHC, are an instrument for recording retrospective life history data. In contrast to the EHC,

life history data is not restricted to discrete events, but is generally recorded as chronological annotations made by the researcher as participants tell their life story. They tend to be interview-based rather than self-completed. LHCs have been used to conduct semi-structured interviews in the study of smoking histories (Parry, Thomson and Fowkes, 1999) osteoarthritis (Dawson *et al.*, 2003) mobility of nomadic tribes (Adrianson, 2008) and life course research of labour markets transitions (Fehring and Bessant, 2009) and family meals (Harrison, *et al.*, 2011). Figure 12 presents an example of the LHC used.

	1949	1950	1951	1952	1953	1954	1955	1956	1957	1958	1959	1960	1961	1962	1963
age	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14
life events	Born in London Harrow Bank clerk, only child & housewife										family moves village nr Cambridge		goes to boarding school		
walking				walked to school	walked locally										
cycling															
past times															
car access															
age	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
life events		teacher training to Dipton up to 30			RTA knee injury	Teaches in PNH.		Birmingham moves starts teaching suburbs married Sandwell W.M.				daughter born			son born
walking							walking to wife				church shopping car				
cycling															
past times															
car access															

Figure 12 Life history calendar

The structure of a LHC enhances recall by cueing autobiographical retrieval mechanisms. The basic structure is a grid with columns providing a standard set of timing cues and rows a variable set of substantive cues pertaining to life domains (Martyn and Belli, 2002). This allows life history data to be elicited incrementally with contextual cues prompting further retrieval of autobiographical memory, and reducing recall bias through the cross-referencing of details across life domains. The cues used in this study were life course events, walking, cycling, physical activity, past times and car access and the columns were labelled as years.

The pilots showed that the LHC provided a useful focus for the interview (see also Dawson *et al*, 2003) which made it easier for the interviewee to initiate the life history account and helped to engage them in the collaborative reconstruction of their life history. It also became apparent as interviews progressed that participants' retrospective accounts of walking and cycling were qualitatively different, and that this would fundamentally characterise the data and findings going forward. Past cycling activity was more salient, with participants better able to identify activity over the life course as either cycling or no cycling, and then qualify the type and frequency of cycling at that time. Access to a bicycle was seemingly used as a marker of potential cycling. As was recognised early on in research design, walking is a fundamental form of human movement and integral to many activities therefore accounts were less readily elicited and required more probing from the interviewer. Accounts tended to focus on changes that were identified through probing on the impact of life events on routine trips rather than a participant-led characterisation of episodes of walking over the life course. In this sense it seems individuals' possess a more well-developed understanding of their cycling biographies than their walking biographies.

### 3.5.4 Interview Protocol

The design of pilot four was taken forward as the interview protocol for the collection of biographical accounts. Interviews were recorded with an Endirol Digital Voice Recorder. In more detail, the interview protocol was as follows:

First interview: The interview began with the interviewer explaining the purpose of the research and how the findings would be used before asking for the interviewee to sign a consent form. The interviewer then introduced and explained the LHC as a grid that would be used to help the participant and interviewer to reconstruct their life history, recording life events, past and present walking and cycling activity and participation in activities outside of work. The participant was asked to describe and explain their walking and cycling over their life course with attention to times when their behaviour changed and times when it was stable, whilst the interviewer annotated the LHC with the life events and recalled experiences. The grid was physically positioned to be in view of the participant during the interview. It was explained to the participant that it was fine for them to jump forward and back in time, and also to amend the grid if they realized something was out of place. If the interviewee paused the interviewer would prompt with a question that related to what they just said. The types of supplementary questions posed during interviews were as follows:

- Were there any changes in your walking and cycling around that time?
- Could you recall anything further about your walking or cycling at that time?
- How did you spend your free time then? How would you travel for that?

Once the interviewee had 'completed' their account the interviewer returned to sections of the life course that had been dealt with quickly and probed for more information, or queried anything that appeared unclear or contradictory. The first interview was concluded by asking the participant to give an overview of walking and cycling across

their life course. Whilst they did this the interviewer listened for consistency with the original account.

A pseudonym was selected for the participant after completion of the first interview in order to protect their identity. From this point forward real identities were only known by the researcher/interviewer.

A final modification, implemented after the last pilot, was for the researcher to construct a personal timeline working from the recording of the first interview and the LHC. This was then taken into the second interview. The timeline depicted life events across domains of residence, education, employment, family and health with references to past walking and cycling, and behaviour changes reproduced as concise descriptions. Essentially, this process transferred the information recorded on the original LHC into a more legible format. It was then supplemented with information that may not have been added to the grid during the interview dialogue. Using the timeline, the researcher then identified the timing of developments in the trajectory in preparation for the second interview occasion.

As far as was possible, the interval between the first and second interview was kept to around one week. The participant was given the opportunity at the start of the interview to view and amend the time line. The interview then proceeded with the interviewer asking questions that probed the circumstances and explanations of the transitions, turning points and stability in the walking and cycling trajectory. The standard introductory questions are presented in Figure 13 and Figure 14 is an example of a time line. Having the participant review the time line at the beginning was a means to converge the researcher's interpretation of the first interview with the participant's recollection of their walking and cycling trajectory.

The interviews were arranged at a time and place that was convenient to the participant. Most interviews were conducted in a participant's home or the home of their

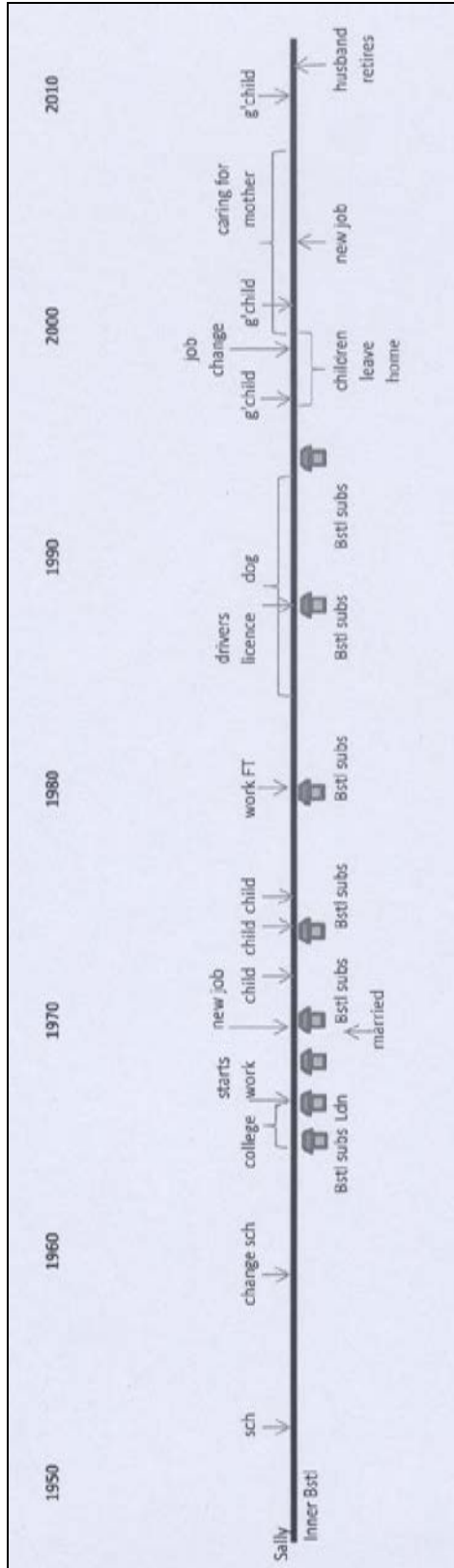


parent or child. A few interviews were conducted at a place of work during their lunch hour; two were conducted in the evening in university rooms, one in a cafe and one over the telephone to France (to the participant's home). In this case the phone was placed on speaker phone with an Endirol Digital Voice recorder in proximity.

<p><b>Interview 1 LHC-structured interview</b></p> <p>This grid is for me to record the key events of your life together with your walking and cycling activity at the time. Please can you tell me your life history and include in your description your recollection of the walking and cycling you were doing at various stages of your life. As you talk I will fill in the grid and ask you some questions to make sure I have understood things correctly. Feel free to jump back and forth and correct things if you remember more clearly.....</p> <p>Thank-you, now can you give me an overview of your walking/cycling across your life, thinking about how it changed from when you were a child, teenager, young adult, met your partner, became a parent, grandparent, retired etc.....</p> <p>Thank-you. Now can you do a similar thing for your parent/child for walking and cycling. You may not be able to give me the same amount of detail, that's ok.</p> <p><b>Interview 2 semi-structured interview</b></p> <p>This is a timeline I created from what you told me in the last interview. Please can you look at it and tell me if I have got anything wrong. Feel free to take the pencil and draw on it if you wish.....</p> <p>Thank-you. In the last interview you told me that your walking declined when ...../ you started cycling again when..... can you tell me more about that? Why things changed?.....</p> <p>Have there been any turning points in your walking or cycling over your life? If so what do you think they are?</p>
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**Figure 13 Interview guide**

Figure 14 Life history time line produced after first interview



### **3.6 Criteria for research quality**

Demonstrating quality and integrity is an on-going challenge for biographical research which is prone to criticism that lacks rigour. Whilst some have sought to institute methodological procedures in an attempt to satisfy the established criteria of quantitative research (Denzin, 1970), others (Atkinson, 1998) reject these criteria as unsuited to the underpinning epistemological assumptions, aims and methodology of biographical research. Qualitative researchers reject reliability (concerning the replicability of data collection) on the grounds that what emerges in research is contingent on the specific time, place and interpersonal context of the researcher-participant encounter and therefore replicating the interview would not elicit the exactly the same account (Finlay, 2006). Put another way, if the participant was asked to give their account of their walking and cycling biography again, the account would be different because their biography had progressed in time.

Some qualitative researcher reject validity (the degree to which research truly measures what it was meant to measure) on the basis that they reject 'reality' in an undisputed, objective sense. This researcher took the view that validity is not a suitable criterion to judge the accuracy of these accounts given we have no unequivocal means of apprehending the reality of walking and cycling trajectories.

Finally, the purpose of biographical research is not to generalise findings to a wider population through statistical extrapolation. Instead, the concern is to show where findings have meaning or relevance in the understanding of other individuals, contexts and situations (Finlay, 2006); the aim of research being richness and depth of insight that can only be obtained from a small collection of life histories, purposely recruited.

The evaluative criteria deemed appropriate for the assumptions and objectives of this study were credibility, confirmability and relevance. The first two were outlined by Lincoln and Guba (1985) as parallel to the quantitative criteria. Credibility was sort

through getting the participants to review the personal time lines produced by the researcher in the second interview allowing them to amend any misinterpretations. In addition, their biographies were revisited in the interview so that the researcher could assess internal consistency. The involvement of research supervisors in the data analysis was intended to achieve confirmability through corroboration and interrogation of the process, and assessment of the plausibility of the biographies in light of existing research. Finally, the relevance and contribution of the research were assessed within a second stage of the primary research, in a knowledge exchange workshop held with policymakers and practitioners that is presented in chapter six.

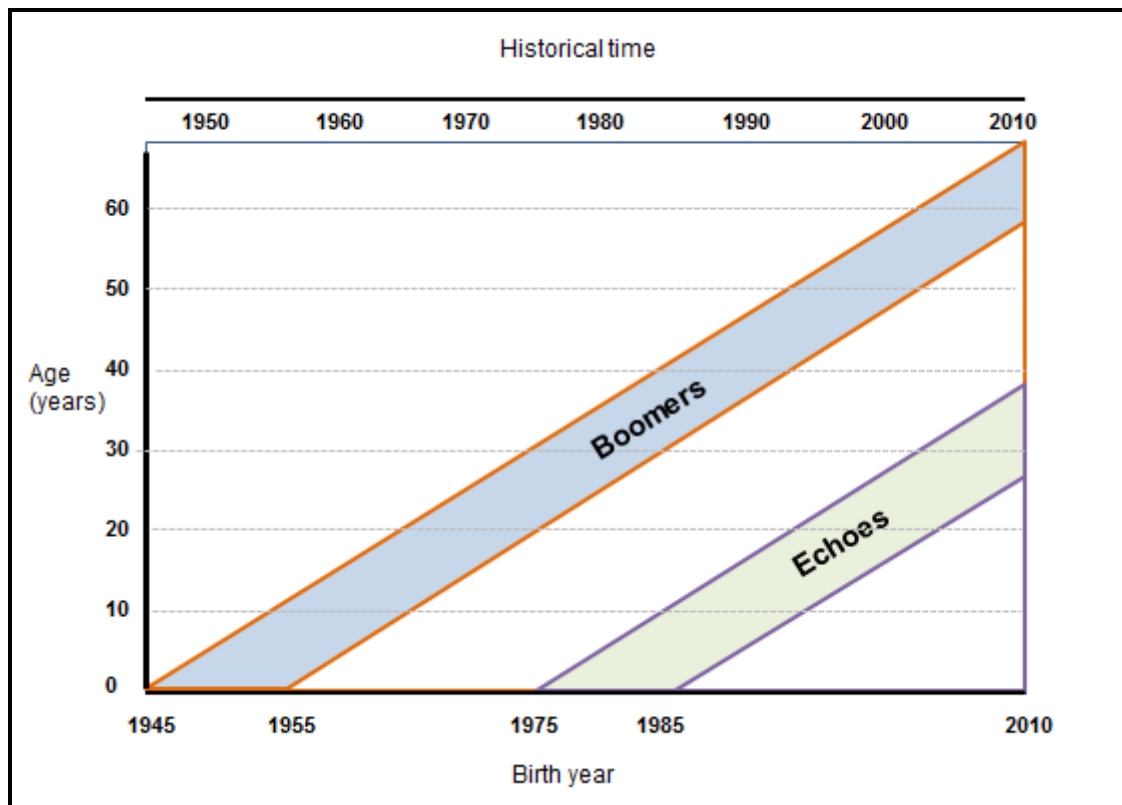
### **3.7 Study participants**

The purpose of the research was to generate insights on life course development of walking and cycling trajectories that would have relevance for understanding trajectories in the population. It was not achievable to obtain in-depth understanding of individual cases at the quantity that would support generalisation to a population via statistical extrapolation. The sample did not therefore need to represent a population but instead needed to capture a range of different life course experience and walking and cycling histories. The sample was therefore purposively recruited to form a study group that served three dimensions of analysis; intra-individual change, inter-generational influence and inter-cohort comparison.

Participants were recruited from two ten year birth cohorts to provide two groups whose life course intersected with an evolving macro context at different points. This meant that their trajectories unfolded within different macro-contextual social and structural conditions whilst the individuals within each cohort shared a common historical location meaning their encounter of social and structural conditions was broadly similar. The limits of the birth cohorts were positioned to provide a younger cohort who were in adulthood and had passed through some life experiences associated with early adult life, and an older cohort who had experienced some of the life course transitions

associated with later life, but were not so advanced in age that cognitive decline may impede their ability to engage with the research method. The study group as a whole needed to also comprise pairs of participants who were parent and child (here after referred to as dyads) to permit examination of the inter-generational influence of walking and cycling trajectories. The time interval between the cohorts therefore had to be a range that was realistic to encompass the length of time between birth of one individual and the birth of their offspring (generational length).

The older participants were drawn from a ten year birth cohort that constitutes the leading edge of the post-World War II fertility spike, 1945-1955, popularly known as the 'baby boom'. The younger participants were born between 1975 and 1985 and belonged to a social generation that has been variously referred to as Generation Y or the baby boom echo. For brevity in this study the terms 'Echoes' and 'Boomers' have been used to refer to the participants from the younger cohort and older cohort, respectively. Figure 15 over leaf illustrates how the life courses of each cohort intersect with historical time.



**Figure 15 Historical contexts of the participants**

Many baby boomers were in their sixth and seventh decades and were negotiating the transition from employment to retirement, having a number of key life transitions behind them. The Echoes were in their third and fourth decades and had variously negotiated their early working life, forming partnerships, leaving home, having children and renting or buying homes. Within these parameters, the shortest potential generational length for a dyad was twenty years and the longest was forty years, i.e. the older cohort could have been parents at the earliest at twenty years old or, at the latest, forty years old.

The study was conducted in Bristol, UK and all participants had a residential connection to the greater Bristol area i.e. either themselves or their participating parent or child were Bristol residents. Bristol is not unlike the other regional core cities in terms of its spatial planning, governance, transport infrastructure and socio-economic profile. One notable distinction is that a significantly higher level of investment was made in the city's cycling infrastructure over three years from 2008. This was a part of a programme funded by national government to trial levels of per capita spending on cycling

equivalent to some northern European cities. It was expected that any impact this had on the trajectories was limited to the years succeeding this programme. The 2011 census showed Bristol's cycle commuting share had increased by 2.9% since 2001, which corresponded to an increase in the absolute numbers of people cycling from around 8,000 to over 15,000, while the national cycling share had stayed unchanged (ONS, 2012).

### 3.7.1 Recruitment

Sampling proceeded purposively, with participants recruited to meet the historical location and familial criteria, and build a study group comprising heterogeneity across gender, level of education, and geographical location of residence in childhood and adulthood. Participants were recruited in series so that the selection of later participants was contingent upon the characteristics of those already interviewed.

The initial strategy was to recruit dyads through the parent generation. Generation length, i.e. the length of time from the start of one familial generation to when the next generation is born, varies between families. This means it is not possible to target a specific younger cohort that would certainly have parents in the right age group. To take this approach would produce a participant group of families who had had children at a similar age and therefore may be distinct from their peers in other respects.

It was decided against advertising for participants in favour of visiting community groups, explaining the project and asking for volunteers. This was considered preferable because it was found that the project and recruitment criteria were communicated more successfully through face to face communication. It was felt that potential participants were more motivated and reassured about giving a life history interview having met the researcher in person. This also gave the researcher the opportunity to ascertain whether it was possible for a parent or child to participate, before the first interview was arranged. The researcher emphasised in her explanation

of the research that the purpose was to find out about all types of walking and cycling life history and not just people who had maintained high levels or had a particular interest in either activity. This was reinforced by saying “so if you’ve not been on a bike or walked further than the end of the road in years then your story is still of interest”.

A particular challenge for recruitment was to identify community groups popular with people born between 1945 and 1955. Discussions with service providers confirmed that community groups e.g. lunch clubs tend to be used by ‘old-old’ or ‘young-old’ who were in need of more support. Some groups that were visited and recruited from were choirs, bowling groups and badminton clubs. Faced with slow recruitment, the strategy was extended to recruit through community groups which might be attended by people in their twenties, thirties and forties to recruit the younger member of the dyad first. Some participants were recruited through a partner who volunteered to ask their spouse after being interviewed themselves. This route led to a number of family groups of both parents and/or two children being included in the study group, which was beneficial in supplying multiple dyads. The focus on intra-familial relations was not extended beyond parent-child relations.

### **3.8 Ethical considerations**

Careful consideration was given to the implications of being involved in the research for participants and how to safeguard their rights and wellbeing. A research protocol which involved eliciting personal information from participants in the form of life histories clearly posed some risk of psychological harm to the participants. The research protocol was submitted to and approved by the University Research Ethics Committee. The letter of approval, which details some stipulations for the minor modifications to the protocol, is included in appendix A, p3. This process helped to identify and formulate strategies to deal with some important ethical issues. For instance the study’s engagement of multiple family members posed potential ethical issues. The process also proved worthwhile in preparing the researcher to deal with unanticipated issues



encountered in the course of the research by familiarising them with the principles of ethical research practice. In practice there was a second safeguard of ethical research practice in that issues that had the potential to affect the interests of participants were able to be discussed with research supervisors as they arose.

### 3.8.1 Participant remuneration

Participants received twenty pounds in return for completing the two interviews. This was intended to represent remuneration for their time rather than incentivise people to participate. The researcher wanted to be confident that participants were willing to share their life history and that their autonomy in this decision was not compromised by an incentive. For that reason the gift was not advertised in the initial introduction of the project and only mentioned once an individual had signalled their willingness to take part. It was accepted that in the secondary recruitment of family members the researcher was not able to control the way the remuneration was presented and therefore it may have provided an incentive for some participants.

### 3.8.2 Consent

A life history interview essentially constitutes an introspective process that individuals would not necessarily go through outside a research context (Miller, 2000, p.104-105). Within such an interview there is the potential to approach sensitive topics and negative life experiences which posed the potential of psychological harm to the participants. Gaining informed consent mitigated this risk to a degree. The researcher took the time to help potential participants understand the nature of the research prior to seeking consent, in particular emphasising that although the focus was on walking and cycling the interview might approach other positive and negative life experiences. This restated and built upon the information they had received prior to the interview. It was also made clear how the participant's life story would eventually be used. It was impressed on the participant that they were not obliged to talk about any aspect of their

life that they did not wish to, and that they could end the interview at any point. In addition, they were informed that should they wish to, they could withdraw from the study up to a month after the interviews were completed. The participant was then asked to read and sign the consent form which they had been given at the initial contact. A verbal assent for their on-going participation was elicited at the start of the second interview. The participant information sheet and consent form are presented in appendix A, p6-9.

The recruitment of a family member posed a particular issue concerning consent. The additional family member was recruited via the initial contact who was either a parent or child. The concern was that the second family member would feel obliged to participate due to the prior participation of their parent or child. The researcher emphasized in initial discussions with potential participants the need for the additional family member not to feel an obligation to participate, and that agreement of a parent or child to participate was not a precondition for their participation. The researcher was careful to give the same level of attention to explaining the research and securing informed consent with the second family member, restating that they should not feel an obligation to do so.

### 3.8.3 Confidentiality and safety

Confidentiality was preserved in a number of ways. Interview recordings were transferred shortly after the interview to password-protected file space on a secure network. Pseudonyms were used for the participants throughout the research process. The only link to their true identities were the consent forms, interview recordings and an excel spread sheet with participant contact details. Electronic files were kept on password protected media and consent forms were kept in a locked filing cabinet.

A buddy system was put in place to mitigate the risk to the researcher of lone-working and conducting interviews in private homes. The details of interview appointments

being conducted in private venues were left with a colleague so that, in the event that the researcher did not make contact at an appointed time, this person could then raise the alarm if necessary.

### **3.9 Chapter summary**

This chapter has detailed the deliberations and decisions of research design. In summary the philosophical position of the research was that walking and cycling trajectories exist as an independent reality but are knowable indirectly through observable experience. Research objectives pertained to intra-individual change and stability, inter-generational influence and inter-cohort similarities and differences in trajectories. These were developed in consideration of the identified knowledge limitations and the principles of the life course perspective. A conceptual framework identifying preliminary concepts and relations was adapted from life course studies of food choice. A qualitative retrospective approach was justified on the basis of the need to gain a whole life view and the assessment that this could be best attained through participants' contextualised reasoning of past change and stability in their behaviour. A life history interview method, incorporating a life history calendar, was developed and piloted. Credibility, confirmability and relevance were identified as evaluation criteria to establish the trustworthiness and contribution of the findings. A purposive recruitment strategy was adopted to put together a participant group of older and younger adults who were differentiated in their encounter of macro contextual conditions for walking and cycling. This group simultaneously comprised inter-generational dyads. The chapter closed with discussion of the ethical considerations of the study. The next chapter outlines the processing and analysis of the interviews.

## 4 DATA PROCESSING AND ANALYSIS

### 4.1 Chapter Introduction

Following on from the outline of the research objectives, conceptual framework, methodology, recruitment, evaluation criteria and ethical considerations in chapter 3 this chapter details the processing of the interview material and analysis strategy. Two interpretive and visual biographies, belonging to a father-son dyad, are presented to illustrate the data processing. The rest of the biographies are presented in appendix B, p.12-122. Some general reflections are offered on the conduct of interviews followed by explanation of how scrutiny and corroboration was conducted of the processing and analysis of the data. Figure 16 illustrates the sequence and inter-relation of these activities.

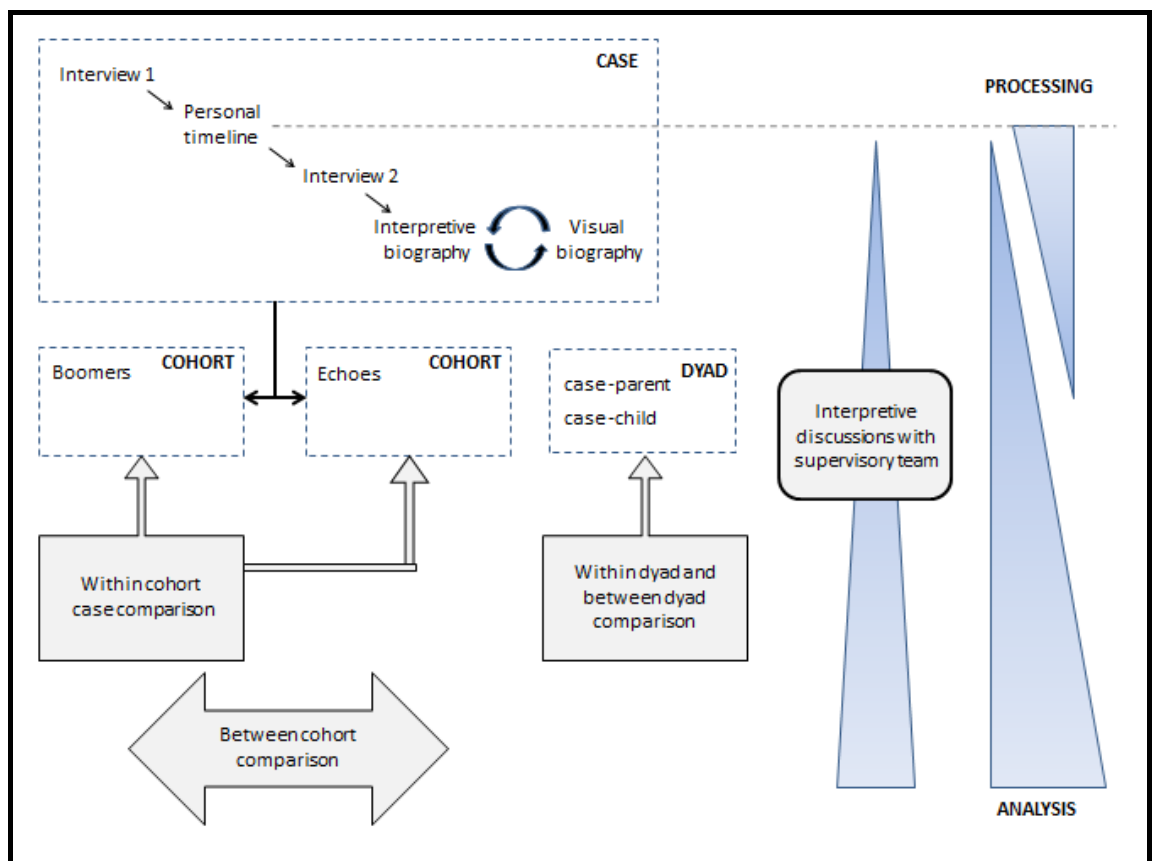


Figure 16 Schematic of data processing and analysis

## **4.2 Data processing**

The raw data emerged from the two interviews in the form of the interview recordings and LHC. This was transferred in the first stage of processing on to a time line. The participants were presented with their time lines at the start of the second interview and asked to review them and correct any misrepresentations. The purpose of this step was convergence between the researcher's representation with the participant's understanding of their biography, to instil credibility in the eventual biographies. The collaborative element, in which meanings were negotiated and clarified between the researcher and the participant, extended to the completion of the interviews. Beyond this, authorship of the biographies resided with the researcher.

The body of data generated in the course of two interviews with each participant was very large. Interviews from the pilots and the first five participants were transcribed in full. This served to familiarise the researcher with the life history and, at the same time, provided an opportunity for the researcher to reflect on her performance as interviewer and the influence she was having on the accounts elicited. More specifically, it highlighted occasions where phrasing of set questions had been convoluted and not well understood by the participants, and where phrasing of follow up questions or responses to encourage elaboration could have been less influential.

It was clear that, for the purposes of analysis, the raw data needed to be reduced and refined into a format that summarised a case. This format needed to be amenable to examining life course patterns of change and continuity between cases and cohorts, and inter-generational influence between dyads. It was found that the visual presentation of the life history on the timeline was a useful format that summarised the life history, enabled the comparison of multiple cases and facilitated the presentation and discussion of cases with the research supervisors.

The timelines were enhanced to present a visual, hand-drawn depiction of the biography, separately for walking and cycling. The visual depictions indicated trajectory developments through inflections and variations in the thickness of the line. Thickness did not correspond to an absolute level of activity, but served as a heuristic device that made visually apparent the timing and density of changes and the timing and duration of stable segments of the trajectory. To establish consistency in the way cases were drawn, a series of decision guidelines were developed that dictated how different attributes and details of the account were depicted. These guidelines are presented in Figure 17:

Utility and recreational activity are depicted separately, above and below the line respectively

If behaviour change is ascribed to life events these are aligned chronologically

Periods of no cycling or no regular utility walking trips are depicted as a gap

Affirmations of regular plentiful, regular modest and irregular activity are distinguished through varying thickness.

Indicate where changes were recalled as gradual, or the timing is ambiguous, with a slope

Temporally definitive changes depicted as a step change

Bike acquisition/ loss are marked

**Figure 17 Decision rules for drawing visual biographies**

An interpretive biographical summary was composed to support the visual depiction. This presented all developments in walking and cycling in the context of life course events and transition. These incorporated the participants' retrospective reasoning of trajectory developments, and concluded with interpretive statements constructed by the researcher that took a holistic perspective on the developmental trajectory.

Together the visual and the text were an interpretive, and not simply descriptive, presentation of a case. These were developed in parallel, from the time line, with repeated listening to the interview audios and working iteratively between visual and

text, rather than in sequence. The aim was to present the walking and cycling trajectories in depth, holistically and in context of the individual life course. Two biographies are presented in section 4.3. These were selected to illustrate an older and a younger biography, a dyad and reflect some of the commonalities and differences in the life course patterns of walking and cycling.

### **4.3 Interpretive and visual biographies**

#### **4.3.1 Sean Rawlings**

Sean was a fifty-six year old engineer working full time for a large company. He was married to Jane and lived in the outer suburbs of Bristol. They had three grown up children Hannah, Georgina and Callum. Hannah and Callum each had a pre-school child.

Sean was born in 1955 and grew up in an outer suburb of Bristol. His father was an engineer and his mother had casual work as a cleaner. His father always cycled to work. The family got a car when Sean was thirteen. The car was used for family outings and holidays. All other journeys were made on foot or by bus. Sean walked to primary school, a distance of less than a mile. Sean got his first bike at ten, which he used to cycle to secondary school and to go for bike rides. Sean started an apprenticeship with his current employer at sixteen (1971) and cycled to work from the start. At twenty-one (1976) Sean married Jane and they moved to an inner suburb. Around this time Sean got a car and, for four years, drove to work giving some colleagues a lift. Sean and Jane had their three children in the early 1980s. When his colleagues no longer needed a lift, Sean returned to cycling to work because he found it too expensive to drive on his own. This second phase of cycling to work lasted around twenty-seven years.

Back in 1982 the family moved to an outer suburban centre. Owing to the pressures on their household budget at this time, they shared a car with his parents for a few years,

Jane and Sean having use of the car at weekends, when it was generally used for family outings. After getting their own car again it continued to be used for family journeys and chauffeuring children to some activities. Neither Sean nor Jane used the car regularly for work. Sean walked regularly within his locality to the pub or shops. He would use the car to go and play golf. The family had a couple of holidays visiting extended family in the Netherlands and, while they were there, did some cycling all together. Many holidays were spent in Devon where recreational walking was a feature.

In 2008 Sean, Jane and son Callum downsized to another house in a similar area and bought a holiday home in Devon. This meant short breaks in Devon as regularly as twice a month. In 2010 Sean and Jane moved to a rented flat in the city centre, leaving Callum and his family to live in the previous house. Sean's cycling to work initially stopped due to a back injury around the time of the 2008 move, and he started driving to work. He considered that the move to the centre, which increased the distance to work, coupled with an early shift pattern prevented him returning to using his bike. He also thought he had become more wary of cycling in traffic and he was deterred by the prospect of the route from his new residence. Sean reengaged with cycling for a charity ride in 2010 prompted by his grandchild suffering a serious illness. This meant about four months of recreational cycling in preparation. Sean didn't think he was likely to cycle to work again but intended to continue cycling recreationally. Sean and Jane use the car a lot for visiting their grown up children and supporting Jane's elderly parents, as well as going to their holiday home. Living centrally, Sean and Jane often walk around the waterfront area for recreation.

Sean had stability in his residential and occupational histories, remaining with the same employer and in one residence while his children grew up. This continuity could have been a factor in sustaining his cycling. Sean did not consider his father's pattern of cycling to work had influenced him. Motorised mobility had been a feature of his adult



life; at the beginning of his working life for a limited period and currently towards the end of his career and increasingly for recreation, travelling to Devon, playing golf and visiting their grown up children. Throughout their relationship Sean and Jane have managed with one car; this included a period of a few years sharing a car with Sean's parents. Sean's phase of cycling to work was initiated when they had a young family and gave up a car to car-share because family's finances were tight. This phase then continued after they became more comfortably off.

The more distinct changes in activity in Sean's cycling trajectory were getting a bike when he was ten, changing to driving to work when he got a car at twenty, relinquishing the car and returning to cycling to work, his back injury and moving further away from work when he was fifty-five and being prompted to do a charity ride two years later. From getting his first bike, Sean's walking for transport has generally been limited to discretionary travel. Sean made short trips within his local area over his adult life. Recreational walking involving driving to a destination to go for a walk has been a consistent feature of Sean and Jane's life together, and a stronger focus since purchasing a holiday property in Devon.

The visual depiction of Sean's biography is presented in Figure 18.

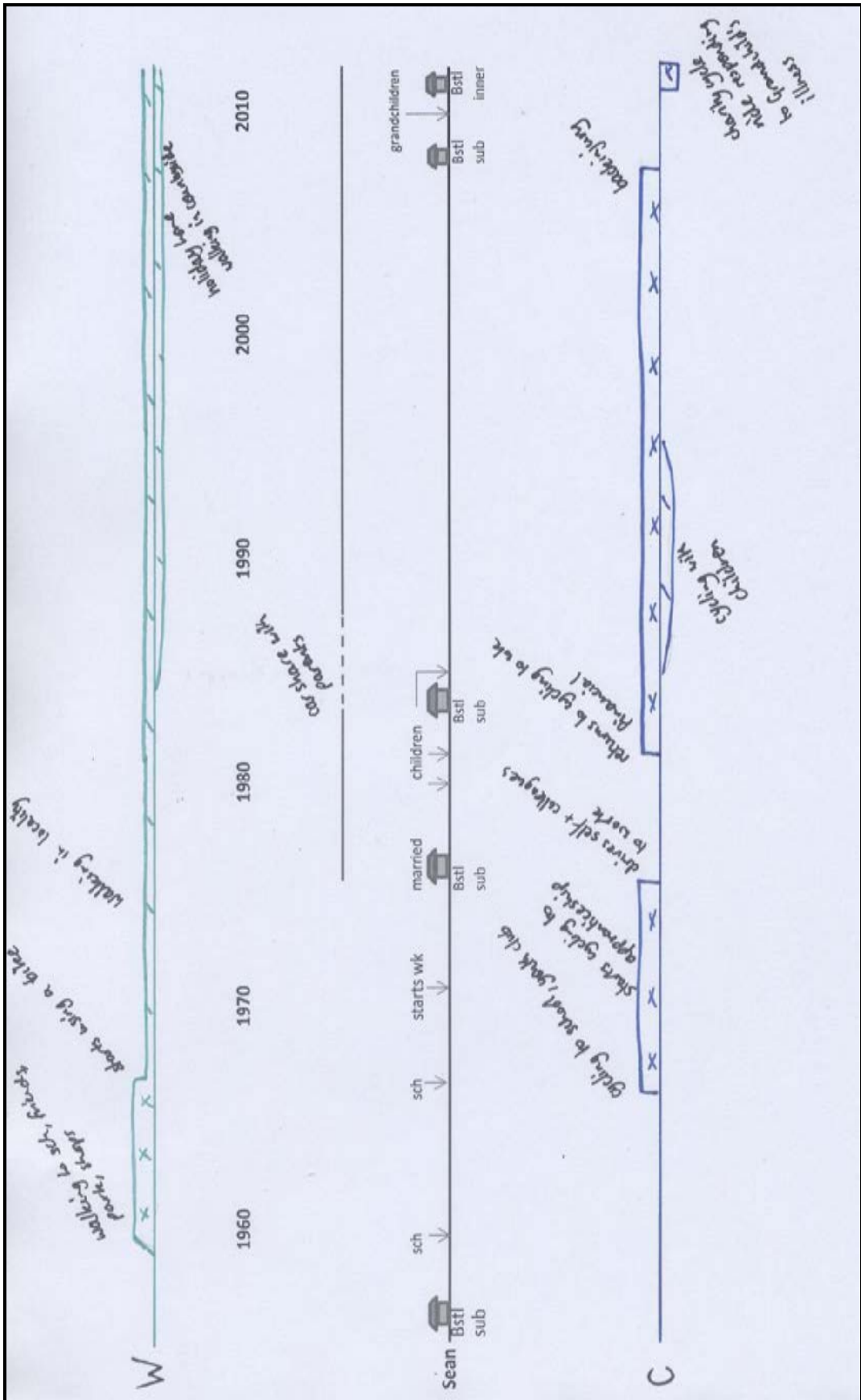


Figure 18 Sean Rawling's visual biography

#### 4.3.2 Callum Rawlings

Callum Rawlings was a twenty-six year old gas engineer in full-time work. He lived with his partner Lou and their two year old daughter Anna. His current recreational walking was limited to walking with his family to the park or on day outs. He had a bike, which was previously his dad's bike. He had last used this bike the previous summer for a charity bike ride. Leading up to this, he had done a lot of training. This ride was inspired by his daughter having a serious illness in January 2011, to raise funds for causes related to this.

Callum was born in 1985 and has two older sisters. He thinks there was one car at home, which his mother had use of, and his father cycled to work. They walked locally to the park and shops and later to school. The car was used to visit grandparents and for the family to go out. He thinks he got a bike when he was about six. He thought he had ridden the bike up and down the streets with parental supervision at first. He thought he got a bit more independence to cycle round the streets toward the end of primary school. They would occasionally go cycling with his family - he can't remember his mum cycling and, when he was about eight, the family spent a holiday in Holland, when they cycled everywhere. He often played football after school and would get lifts home from this when it was dark. Once he got to secondary school he would cycle now and again, but was concerned about his bike being stolen so tended to walk. This took between half and three quarters of an hour. He played more football and other sports at secondary school. At weekends he played football for a club. Towards the end of secondary school he would get the bus home occasionally.

At sixteen he left school and went to college. He would usually cycle and occasionally get the bus if he could not be bothered to cycle - but more often than not, he cycled to keep the cost down. He started work at eighteen as an operative at a manufacturing company on the other side of the city and got the bus to work. His cycling for transport stopped after leaving college. At nineteen he passed his driving test, got a car and

started driving to work. He stopped playing football between sixteen and twenty, but then took it up again to keep fit. Callum described how, at this time of his life, he often walked if he was going out in the evening with mates and was going to drink. At twenty-one he was made redundant, and was unemployed for a few months before getting contract work with an agency. He retained his car in this period but used it minimally when he was unemployed due to the cost. When he was working temporarily he used the car more because he was working at a different location every week, often starting or finishing at unsociable hours. At twenty-two he started work as an operative at a distribution centre at an industrial centre on a motorway junction. Callum described his work as active and drove to work. After two years, Callum started an apprenticeship to be a gas engineer. As a trainee he would drive to his supervisor's house each day and then travel with him in a van. He has been with his partner, Lou, since he was twenty. Lou moved in with Callum and his parents when he was twenty-four. Since qualifying, he has been contracted to domestic work and has been provided with his own van. Callum and Lou had a daughter in 2009 and he thinks his walking has increased since having Anna.

Both walking and cycling have been limited for Callum since being able to drive. His phase of recreational and utilitarian cycling in adolescence declined after he completed college and started work. After a short spell of using the bus he has driven to work ever since and driving is an essential part of his current work. A year ago, he reengaged in cycling recreationally and he described his walking as limited to taking his daughter to the park or walks at the weekend, but, as a family, most of their travel involves using a car.

The visual depiction of Callum's biography is depicted in Figure 19.

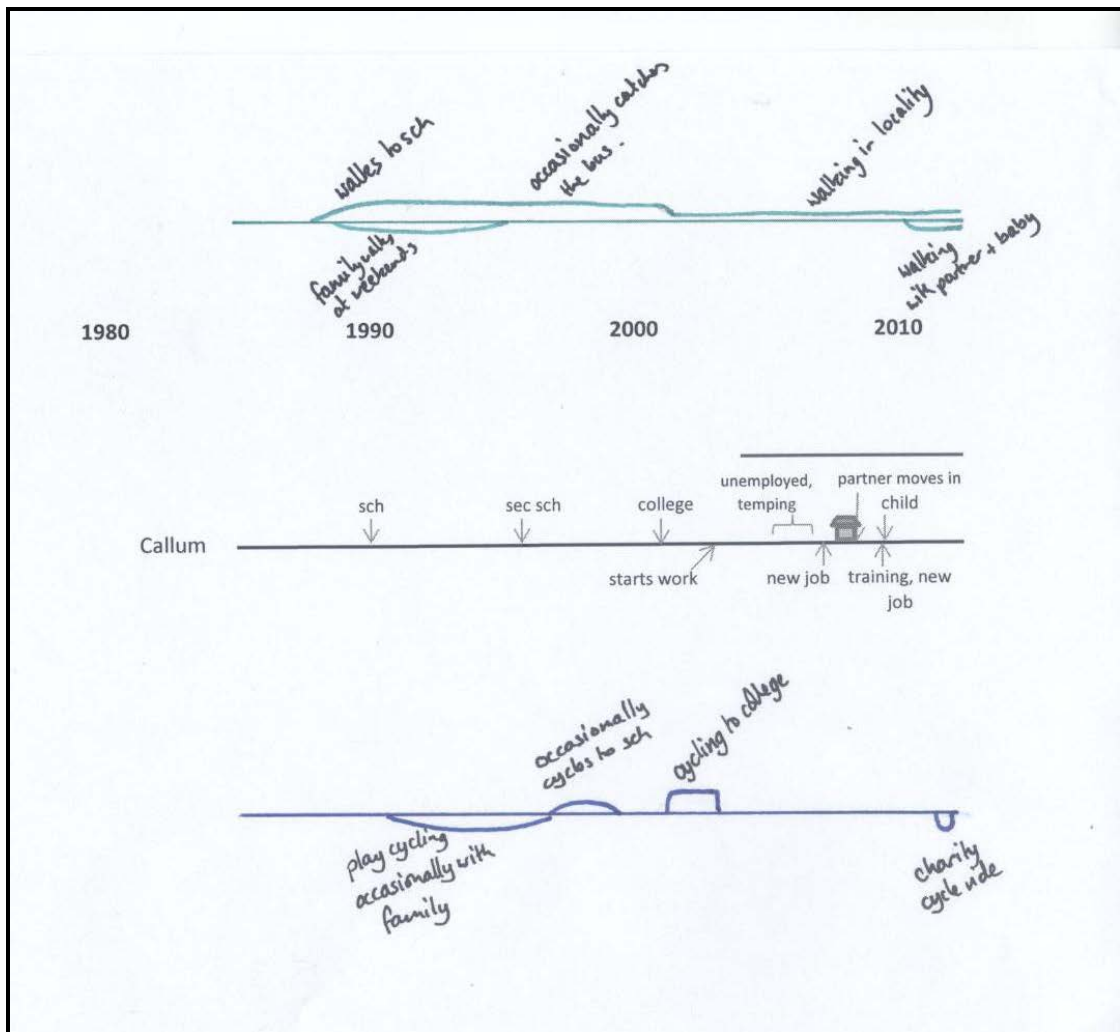


Figure 19 Callum Rawling's visual biography

#### 4.4 Data analysis

The analysis moved from consideration of individual cases (or dyads) to comparison of cases to understand commonalities and differences. Beyond these dimensions (intra-individual, inter-generational and inter-cohort) data analysis was not a fixed, pre-determined process but rather a flexible, data-led exercise with subsequent steps being directed by emerging insights. The analysis of differences between the cohorts drew heavily on the literature reviewed in section 2.5 to interpret the impress of macro-level structural and social changes.

In the early stages of analysis the visual biographies were mounted on the wall and examined in collectives of whole cohorts e.g. Boomer males and females together, and

gender-cohort subgroups e.g. Echo females. Reference was made to supporting interpretive biographies for clarity as needed. Initially, visual inspection concerned revisiting the observations made on single or multiple cases during the interviews and processing of data, to assess the applicability across all cases. These pertained to the nature of walking and cycling activity in particular phases, timing, circumstances and nature of changes in behaviour, circumstances of stability and patterns of activity.

This process confirmed an initial impression that the transition from adolescence to independent adulthood was a common period of trajectory development. Furthermore it revealed that the cohorts differ in their life course patterns during this transition, in ways that were relevant for opportunities and constraints for walking and cycling. This prompted construction of a table, Table 6 presented below, which summarised each participant's situation in regards to residence, education, employment, family status and principle means of mobility at the ages of sixteen, eighteen, twenty-one, twenty-five and thirty. This table enabled the identification of gender and cohort differences in life course developments and changes in use of different mobility modes during this transition.

**Table 6 Summary of participants' residential, family, employment statuses and travel modes at 17, 19, 22, 25 and 30 years of age.**

Name	17	19	22	25	30
Carl	edu	edu	edu	working	working
	parents	shared house	parents	married, owning home	divorced, repartnered
	subs	inner city	subs	Xurbs	subs
	no car	no car	car	car	car
	PT, C & W	W, PT & C	Dr & W	Dr	Dr
Julian	edu	edu	working	working	working
	boarding	shared house	living abroad	married owns home	owns home, child
	small town	small town	rural village	Xurbs	Xurbs
	no car	no car	no car	MB shares car	MB shares car
	C&W	C&W, PT	W	W, C, MB,	MB or lift
Alan	working	working	working	working	working
	G'parents	G'parents	renting with g'friend	married, renting	married, owns home, child
	subs	subs	inner city	subs	subs
	no car MB	car MB	car	car	shares car
	PT, MB & W	Dr	Dr & W	Dr	C, Dr & W
Bob	training	training	edu	working	working
	parents	parents	shared house	shared house	married, owns home
	inner city	inner city	inner city	inner city	subs
	no car	no car	no car	car	car
	W & PT	W & PT	lifts & W	Dr	Dr
Stuart	training	training	working	working	working
	parents	parents	shared house	parents	married owns home, children
	subs	subs	inner city	subs	Xurbs
	MB	MB	car	car	car
	MB	MB	walk	MB	MB
Sean	training	training	working	working	working
	parents	parents	married, renting	married, renting, child	married, owns home, children
	subs	subs	inner subs	subs	subs
	no car	no car	car	car	car-share
	C	C	Dr	Dr	C
Don	edu	edu	edu	working	edu
	parents	parents	shared house	married, renting	married, renting, child
	inner city	inner city	inner city	Xurbs	Xurbs
	no car	no car	no car	shares car	shares car
	W, C & PT	W & PT	W & PT	PT	W
Jane	working	working	working	raising children	raising children
	parents	parents	married, renting	married owned home, child	Married owned home, children
	subs	subs	inner subs	subs	subs
	no car	no car	shares car	shares car	shares car
	PT & W	PT & W	PT, W & lifts	PT, W & lifts	PT, W & lifts
Pam	edu	edu	working	working	raising children
	parents	halls of res	married, renting	married, owned home	married owned home
	small town	inner city	inner subs	inner subs	inners subs
	no car	no car	shares car	shares car	shares car
	W, PT & lifts	W&PT	W, PT & lifts	W, PT & lifts	W, PT & lifts
Bel	working	working	working	working	raising children
	parents	shared housing	shared housing	married owning home	married owning home
	inner city	suburbs	suburbs	small town	living abroad
	no car	no car	no car	shares car	shares car
	W & PT	W & PT	W, PT & lifts	lifts, Dr, W, C	Dr
Lorna	edu	edu	working	working	working
	parents	shared housing	parents	living abroad	married living with partner
	small town	uni campus	small town	small town	subs
	W,C & PT	W,C & PT	PT, W & lifts	Dr	Dr
	no car	no car	no car	car	car
Kathleen	edu	working	working	raising children	raising children
	parents	married	married	married child	married children, owning home
	inner subs	Xurbs	Xurbs	Xurbs	Xurbs
	PT & W	Lift	Dr	Dr	Dr & W
	no car	no car	car	car	car

Kathy	working	working	working	working	working, raising children
	parents	parents	parents	married	married, children
	inner subs	inner subs	inner subs	Xurbs	rural village
	PT & W	PT & W	W&Dr	Dr	Dr
	no car	no car	car	car	car
Carmel	working	working	raising children	raising children	raising children
	parents	married, renting	married, owning home	married, owning home	married, owning home
	subs	inner city	subs	subs	subs
	W & PT	W & PT	W & PT	W & PT	W & PT
	no car	no car	no car	no car	no car
Sally	edu	working	working	raising children	raising children
	parents	shared housing	married, renting	married renting	married renting
	subs	inner city	subs	subs	subs
	W&PT	W&PT	W, PT & lifts	W, PT & lifts	W, PT & lifts
	no car	no car	no car	no car	no car
Paula	working	working	working	working	working
	parents	shared housing	shared housing	shared housing	living with partner, own home
	Xurbs	Xurbs	Xurbs	Xurbs	subs
	W&C	Dr	Dr	Dr	Dr & W
	no car	car	car	car	car
Dawn	edu	edu	working	working	working
	parents	shared housing	parents	own flat	living with partner, own home
	subs	inner city	subs	inner city	inner city
	Dr & W	W & PT	Dr & W	Dr, C, W	Dr & W
Andrea	edu	edu	working	working	working
	parents	shared housing	parents	shared housing	shared housing
	subs	subs	subs	inner city	subs
	no car	no car	car	car	car
	W, PT & lifts	W, PT & lifts	Dr	Dr & W	Dr & W
Lauren	edu	edu	working	working	working
	parents	shared housing	parents	shared housing	
	subs	inner city	subs	inner city	
	no car	no car	no car	car access	
	W,PT & Lifts	W&PT	C,W, PT & lifts	C,W, lifts & occasional Dr	
Harriet	edu	edu	working	working	working
	parents	shared housing	living with partner	living with partner	married, owning home
	Xurbs	inner city	inner city	inner city	subs
	car access	no car	car	car	car
	W, PT & Dr	W&PT	W&Dr	W&Dr	Dr, PT & W
Naomi	edu	edu	working	working	working
	parents	shared housing	parents	shared housing	living with partner
	subs	inner city	subs	subs	subs
	car access	no car	car	car	car
	W & Dr	W & PT	Dr	Dr & W	Dr
Hannah	edu	working	working	working	maternity leave
	parents	parents	parents	living with partner	living with partner
	subs	subs	subs	subs	Xurbs
	car access	car	car	car	car
	W, PT & Dr	Dr & W	Dr	Dr	Dr
Lucy	edu	edu	edu	working	working
	parents	shared housing	shared housing	shared housing	
	subs	inner city	inner city	inner city	
	car access	no car	no car	no car	
	PT, Dr & W	W & PT	W & PT	W & PT	
Justine	edu	working	working PT	working PT	working PT
	parents	parents	parents	single parent	single parent
	subs	subs	subs	subs	subs
	car access	car access	car	car	car
	PT, W & Dr	W & PT	W & Dr	W, PT & Dr	W&Dr



	car	car	car	car	car
	Dr	Dr & W	Dr & W	W & Dr	Dr
Callum	edu	working	working	working	
	parents	parents	parents	parents + partner + child	
	subs	subs	subs	subs	
	no car	car	car	car	
	C,W, lifts &PT	Dr	Dr	Dr	
Andrew	edu	working	working	working	working
	parents	parents	parents	parents	living with partner +child
	inner city	inner city	inner city	inner city	inner city
	no car	no car	no car MB	no car MB	car access
	W & PT	MB & W	MB & W	MB, C & W	MB, C & W
Aaron	edu	edu	working	working	working
	parent	parent	parent	living with partner	living with partner
	inner city	inner city	inner city	inner city	inner city
	car	car	car	car	car
	Dr	Dr	Dr & C	Dr & W	Dr, C & W
Mark	edu	working	edu	working	working
	parents	parents	shared housing	living with girlfriend + family	living with partner
	Xurbs	Xurbs	inner city	small town	inner city
	car	car	no car	car	car
	Dr & W	Dr & W	W & PT	Dr	W & Dr
Rich	edu	edu			
	parents	parents			
	subs	subs			
	no car	no car			
	C & W	C & W			
Joe	edu	year out	edu	working	
	parents	living abroad	shared housing	parents	
	subs	rural village	small town	subs	
	no car	no car	no car	no car	
	W	W & C	W & PT	W & PT	
Matt	edu	edu	edu	working	working
	parents	halls of res	shared housing	shared housing	living with partner and child
	small town	small town	small town	inner city	Xurbs

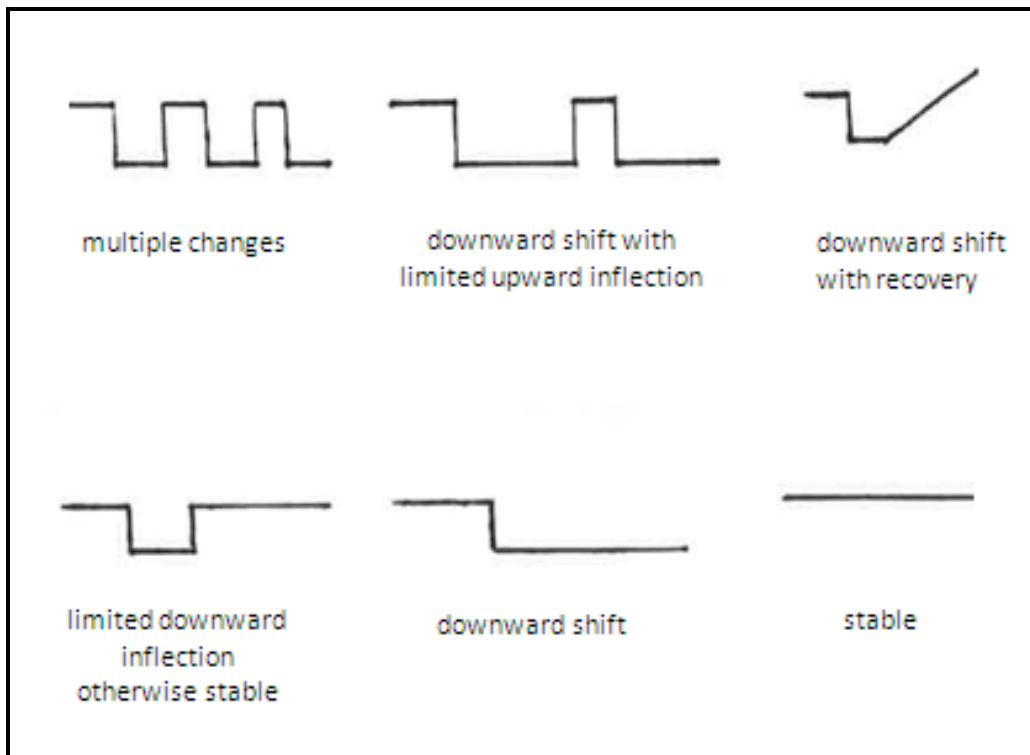
#### 4.4.1 Trajectory typologies

Whilst the construction of cases had reduced the data, it was still found to be challenging to work across thirty-three biographies and draw out summary insights. A grouping process was undertaken to construct typologies of walking and cycling trajectories, in the expectation that this would lead to better comprehension of inter-individual variation. The grouping process involved subjective assessment of trajectory attributes. The grouping processes for walking and cycling are presented below.

Walking trajectories were grouped by positioning individual cases on a matrix according to assessment of stability over the trajectory and current walking activity relative to the other participants. Position on the y-axis pertained to current level of utility walking as low, moderate or high, taking into consideration mode choice for

occupational, maintenance and social trips. Position on the x-axis reflected assessment of the degree of stability in the trajectory. Positioning on the x-axis reflected assessment of a longitudinal attribute, whereas current activity was assessed at a point in time. An assessment of walking activity over the trajectory was discounted on the basis that it was not thought a credible assessment could be made from the biographies.

In the course of positioning cases on the y-axis a prototype schema was composed that represented different degrees of changeability to guide positioning of cases. This is presented in Figure 20. Cases that were readily identified from their visual biographies as highly changeable or stable were positioned first. Then common changes in cases of intermediate changeability were identified, and incorporated into the prototype according to the number of changes these incurred e.g. downward shift in walking coinciding with access to car or upward or downward transient inflection. This was then used to guide the positioning of further cases with intermediate changeability.



**Figure 20 Prototype for walking typology**

Preliminary positions were finalised through iterative comparison of the relative position of cases. After positions were fixed, groupings were identified and then considered for within group homogeneity and without group heterogeneity. Titles for the groupings were derived from the positioning on the matrix e.g. low and changeable.

The typology of cycling trajectories was constructed differently because these trajectories had a more episodic quality, which meant they were easier to comprehend holistically, and, therefore, groupings emerged more readily from the data. Initial distinctions were the cessation of cycling beyond childhood, trajectories where cycling reoccurred in adulthood once or multiple times and trajectories where engagement in cycling was more stable. Further groupings became apparent on the basis of timing and duration of returns to utility or recreational cycling in adulthood, for instance amongst the Echoes, mostly females, having brief returns to recreational cycling in their twenties. Unclassified cases were assessed for similarity to existing groups and either added to an existing group or placed as a new group. When all participants had an initial place within the groups, the groups were reviewed for internal homogeneity and external heterogeneity with the result that some groups were collapsed, disbanded or overlapped.

#### 4.4.2 Dyads

The individual biographies were combined to produce two joint visual biographies for each dyad, one for walking and one for cycling. These were then reviewed, together with the interpretive biographies, to identify changes in walking and cycling that were ascribed, by either dyad member, to a shared life event or life event in the life course of the other. The following tables (Tables 7 and 8) were produced summarising the circumstances of intergenerational influence between the trajectories for each dyad and noting more generalised references to other family members' influence on their walking and cycling.

Dyad	Intergenerational influence
Sean-Hannah	No life events that corresponded with reported changes in transport walking. Both members of the dyad recognised walking with the family as a primary source of recreational walking particularly when Hannah was a child and now with Hannah's child. Hannah and Sean both identified some walking to destinations within their locality.
Sean- Callum	No life events that corresponded with reported changes in transport walking. Both members of the dyad recognised recreational walking as a feature of family life particularly when there are young children in the family structure. Callum didn't identify any local trips he would make on foot.
Jane-Callum	Jane regarded the time when her children were small involved a lot of walking for her locally between children's activities. Recreational walking was generally recognised as a feature of family life. Becoming a grandmother and providing childcare has been a source of walking for Jane.
Jane-Hannah	Jane regarded the time when her children were small involved a lot of walking for her locally between children's activities. A job change for Jane that coincided with Hannah's move to secondary school meant for a couple of years Jane would drive to work and give her children a lift in the morning. This stopped when Jane's job moved from a peripheral to a central location. Recreational walking was
Stuart-Paula	No life events that directly corresponded with changes in transport walking. The move of Stuart's parents into the neighbourhood meant a car trip was replaced with a walking trip. Some family walks were recalled and both members of the dyad reported participation in recreational walking in adult life.
Alan-Lauren	No life events that directly corresponded with changes in transport walking. Family outings and family holidays were shared sources of recreational walking.
Lorna-Lucy	No life events directly corresponded with changes in walking for transport. Gaining a place at a preferred school was a trigger in a residential move that also permanently changed Lorna's commuting mode choice. Lorna professed a belief that walking to school was important and so wanted that for her children. Recreational walking a feature of family life, walking holidays a relatively new feature.
Lorna- Rich	No life events that directly corresponded with changes in walking for transport. Recreational walking a feature of family life.
Carl-Rich	No life events that directly corresponded with changes in walking for transport. Recreational walking a feature of family life.
Carl-Lucy	No life events that directly corresponded with changes in walking for transport. Recreational walking a feature of family life.
Kathleen-Naomi	Mother's return to fulltime work and residential relocation meant Naomi had to be driven to school. Parents separation triggered relocation which meant Naomi could walk to school and friends houses again.
Kathy-Joe	Care of sick (grand)father meant Joe and Andrea had to be dropped by car to school rather than walk for a while early in school career, not recalled by Echoes. Family walks and walking the dog were a feature of family life when echoes were little. No other changes in
Kathy-Andrea	Care of sick (grand)father meant Joe had to be dropped by car to school rather than walk for a while early in school career, not recalled by Echoes. Family walks and walking the dog were a feature of family life when echoes were little. No other changes in transport
James-Joe	No life events that directly corresponded with changes in walking for transport. Weekend family walks and walking the dog were a feature of family life

James-Andrea	No life events that directly corresponded with changes in walking for transport. Weekend family walks and walking the dog were a feature of family life
Julian-Harriet	Harriet's walking to school was curtailed by her mother's return to work, after which she was driven. The birth of Harriet's son has meant weekly long-distance drive and walking for Julian to provide grandchildcare
Bob-Dawn	No life events that directly corresponded with changes in walking for transport. Recreational walking was a strong feature of family life which Dawn recognises has stuck with her.
Belinda-Dawn	Belinda's return to work meant Dawn stopped walking to school and started being driven. No other life events directly corresponded. Recreational walking a strong feature of family life which Dawn recognises as having stuck with her.

**Table 7 summarising observations on inter-generational influence on walking trajectories**

Dyad	Intergenerational influence
Sean-Hannah	No life events directly corresponded with changes in cycling, but recognised the cycle rides with her father may have been a factor in her keeping a bike and riding occasionally in adulthood.
Sean- Callum	No life events directly corresponded with changes in cycling, but recognised the cycle rides with her father may have been a factor in her keeping a bike and riding occasionally in adulthood.
Jane-Callum	No life events directly corresponded with changes in cycling.
Jane-Hannah	No life events directly corresponded with changes in cycling.
Stuart-Paula	Stuart initial return to cycling happened when he rode a new bike for his son home from the shop, then decided to get bike of his own. Both have done off-road cycling for leisure in adulthood. Paula recognised her fathers involvement was probably a factor in her cycling. Had done some trips together.
Alan-Lauren	no life events directly correspond with changes in cycling. Lauren's adult bike was acquired through the cycle to work scheme at Lauren's mums work. Alan similarly got a cycle to work scheme bike. Alan talked about both his children using cycling as a means of transport in adulthood.
Lorna-Lucy	no life events directly correspond with changes in cycling.
Lorna- Rich	no life events directly correspond with changes in cycling. Carl and Lorna have been inspired to do their first cycle holiday since children were small since their son has got into road cycling
Carl-Rich	no life events directly correspond with changes in cycling. Recognised his teenage sons cycling had inspired him to start cycling again
Carl-Lucy	no life events directly correspond with changes in cycling. Carl got Lucy a bike when she moved to London, Lucy has yet to use it but likes the style of it and may use it in future.
Kathleen-Naomi	no life events directly correspond with changes in cycling

**Table 8 summarising observations on inter-generational influence on cycling trajectories**

#### **4.5 Scrutiny of processing and analysis**

Initial impressions and developing inferences were discussed with the research supervisors as interviews and data processing progressed. Analyst triangulation was conducted to establish the confirmability of the process. Research supervisors were tasked with composing a timeline and visual depiction of the biography from an interview transcript. These corroborative visual biographies are presented in appendix C, p124-126.

Agreement between their representations and the researcher's was generally found to be good. The same life events were identified and there was good agreement in the depiction of trajectory developments that the participant ascribed to life events. The researcher reviewed the few discrepancies and found that these related to ambiguous exchanges, where, perhaps, the participant had made a non-verbal gesture towards the LHC within the dialogue, or instances where there had been initial ambiguity which the researcher had returned to later in the interview but this had not been picked up by the supervisors. The corroborative trajectories suggested a greater hesitancy in drawing which was taken as a reflection of their lesser degree of familiarity with the technique and the specifics of the interview.

Corroboration of data processing formed part of a more general scrutiny of the research process to establish confirmability. This was also pursued through opening up the process of analysis to the scrutiny and corroboration of other researchers. In the earlier stages of the research, scrutiny took place during research supervision meetings. This was reinforced by holding a focused session on analysis and the emergent findings with the research supervisors and another colleague<sup>7</sup>. The session took place just before interviews were completed with two final participants, when

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<sup>7</sup> this was a colleague who had previously completed a PhD on car ownership trajectories with a qualitative longitudinal approach and had some knowledge of the present study.

analysis had proceeded as far as constructing the typologies. During the session a selection of individual biographies were described by the researcher and discussed by the group. The researcher then explained the analytical steps and presented emergent findings on intra-individual change and stability, intergenerational influence, cohort and gender differences and the cycling typology. Potential ways to refine the conceptual framework in the light of the presented findings were discussed. Options for a walking typology were discussed.

Advice taken forward from the interpretive focus group was to persist with a walking typology in spite of the higher degree of indeterminacy in positioning cases on the matrix. The structure and content of the forthcoming knowledge exchange workshop with policy makers and practitioners, detailed in chapter six, were discussed.

#### 4.5.1 Reflexivity

It was important to recognise the influence of the researcher in producing these accounts of walking and cycling histories. Empathic neutrality was identified as a guiding principle of practice for interviewing, data processing and analysis. This meant the researcher strove to reconstruct biographies that were as close to the perspective of the participants as possible, and minimise the incursion of their personal judgements in the collection and presentation of the data. To do this the researcher gave explicit consideration before finalising a biography to its correspondence with the account given of developments in the interviews.

In practice as interviewer, author and interpreter of these biographies the researcher was an inextricable component of the collection, processing and analysis of the data. A human interpreter was needed to derive insights on intra-individual processes and inter-individual variation and it was not possible to divorce personal experiences, values and walking and cycling biography in this process. Instead the researcher tried to practice reflexivity, recognising and remaining conscious of her position and how this



might influence her approach to the data. She was supported in this endeavour by opening the process up to research colleagues who could challenge her interpretations and help expose the assumptions and biases of her position.

#### **4.6 Chapter summary**

This chapter has detailed the processing of the life history interviews and analysis of the subsequent biographies. Analysis proceeded along three dimensions; intra-individual change, inter-generational influence and inter-cohort differences. This was a flexible, data-led exercise which proceeded from consideration of individual cases to the visual inspection of biographies in collectives of cohort and gender-cohort groups. Subsequent steps involved more focused consideration of the transition to adulthood, changes in mobility and other life domains that occurred during this phase, and the development of trajectory typologies. The chapter closed with details of corroboration procedures and scrutiny of the analysis conducted by research supervisors and colleagues.

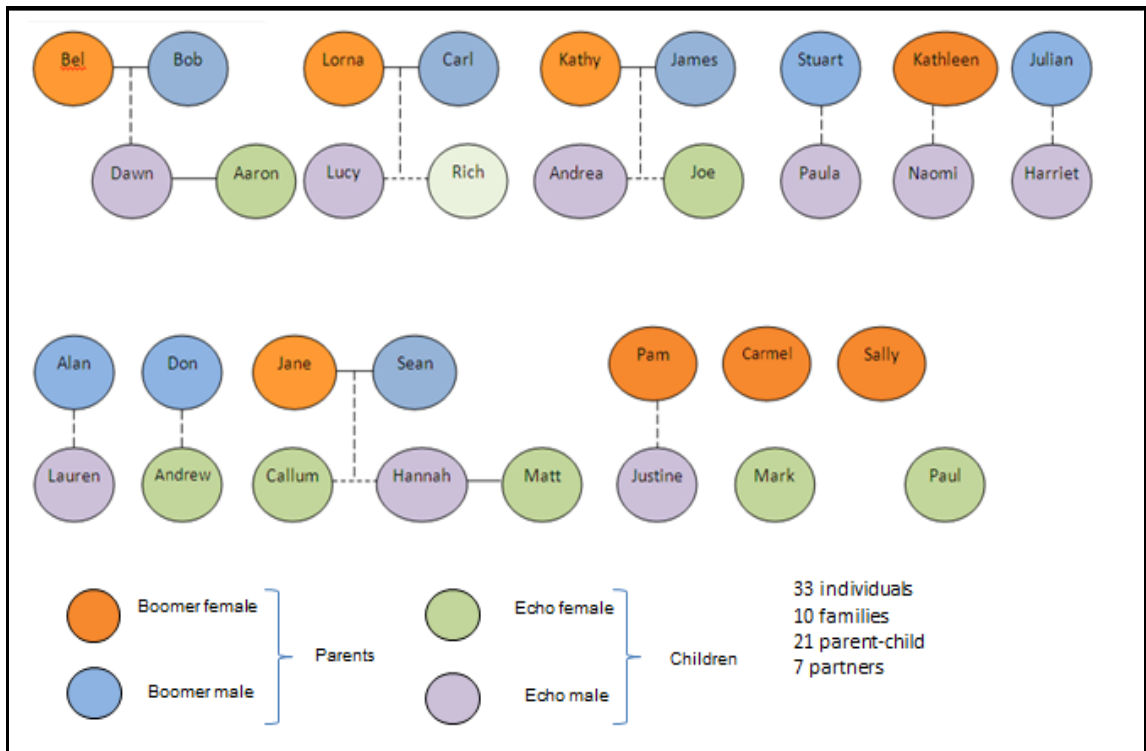
## **5 FINDINGS**

### **5.1 Chapter Introduction**

This chapter presents the findings that emerged from analysis of the biographies. Section gives details of the study group in terms of gender, level of education in childhood and adult experience of residential settings, level of education and occupational status. Section 5.3 describes the change and continuity occurring in the trajectories through different stages of the life course. This is followed by an explanation of the cycling and walking typologies, which are then resolved into spectrums of resilience. Section 5.6 presents the findings from the dyads. A summary of the findings is presented in section 5.7. The names used for participants are pseudonyms and these are succeeded by identification of their cohort-gender group in parenthesis, i.e. Belinda (BF) and Paul (EM).

### **5.2 Background of participants**

Interviews were completed with eight women and eight men born between 1945 and 1955 and eight men and nine women born between 1975 and 1985. These represent twenty-one dyads drawn from 10 families. In some families more than two people volunteered to take part. The study group comprises six individuals who were not part of a dyad. These were four individuals who did not have a parent or child who could participate and a further two spouses of Echoes who were recruited to the study without their parents. Figure 21 illustrates the family groupings within the study group.



**Figure 21 Familial relations of study participants**

Whilst generalisation of the findings to the UK population was not a research objective the following characteristics were monitored in the course of recruitment to ensure the group was heterogeneous along the dimensions of gender, educational level, occupational status and experience of residential settings. A heterogeneous sample was required to increase the likelihood of a study group with variable past experiences of walking and cycling.

Within the older cohort three men and two women received tertiary-education. The rest had undertaken secondary education and some had completed vocational qualifications. All were within a decade of state pension age. Their position with respect to retirement ranged from fully retired, reduced working, retiring within a year or a few years and having no plans for retirement. Their current occupations or occupation before they retired spanned professional, technical, administrative and low-skilled service employment. Classification of occupational status, using the National Statistics

Socio-Economic Classification, suggests there was a range in socio-economic status amongst the participants.

The younger cohort were more highly-educated; one man and one woman had received secondary education, one man and one woman started work after gaining post-16 qualifications and the rest had received tertiary education and some had postgraduate professional qualifications. Their occupational status reflected the same range as the older cohort but the distribution was skewed towards group two. One member of this cohort was in full time education, three women were working part time whilst looking after children and the rest were employed full time.

The majority of the older cohort experienced an urban residential setting in childhood whilst the majority experience in the younger cohort was suburban. The majority of the older cohort was living at the time of the interview in suburban locations whilst the younger cohort was more evenly split between urban and suburban settings. Table 2 summarises these characteristics of the study participants. Further details on the participants and their socio-economic characteristics are presented in a table in appendix B, p10-11.

<b>Gender</b>	<b>Boomers</b>	<b>Echoes</b>
Male	8	8
Female	8	10
<b>Level of education</b>		
Secondary	10	2
16-18	1	2
Higher	5	14
<b>Current employment status</b>		
Education	0	1
Working Fulltime	7	14
Working Part time	0	3
Semi-retired	4	0
Retired	5	0
<b>Childhood residential setting</b>		
Rural	0	1
Suburban/peri-urban	2	13
Urban	10	3
Mixed	5	0
<b>Current residential setting</b>		
Rural	1	0
Suburban/peri-urban	14	11
Urban	2	7
<b>Relationship status</b>		
Single/ non-co-habiting relationship	0	5
Married/co-habiting	15	13
Widowed	1	0

**Table 9 Summary characteristics of participants**

### 5.3 Early impressions of the data

Owing to the order of recruitment the earliest impressions of the data came from interviews with older women. Generalised impressions of these initial interviews were of a common structure to the narrative. When talking about early life, participants spoke of fewer constraints on their time, together with fewer mobility options and linked this with higher participation in walking and cycling. Reflections on adulthood tended to position walking and cycling as forms of mobility that were generally incompatible with constraints of employment and family. When talking about later working life and retirement, participants often articulated an awareness of increased time to walk and cycle and associated walking and in some cases cycling, with being active, which was in turn linked to health and the experience of ageing.

Some gender differences were also apparent from early interviews; Boomer males had been earlier in the timing of their shift to motorized mobility after which mode choice for travel to work in most cases remained stable throughout working life with most driving. There was more variation in the timing of motorized mobility amongst older females, which meant multi-modal behaviour in young adulthood was a more common feature amongst females than males. From then on the impression of developments in their employment and family trajectories was more apparent in female biographies.

Common demarcations of the life course for these women were career breaks to have children, followed by part time, often local employment to accommodate the school day before returning to full-time employment. Late-career positive changes in walking and cycling were more common in older females than older males, more of whom experienced negative changes.

A small number of changes were not attributed to a life event and the participant could be unclear of the timing and reason for gradual changes. For instance, some that were ascribed to a change in motivation or no reason was given at all.

In general cycling biographies were reported with greater determinacy which meant they were more readily represented in visual form.

Walking biographies tended to be constructed through identification of life events that incurred changes in routine walking trips. Segments of the life course that were relatively uneventful tended to translate/coincide with segments of the walking trajectory without any inflections; in these segments the thickness of the line would be continued from the last identified change to signify no identified change in levels of engagement in walking. It is possible that changes occurred that were unrelated to life events but were not recalled due to the absence of a salient life event to act as a recall prompt. It is uncertain whether the relative stability of some trajectories is a true reflection of reality or whether there are unrecalled developments. A significant limitation of the research methodology is that there is no means of verifying the trajectories, either the changes that were recalled or changes that remain unrecalled. It is expected that the accounts represent less well changes that were less significant, or more difficult to delimit in time or were unrelated to life events.

#### **5.4 Walking and cycling through the life course**

Changes in walking and cycling were usually ascribed to events in people's lives.

Sometimes these changes were attributed to a single event, often multiple, proximate and interrelated events were implicated. Life events implicated in walking and cycling trajectories were

- changes in mobility resources, including gain or loss of a bicycle, car or driver's licence, obtaining bus pass;
- locational changes e.g. residential relocation, changes in educational institution, changes in employment status and location;
- change in household/family structure e.g. relationship formation/break up, having a child and subsequent events in the life of the child.

- health events, including injury, chronic conditions, recognition of stress or weight as an issue, as well as health events in the life of partner or parent;

Most types of event were implicated in both walking and cycling trajectories. Obtaining a bus pass was only implicated in walking trajectories and was associated with a positive impact on walking.

#### 5.4.1 Childhood and adolescence

All participants reported cycling experience in childhood and adolescence. Boomers generally had access to bikes later and for a shorter duration in childhood but described greater spatial freedom in their cycling. Most Boomers related the circumstances of how they came by their first bicycle; many were second hand bikes acquired or donated by members of the extended family, some earned their first bike with a Saturday job, one repaired a bike he found, many shared a bike with siblings and one participant's cycling experience was limited to her friend letting her use her bike. Some only had use of one bike whilst growing up and therefore their childhood cycling was limited to the years in which a particular bicycle fitted them. Those Boomers who had their own bicycle had mixed cycling experiences i.e. for both recreation and utility. Some Boomers commented on how getting a bike had meant a significant extension to their range of mobility. There were no prominent gender differences in the adolescent cycling experiences of Boomers.

In general Echoes had access to bikes for a longer period of childhood and adolescence; most had a succession of bikes. Whilst the Echoes often described their first bikes there were no similar accompanying reports of inheriting, earning or finding their bikes suggesting that the circumstances were unremarkable. In contrast to the older cohort, most made reference to the spatial limits of their cycling in childhood which were often their street or surrounding streets. Cycling was almost exclusively play-oriented with few references to using their bike to get anywhere. Gender



differences in adolescent cycling were more apparent within this cohort. Some Echo males were using their bikes as a means of transport in mid and late teens, while their female contemporaries had generally ceased cycling by this time. Utility cycling trips for Echo males included getting to football training and tennis lessons, going to friends' houses, getting to part time work; and two Echo males regularly used their bikes to go to school. In addition many Echo male trajectories reflected a significant engagement with specialist cycling during their teenage years, mostly BMX-ing and mountain biking, and in a few cases, road biking. A couple of Echo females reported some utility cycling in early teens; occasional cycling to school, youth club and going to a friend's house to then go on and "hang out" on their bikes.

Many Echoes recollected cycle rides with their family. These tended to stand out because of their infrequency, for most it was just a one-off experience. These cycle rides often occurred on holidays in places that would be considered to have good conditions for cycling, for instance at Centre Parcs<sup>8</sup> and in the Netherlands. Some recalled doing some cycling with their fathers but generally not their mothers. Some Boomer fathers referred to the unlikelihood of their partners cycling. Julian (BM) was the only member of the Boomer to recall cycling his with parents. This occurred after his family moved from London to live near Cambridge.

In both cohorts childhood and adolescence were recounted as stages when walking made a greater contribution to mobility. Changes in mode of school travel were common in the course of graduating from primary to secondary school. Such changes sometimes concerned cycling and more often walking. The older cohort had almost universally walked unaccompanied for the duration of primary school. After the transition the cohort in fairly equal proportions continued to walk, started to cycle or caught the bus with one Boomer continuing to be driven to secondary school on her

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<sup>8</sup> a holiday resort with cycle trails and limited car access

father's way to work. Echoes finished primary school either walking, mostly with a parent, or were being chauffeured by parents. It was common for Echoes to report using a combination of modes for school travel after the transition; catching the bus or being driven by parents were the main modes. A few cycled infrequently and many walked in one direction increasingly as they progressed through secondary school, replacing a trip by car or bus. Saving money or socialising were cited as reasons for this change.

In addition to changing schools, a mother's return to work and employment changes in general often resulted in changes in walking for the Echoes. The return to work always resulted in a switch from walking to being driven to school. Acquisition of a bicycle in the older cohort sometimes precipitated substitution of cycling for walking. Change of residence could precipitate both positive and negative changes in walking.

#### 5.4.2 Transition to adulthood

At the end of compulsory education Boomer males went, in fairly equal proportions, into vocational training, full-time employment and full-time education. All of the Boomer males who entered the labour market at fifteen or sixteen had become car-owners and car commuters by the age of twenty-one. A phase using a motorcycle was a common prelude to this. Those who went straight into employment or training were generally a year or two earlier than graduates in getting cars. Most graduates got a car after they started work.

The timing of Boomer females' acquisition of driving licences and cars was generally later and more variable, ranging over their third, fourth and fifth decades with the consequence that collectively Boomer females had a longer period in early adulthood and for some individuals beyond this, without the ability or means to drive themselves. Instead their mobility during this time combined walking, using public transport and later getting lifts from friends and partners. With the exception of Lorna (BF), who

cycled occasionally at university this was a cycling-free time for the Boomer females. All Boomer school leavers, both male and female, found their first jobs within their existing urban area, mostly in central locations. Most Boomer females who started work at fifteen or sixteen used public transport to get to work.

Echo males followed two general pathways when they reached the legal age for driving; those that took up driving with a subsequent detrimental impact on their utility walking and cycling, and those who delayed licence-holding or getting a car with the effect of preserving their walking and in some cases cycling. In contrast with their female peers, a majority did some cycling for transport as they approached the legal driving age. Three Echo males became main drivers of a car at or soon after the age of seventeen, a group including both those bound for university and those entering employment.

Half of the Echo males that went to university had cars but differed in the respect that they used them; Aaron (EM) commuted daily from his parent's house to university (a forty minute drive); Matt (EM) had his car with him on campus and would use it infrequently for trips out or supermarket shopping, its main purpose was identified as travelling home to his parents at weekends; and Mark (EM) took his car for the first year then left it at home, after finding that living in a central urban location meant he walked nearly everywhere. All three recognised that the utility cycling they had been doing prior to getting a car significantly diminished with the advent of driving. However all three have had periods since university where they replaced some driving with walking and cycling in their travel to work and for other trips. For two these periods are on-going, having continued from their mid-twenties into their early thirties. All three have re-engaged to varying degrees with recreational cycling.

Most of the Echo females who entered employment between the ages of sixteen and eighteen all commenced driving to work and for most other aspects of their mobility. Hannah (EF) described how, even though her first job was within walking distance, she

drove instead because of how she wanted to dress and style her hair for work. Her next job was at an edge of town office development to which she drove. The third lived very close to work and walked.

All graduate Echo females had learnt to drive and most had occasional use of their parents' cars prior to going to university. Most Echo females were then without access to a car at university and all recalled their university years as a period of higher utility walking.

University education seemingly differentiated the residential histories of the younger cohorts from their non-graduate peers. Some graduates stayed on in their generally urban university settings, noting the good public transport provision, and continued their university patterns of mobility. Some had a return to their parents' homes generally a suburbanising relocation, before leaving home again for higher density urban areas. Some noted the loss of transport options moving home brought. In the absence of this prompt to migrate to more central urban locations, Echoes who did not have university education had continued to live with their parents before moving into rented accommodation in similar locations. In a general distinction from the older cohort was that Echoes generally left home to live independently whereas many of the older cohort had been moving in with a partner.

The spatial mobility of Echo graduates and non-graduates were also distinguished by employment opportunities. The employment locations of the Echo non-graduates in their early careers included edge of city office developments, retail centres and industrial areas and an ex-urban business park. Many still have jobs that entail work-related travel, their job histories encompassing delivery driver, sales representative, gas engineer. While peripheral office developments featured in the employment histories of some graduates who included pharmacists, teachers, architects, accountants, business owners and private and public sector managers, a greater proportion worked in city centres or district centres, in their early careers.

Living overseas was a feature in some biographies in each cohort and in most instances these episodes were reported to have made an impact on their trajectories. For instance the Boomer couple who went to Kuwait had driven everywhere, and walking had been restricted to walking within their gated complex.

#### 5.4.3 Parenthood

In this study, in both cohorts, becoming a mother was associated with an increase in walking within their locality before walking became more constrained as and when they returned to paid employment. Boomer females had career breaks of around five years to have children and these breaks generally occurred earlier in the life course than for Echoes. Many Boomer mothers took local part-time work on their return to employment which they could make trips to work and to pick children up from nursery or school on foot. The distance to work and hours Boomer females worked often increased as their children got older.

A greater proportion of Echo females had tertiary education and for those who had started families, the transition to motherhood had generally been later than their own mothers and the other Boomer females. Car ownership prior to motherhood was universal with the exception of one who acquired her first car when she became a single mother at age nineteen. Consequently career breaks to have children have occurred when careers and travel to work patterns were established. In general this represents a departure from the situation of women of the Boomer cohort many of whom did not have cars when they had young children.

So far all Echo mothers have had a much shorter period of maternity leave rather than the definite career break experienced by most of the Boomer females. Maternity leave was still identified as a period of increased utility walking but driving was the usual option for travelling beyond the local area. Trajectory developments after maternity leave was completed was dependent on whether they went back to work full-time or

part-time. The utility walking of the Echo mother who worked full-time had diminished significantly when she returned to work and she felt it had become essential to have a car at work to go and collect her child from nursery if he became ill. The mothers who worked part time considered their walking on their days at home was comparative to that which they had done whilst on maternity leave.

Some Echo women attributed motherhood to bringing an end to a period of infrequent recreational cycling. There were only a few, isolated reports of cycling carrying a child on the bicycle across both cohorts. Lorna (BF) and her partner Carl (BM) were cycling for recreation at the time they became parents and continued to cycle with her partner with their children on their bikes. Pam (BF) had got a bicycle to take her daughter to nursery but had quickly abandoned the idea, not feeling safe enough to cycle with her child. Hannah (EF) had taken her child for a recreational ride on her bike. For Justine (EF) her lack of cycling in adult life was put down to her son's dyspraxia<sup>9</sup>. There was some cycling amongst Echo females who did not have children both for leisure and utility, including Lauren (EF) for whom cycling was her principal mode for intra-urban travel.

The influence of fatherhood on men's biographies was less immediate and mostly indirect. A minority in each cohort attributed a decision to walk or cycle to work to making a shared car available to a partner looking after children. In both cohorts father's described a more minor role in children's mobility. Walking with their families for recreation, which often entailed a drive to an outdoor destination, was relatively more important as a source of walking for men than women. For James (BM) family walks at weekends and more frequently walking the dog were the sole sources of walking for him during the time he was raising his family. Beyond this phase when the children had grown up and the family no longer had a dog, he did not recall any regular

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<sup>9</sup> Dyspraxia a condition associated with impaired movement and co-ordination.

walking. For some Boomer males walking to destinations within their suburban residential location was the only source of utility walking for a large portion of adulthood.

Some Echo fathers (both participants and partners of participants) had flexible working hours which were sometimes used to provide childcare. Callum (EM) and Andrew (EM) said the flexibility of their work schedules as gas engineer and delivery courier respectively, often allowed them to be free in the afternoon to collect their children from school and walk to the park. Andrew had taken his daughter swimming on the handlebars of his bike.

#### 5.4.4 Residential relocations

Some revisions in walking or cycling patterns were attributed to changes in residence, particularly those that involved a move between spatial contexts of differing density or proximity to an urban centre. Moves out of urban settings to less dense suburban, peri-urban and rural settings were described as bringing about a decline in utility walking, whilst walking increased with moves from rural to suburban locations.

Partners Hannah (EF) and Matt (EM) moved from a flat share in inner Bristol to their first owned-home in a commuter village on the fringe of Bristol, shortly before the birth of their first child. This meant a loss of walking in their locality for some social and utility trips but their car ownership and travel to work mode stayed the same. Hannah's walking increased during her maternity leave but this often involved driving to a nearby town and then proceeding on foot. Since she had returned to work part-time childcare was provided through a combination of Matt's parents, nursery and Matt using flexible working. They recognised their new residential area had good access to recreational cycle routes which they had made use of as a family.

For Andrew (EM) a move with his partner and their child from a one bedroom city centre flat to a house in a small town outside Bristol was associated with a small decline in walking trips and putting an end to a phase of regularly cycling to work.

When she bought her first house, Paula (EF) moved from a rural to suburban location, triggering a decline in her recreational cycling and a concurrent increase in her utility walking. She attributed this decline in cycling both to having further to travel to recreational routes, along with it becoming harder to get her bicycle in and out of storage. Conversely she did report that she started to walk to her local shops following her inward move to the suburbs.

Mark (EM) lived in a flat in a central area with his fiancée. Prior to this they had lived with her parents which had meant a forty minute drive to work in Bristol. As well as walking to work they usually walked to go out in the evenings and did a lot of their shopping on foot. However Mark recognised a car was necessary to travel to see friends and family, citing friends who had relocated beyond the city fringe to afford family size accommodation.

Harriet's (EF) residential history entailed a period living in a high density area as a student and then young professional, with walking contributing a significant proportion of her mobility. This was curtailed following a move to the suburbs and a change of job to a business located at a business park on a motorway junction.

The impact of a residential move on walking or cycling was often articulated with reference to contemporaneous changes that influenced changes in mobility. Lorna (BF) commenced cycling to work later in her career after having children. This change came about in the course of a residential move and job change. Her description of this change emphasized her dissatisfaction with her previous pattern of driving to work, a journey that took just under an hour each way. Achieving a more convenient commute



to work had been a factor in the job change and residential move together with moving the family into a locality with a preferred school for her eldest child.

Kathleen's (BF) move with her family from a suburban centre to a peri-urban new housing development coincided with her youngest child transferring to secondary school and her extending her hours of employment. This move meant the distance to school prevented her children walking to school and Kathleen would drop them on her way to work. It also resulted in a decline in walking trips to local destinations because there were fewer places within walkable distance.

Amongst the Echoes that have so far become parents a suburbanising move to raise their families was common. Others Echoes were already living in the suburbs when they started families. Boomers generally reported few residential relocations while they were raising their children. Residential moves that did occur were attributed to changes in family structure or needs of family members, including relationship breakdown, moves for schools, moves for jobs and downsizing moves to provide financial resources to adult children.

#### 5.4.5 Work place travel planning measures

The Government tax efficient bike purchase scheme (Cycle to Work scheme), introduced in 1999, featured in three biographies including Aaron (EF) who used the scheme to purchase a new high specification bicycle to cycle to work as a teacher but also to use for leisure. He noted that at the time the school was encouraging staff not to drive due to pressures on parking.

For some Boomer women employer parking restrictions reintroduced walking and in some cases cycling to their travel to work.

For Kathleen (BF) new parking policies had been recently implemented where she works which meant she was no longer entitled to park on site. She had adapted to this by parking ten to fifteen minutes' walk from work and finishing her journey on foot.

For latter part of her working life Belinda (BF) has worked for a local authority where no parking was available for employees. Initially Belinda drove part of the way and then caught the bus or sometimes drove and walked. About six years ago she started going for recreational rides with a friend and then tried cycling to work. Soon after this she bought an electric bike and rode to work most days in the spring and summer; a pattern she has continued.

No similar restorative changes in utility walking or cycling occurred late in the trajectories of Boomer males. Carl (BM) was caused to reintroduce walking and cycling temporarily to his travel to work and mobility generally whilst serving a driving ban.

#### 5.4.6 Retirement

Most Boomers articulated a positive attitude to walking that recognised the health benefits of being active, and walking was generally recognised as an achievable form of physical activity. Many of those already retired spoke about deliberately building walking into their routine. For some this meant walking to the shops, or to care for relatives and for others it was recreational trips, which often meant driving somewhere first to take a walk.

Some of the Boomers were cycling in retirement and some of those who were approaching retirement had plans to do so. For some this would be a continuation of, or return to, recreational cycling, for others it meant a shift from cycling for transport to cycling for recreation and some were continuing to cycle for both recreation and transport. Lorna, Carl and Stuart had plans for long distance cycle holidays or challenges.

James, who did not plan to retire, felt both walking and cycling for transport were limited for him by running his own business and needing a van for work, and for recreation by his wife's health problems.

One or two entertained the prospect of cycling under certain conditions, conditions that included traffic-free routes, flat terrain and cycling with other people. This could involve travelling to a destination with a bicycle rather than cycling from their residential locations.

Alan, Bob and Don had purchased bicycles within the last decade for recreational and transport cycling but so far had not been successful in starting to cycle again. Eight years previously Bob had seen cycling as a form of exercise that might help on-going back problem that had limited his other activities. He had bought a bike in his fifties envisaging he could use it for some local trips and build a routine he could maintain in retirement. However he had been out on it only once or twice having found he was quite intimidated by traffic.

Alan had recently used the Cycle to Work scheme to get a new bike with the intention of cycling to work. This purchase was prompted by an intention to get more exercise and save money on fuel. Alan planned to start cycling the following summer. If successful, this new phase would have followed an earlier phase of cycling to work in his thirties when he cycled to make the car available to his wife who was looking after their children. This phase had declined when his wife returned to work using the bus, and Alan made use of the available car.

#### 5.4.7 Caring for ageing parents

Some of the Boomers' accounts covered periods in mid-adulthood when they had children living at home and were caring or supporting parents through old age and poor health. These were recalled as times with significant demands on their time and mobility where their opportunities for active travel were constrained as a result.

Kathy (BF) lived within a half hour drive of her parents. When her father became ill Kathy cared for him first at before he went in to a hospice when Kathy visited most days. This period coincided with her youngest child starting school. Instead of walking

her children to school, as she had with the eldest child, Kathy would incorporate the school run into her trip to the hospice. After her father died Kathy returned to walking her children to school. At the time of the interview Kathy's mother was in very poor health and Kathy, herself coping with long term musculo-skeletal problems, was currently visiting her once a week in a nursing home by car.

Julian (BM) recalled a time when his children were still living at home and he would have to drive regularly from the West Midlands to Cambridge after work to look after his long-widowed father towards the end of his life. He would return the same evening for work the next day. In contrast, at the time of the interview Julian and his wife were providing almost daily support to her parents who were living a ten minute drive or half an hour walk from them. They would call in on them most days as his mother-in-law was currently very unwell. This journey was quite often made on foot. They also drove once a week to Bristol to provide one day's childcare for their grandson. In the course of the day Julian usually took his grandson for an hours walk in the push chair.

Carmel (BF) identified supporting her ageing mother as one factor that prompted learning to drive and getting a car in her forties. By this time her children were older and not reliant on Carmel to get about. After she learnt to drive Carmel changed jobs and from then on drove to work, having previously cycled to a job that was closer to home. From then on driving was a principle mode of transport for Carmel.

#### 5.4.8 Grandparenting

This study provides some insights to the impact of grandparenthood on walking and cycling as well as the inter-generational influence of grandparents and grandchildren on their respective trajectories. The majority of Echoes were growing up with at least one set of grandparents living in the same city or region and some were located within the same neighbourhood or a neighbouring area. Some grandparents (parents of the Boomers) moved to live near their adult children while their grandchildren were growing

up, and in a couple of cases this was a long distance move. Echoes whose grandparents had lived in the same locality had made trips to visit their grandparents by bike or on foot. Rich (EM), whose grandparents had relocated from Kent to live in the same neighbourhood as them, was often walked home from primary school by his grandfather. Harriet walked to her grandmother's house for piano lessons. Paula (EF) would regularly walk or cycle to visit her grandparents who moved to live a few streets from Paula and her family.

Half of the Boomers had become grandparents. A minority were involved in providing regular childcare for their grandchildren. For instance Julian's weekly commitment for his daughter described previously. Some had had their children and grandchildren living with them at some point previously and during this time provided some care on a less formal basis. Some Boomers who were still working were anticipating providing more childcare when they retired. About half were living in the same city as their grandchildren and the rest were living at a greater distance from them. Reflecting on whether the arrival of grandchildren had affected their walking and cycling, most Boomers thought that it had boosted their recreational walking, as going for walks to the park etc. was a common activity with young grandchildren. No Boomers reported travelling to or from their grandchildren as a source of walking or cycling.

Stuart (BM) saw his granddaughters once every couple of months and kept a child's bike for them to ride when they visited. Pam's (BF) recalled walking her grandson to the park and shops when he was younger. Her daughter and grandson had lived with Pam and her husband for a couple of years before he went to school. At that time she had worked full-time and had been limited in the time she could help with childcare. Since being semi-retired Pam often drove her teenage grandson to activities as a way to support her daughter who was a single parent and studying part-time.

## 5.5 Cycling trajectories

Figure 22 depicts the result of grouping the participants according to the characteristics of their cycling trajectory. The groupings are based on a holistic view of the cycling trajectory considering timing, duration and type of cycling through childhood, adolescence and adulthood. Eight groups were formed with six groups connected in pairs. Groups were overlapped where individual cases possessed resemblance to two groups but the external heterogeneity was considered sufficient to warrant not collapsing these into three larger groups. The characteristics of each group and these overlaps are described below.

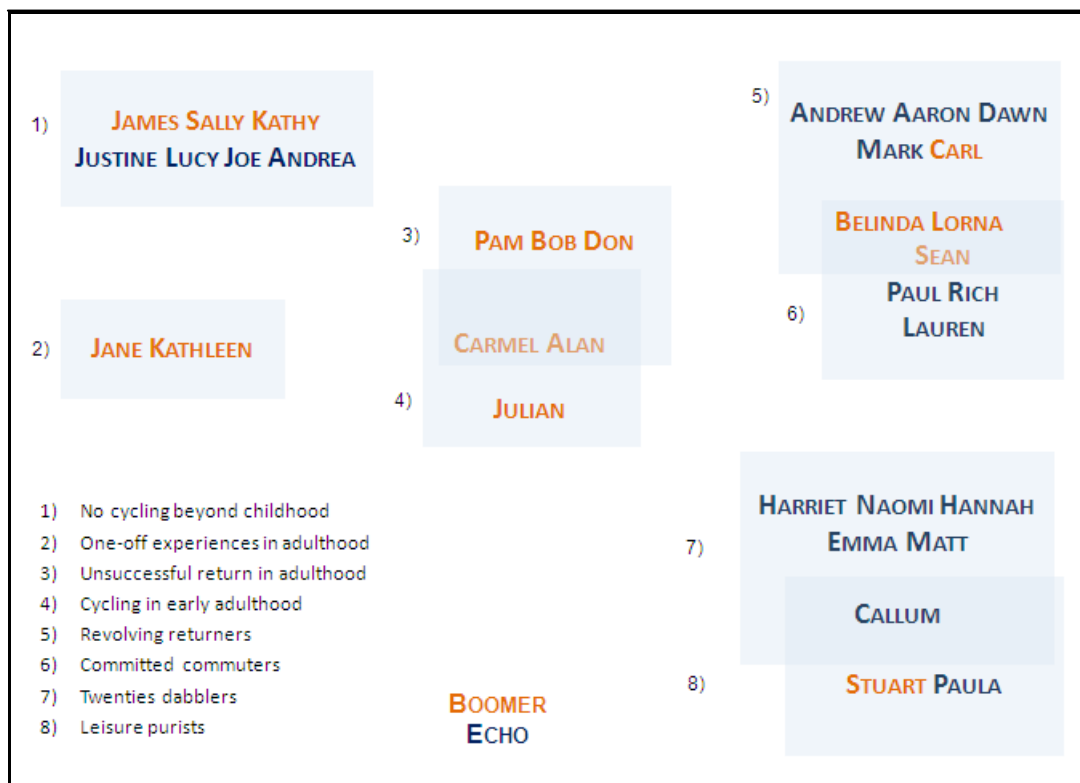


Figure 22 Cycling trajectory groupings

### 5.5.1 No cycling beyond childhood – group one

These individuals had childhood cycling experience but none in adulthood. None of the Boomers in this group saw any prospect that they would cycle again. The Echoes did not reject the idea of cycling again nor did they register any intention to do so. Kathy

(BF) shared an old police bike with her siblings and once cycled to the seaside with a friend on a borrowed bike. She did not cycle again past childhood.

#### 5.5.2 One-off experiences in adulthood – group two

Jane (BF) and Kathleen (BF) both cycled in adulthood but referred to ways in which their access to bicycles in childhood and adolescence had been limited. Jane (BM) did not have a bike of her own and only used her friends' bikes. Kathleen (BF) had a bike between the ages of eleven and fourteen after which her bike was given away. Both had cycled on occasion with their own children during family holidays. For Jane this was in the Netherlands and Kathleen at a holiday park.

Groups three to six comprise trajectories where adult phases of cycling were mixed, i.e. utility and recreational.

#### 5.5.3 Unsuccessful returns in adulthood – group three

Pam (BF) had a bike between the ages of ten and fourteen when her family moved to somewhere she described as very hilly, and she ceased cycling. Don (BM) had not been allowed a bike by his parents and only got a second-hand bike from his uncle, when he was fifteen and Bob (BM) found and repaired a bike himself when he was fourteen but he did not ride it for long.

Pam and Bob all recalled occasional recreational cycling experiences with their families in adulthood. Don had been 'terrified' by a one-off experience when he took his teenage son's bike for a ride. He has acquired a bike for recreational cycling since retiring to France and has used it 'probably only once'. Pam and Bob had similarly had unsuccessful returns to cycling at some point as adults. Pam attempted to cycle as a young mother and transport her daughter on her bike was put off by not feeling safe on the roads. The group generally did not rule out the prospect of cycling again altogether, but had no plans to do so.

#### 5.5.4 Cycling in early adulthood – group four

This group have had sustained periods of cycling for recreation and transport earlier in adulthood in their twenties and thirties, which subsequently declined. Julian's (BM) cycling continued from childhood, through adolescence, university and into the early stages of his career as a teacher. Julian's cycling faded out in the course of successive job moves which increased the distance he travelled to work. His cycling to work ceased completely when his bike was stolen and within a few years he and his wife got a second car which he then used to get to work. Julian continued to cycle for recreation on holidays when his children were young but this subsided when his children were older and family holidays changed. One subsequent and latest cycling experience occurred on a holiday after he retired. Julian considered he was unlikely to do any more cycling due to his wife's physical capabilities.

Carmel (BF), following an earlier period of using a bike for work and local trips in her twenties and thirties, had re-acquired a bike later in adulthood to use for leisure. She was unsuccessful in starting another phase of cycling but retained a notion that she would perhaps cycle again on a flat and traffic-free route. Alan had yet to use a recently acquired bike. Carmel and Alan were considered to occupy an overlap between cycling early in adulthood and unsuccessful returns.

#### 5.5.5 Revolving returners - group five

This group encompassed perhaps the most diversity in cycling trajectories. The key feature was multiple periods of sustained cycling in adulthood both for transport and recreation. With the exception of Dawn (EF) whose cycling in childhood and adolescence was solely for recreation, all had cycling experiences in childhood and adolescence that spanned recreation and utilitarian cycling. Dawn had multiple phases of cycling for transport and recreation through her twenties and thirties that she attributed to a motivation to get fit.



Belinda (BF)'s cycling had stopped when she started work at sixteen. She did not cycle again until her mid-twenties when she had used a bike for some local trips for a couple of years. After a couple of cycling experiences with her children and husband, she returned to cycling on a regular basis in her late fifties. This included regular leisure cycle rides with a friend and commuting a few times a week in the summer on an electric bike.

Lorna (BF) and Carl (BM) were partners who prior to their relationship made some use of bicycles for transport when they were university students and at the start of their careers. They had a phase of cycling together for recreation and holidays that started in their late twenties which continued on and off with their children. Carl used his bike for work during this time. This demised in his late thirties and then briefly returned during his driving ban in his forties. He re-engaged again in his sixties, prompted by his son's participation. In retirement he and Lorna were replicating the cycling holidays they had had in their late twenties and thirties. Lorna returned to cycling for transport in her late fifties and has continued into retirement.

Andrew (EM), Aaron (EM) and Matt (EM) had all cycled for recreation and transport through childhood and adolescence and then went on to have phases of recreational and transport cycling in their twenties and thirties.

#### 5.5.6 Committed commuters – group six

This group had all used the bicycle as their main mode of transport for a sustained period in their adult life. Sean (BM) was an exception amongst his male peers in having cycled to work for almost four decades. Sean shared lifts to work for a few years in his early twenties but then reverted to cycling, a return he attributed to squeezed family finances, parking difficulties and congestion at his place of work. There were no occupational or residential moves for Sean for the duration of this four decade phase and Sean and his wife had remained a one car household throughout adult life. Sean's

commuter cycling came to an end in the course of a back injury followed by a residential relocation. This extended the distance to work and precluded Sean returning to cycling once he had recovered. Sean had since re-engaged with recreational cycling, training and taking part in a long-distance charity ride.

Lauren (EF) had cycled regularly since leaving university and starting work. Cycling was her principle mode of transport though she did have to borrow a car for some jobs. This came after a period of over a decade without cycling and an earlier phase in childhood and early adolescence of predominantly recreational cycling. Lauren strongly identified starting to cycle for transport with starting to work as a dancer; Lauren thought cycling was prevalent in the dancer community because it is cheap and kept them fit.

Groups seven and eight comprise trajectories that have been exclusively recreational in adulthood.

#### 5.5.7 Twenties dabblers – group seven

The childhood and adolescent cycling experiences of this group, all Echoes, were principally recreational with only Emma (EF) cycling to secondary school on occasions. The members of this group are all now parents. They all commenced some leisure cycling in their twenties with friends or partners, prior to having children. For Harriet (EF), Naomi (EF) and Emma this entailed the acquisition of a new bike. Callum (EM) differs from the rest in the respect that he embarked on leisure cycling in his twenties once already a father, having also cycled to college between the ages of sixteen and eighteen. Due to these distinctions Callum is situated in an overlap between the 'Twenties Dabblers' and the 'Leisure Purists'. Callum was prompted to do a sponsored ride for charity last year. His cycling stopped after the ride but he thought he might cycle again that summer. Matt (EM) and Hannah (EF) (a couple) had cycled together before they had a family. They had cycled since, taking the child on their bike.

### 5.5.8 Leisure purists – group eight

For Stuart (BM) an on-going phase of both on road and off road recreational cycling began in his forties. This return was explained as an attempt to manage work-related stress. Beyond cycling to work as an apprentice Stuart has used motorised transport for his work as an electrician and had not cycled for transport for any other purpose.

Paula (EF) had phases of cycling for fitness on and off throughout her twenties using off-road trails in proximity to her home. During this time she lived in rented accommodation in a rural location. This activity declined when she moved to the suburbs. She put this down partly to the inconvenience of getting her bike in and out of storage and partly due to new interests in her life.

### 5.5.9 Typology summary: arrested-restorative-resilient spectrum

It is possible that future developments could transform a trajectory of one type into another, for instance some of the twenties dabblers could have a later return or attempted return.

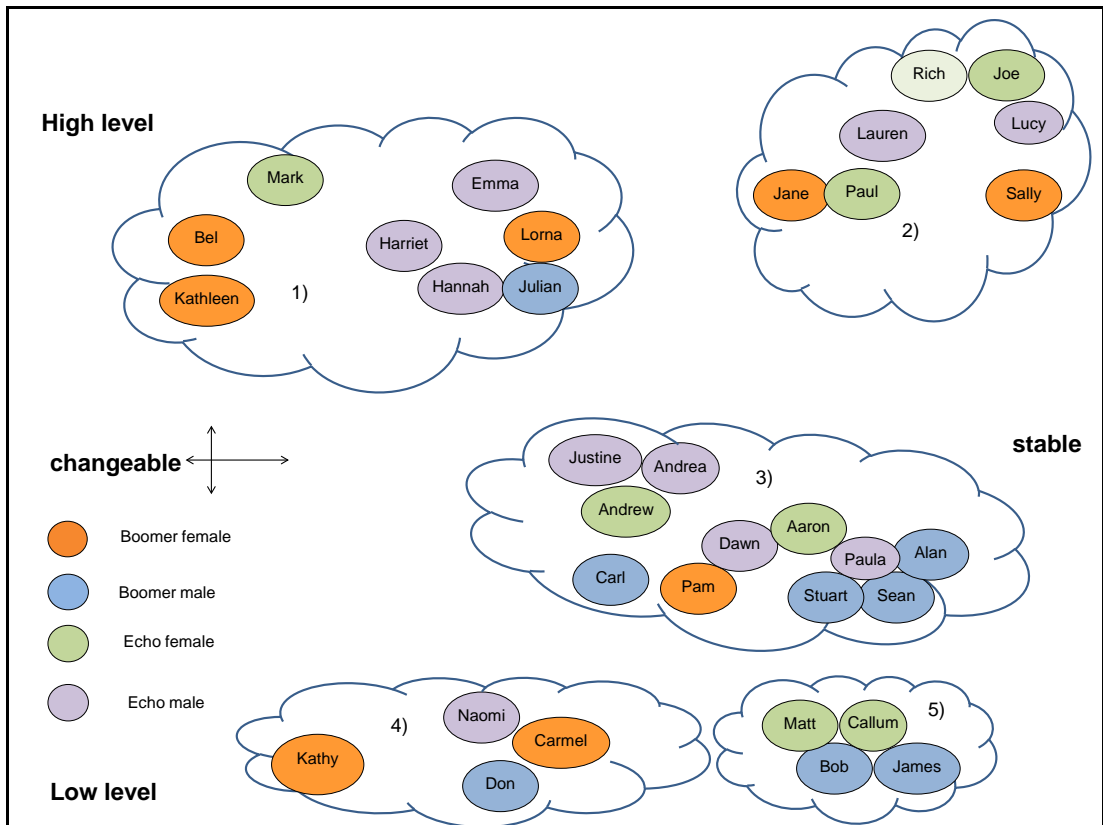
It was felt that an eight group typology would prove cumbersome and difficult to translate into practical applications or theorisation of cycling trajectories; a typology with fewer groups was deemed preferable. In the course of constructing the typology it became apparent that the trajectories followed three broader patterns. These were characterised as arrested, restorative and resilient. Groups one and two comprised arrested trajectories with group one being at the extreme. Individuals from groups three to eight reside along the spectrum with some located between arrested and restorative and others between restorative and resilient. Sean, the committed commuter, was located at the extreme of resilience. Stuart was identified as a more resilient leisure cyclist. Individuals from groups three and four were located between the arrested and restorative arm of the spectrum as these biographies depicted restorative phases in early adulthood which then concluded. Some of the Boomers in this group had intentions to start a new phase of cycling.

## 5.6 Walking trajectories

Retrospective accounts of walking over the life course differ from cycling due to the essential nature of walking to human functioning. Those able to will, almost certainly, walk to some extent every day of their lives. The challenge of discerning changes in an activity that is so ubiquitous in life experience was recognised early on, and prompted focusing of the research on utility walking and the change and stability of regular journeys.

At a broad level participants' accounts reflected the institutional phases that structure the modern life course lived in post-industrial, welfare states; education: employment: retirement. A common narrative was of utility walking making a larger contribution to mobility during childhood and adolescence, being constrained through adult working life with the potential for return in retirement. This three phase form reflects temporally-fixed events which prompt reconfiguration of the spatio-temporal arrangement of activity space. In the transition to adulthood the activity space which had previously centred around home, school and after-school activities generally broadened with the advent of paid employment, familial responsibilities and recreational and social activities. This could result in destinations and schedules over distances which exceeded the practicalities of walking. In the transition to retirement the workplace is removed from the activity space to be replaced or not, with other social commitments.

Figure 23 depicts the typology of walking trajectories that resulted from the grouping process. The grouping was based on assessment of changeability across the trajectory and current level of walking.



**Figure 23 Matrix depicting current activity versus stability over the trajectory**

Each cohort-gender group is represented in four of the five groups. The groups are described as follows;

### 5.6.1 High and changeable- Group one

This cluster included three Boomer females and one Boomer male, Echo females, and one Echo male. Those from the older cohort were either worked part time or were fully retired. The Echo females were all mothers with pre-school children currently working part time and Mark (EM) had no children and was working full-time. All had experienced phases with limited utility walking in their adult lives. For the Echo mothers the car had been the predominant mode of transport prior to motherhood, which for the two graduates had followed a high level of walking for transports as students. In the younger cohort most of their behaviour changes were linked to residential and occupational relocations between urban, suburban, extra-urban and rural settings in the course of variously university, returning home, household formation and early

career moves. In the older cohort change concerned also family career breaks, employer parking restrictions and retirement.

#### 5.6.2 High and stable- Group two

This group included Echoes living in urban centres who were yet to own a car and for whom walking made a significant contribution to mobility, together with some Boomer females who had never been the main driver of a car.

Joe (EM) did not have a licence and throughout his twenties walking had been his principal mode of intra-urban travel with some use of public transport. Since leaving university Joe had spent some time living abroad and at the time lived in London. Rich (EM) was still a student and had a licence but did not drive, choosing instead to walk (and cycle) on the grounds of cost. Similarly Lucy (EF) had a licence but had not driven since before university. Following a couple of post university years in Birmingham she has lived in London. During this time her mobility had centred on walking and public transport.

Sally (BF) gained her licence in her forties but had not driven since. Her mobility throughout adult life had been served by use of the bus, walking and lifts from her partner. She walked to her current job and had used the bus for previous jobs. She had been reliant on lifts from her partner to visit family and for leisure trips. The bus and walking had similarly been strong features of Jane's (BF) travel to work. Since a more recent residential move she had substituted a combination of bus and walking for part lift and walking.

#### 5.6.3 Mixed group – group three

All subgroups were represented in this group. This was a group whose reports suggested modest levels of walking and a mixture of modest, diminishing or restorative changes. For most there had been one significant, downward change in walking

associated with gaining a car. All drove to work, and the majority had done so for most of their working lives. All could identify some walking within their localities.

Justine (EF) was a single mother with a fifteen year old son. During the time her son was at primary school, home, school and work were in close proximity which meant Justine made a lot of trips on foot. When her son moved to secondary school Justine changed jobs to work longer hours at an edge of town retail centre and started driving to work. Justine's car use had increased as her son got older as a result of chauffeuring him to activities. Like some of her contemporaries Justine restricted her car use on days she did not work to save money and as a consequence made more journeys on foot.

Paula (EF) started work at sixteen in a local shop. When she got her driver's licence at seventeen she started work at an out of town business park. For most of her twenties she lived in rented accommodation in rural villages outside Bristol and driving was her only means of transport. In her thirties she bought a house in the Bristol suburbs and began to do some walking in her local area.

Before stopping work to have children Pam travel to work involved buses, lifts and some walking because she was unable to drive. She returned to work after an eight year career break having learnt to drive and began driving to work, which she did for the remainder of her working life. Her walking was there after restricted to some trips within her locality.

Andrew (EM) had a high level of walking throughout his twenties when he lived in a fairly central location and for most of the time was without a car. His walking declined when he formed a relationship with someone who had a car and they eventually moved as a family out of the city to a small town.

#### 5.6.4 Low and changeable – group four

Appearing in this group are one Echo mother working full-time, a semi-retired Boomer female and one further Boomer female and male both fully retired. Similar to some of the Echo mothers in the high and changeable group, Naomi (EF) had experienced an increase in her utility walking for a time at university before her mobility became predominantly car-based from the start of her career. Maternity leave brought a temporary upward deflection in her walking trajectory that was reversed when she returned to work full-time.

Walking made a significant contribution to Carmel's (BF) mobility through her early working life and motherhood. This came to an end when she gained a driving licence and car access in her forties, broadening her activity space. Her utility walking has been low ever since. Kathy's (BF) walking trajectory has been affected by residential relocations between urban and rural locations and back again. Her interrupted employment career whilst she brought up her children had a positive influence on her walking trajectory. Her walking then diminished as she became involved in setting up a business with her husband, and continued to decline with the onset of a musculo-skeletal condition. Don (BM) walked to work from an inner urban location to the city centre for almost four decades and during this phase there were no occupational or residential moves in Don's life course. This concluded when he and his wife downsized to the new development on the edge of the city and he started driving to work. He eventually retired to rural France where he does very little utility walking. His classification in this group is perhaps unsatisfactory and indicates a weakness of the typology in view of his long phase of walking to work during his career.

#### 5.6.5 Low and stable – group five

This group was composed of Boomer males for whom motorised mobility has dominated their mobility since early adulthood to the almost total exclusion of walking and other modes. The Echo males had made a similar shift to driving and their



trajectories are proceeding as low and stable. Bob (BM) drove to work continuously from the age of twenty-three until the end of his career. Though active throughout adulthood through swimming, golf and recreational walking and previously squash for twenty years, Bob's mobility had been almost exclusively car-based.

#### 5.6.6 Typology summary: diminished-restorative-resilient spectrum

Having grouped the trajectories it became apparent that a spectrum similar to the cycling one could summarise the typology. This ranged from diminished to restorative and resilience. Group five –low and stable- were located at the extreme of diminished. Group four were located between diminished and restorative in reflection of earlier phases of walking activity. Group two - high and stable – were located towards the extreme of resilience and group one was located between restorative and resilience. The mixed group is least readily positioned on the spectrum. This was a group whose reports suggested modest levels of walking and a mixture of modest diminishing or restorative changes. The trajectories within this group could be dispersed across both arms of the continuum.

### 5.7 Dyads

The most prominent example of intergenerational impact of a life event was Echo children ceasing to walk to school in the course of their mothers return to work. Children's trajectories could be negatively impacted by a parent becoming a carer for their ageing parents. This could mean the mobility of children was integrated into their parent's trips to provide care and support when otherwise they would have been escorted on foot. In cases where Echoes had their grandparents living within the same locality these had provided extra adults to escort children as well as destinations for children's independent mobility. The Boomers as grandparents identified grandchild care as a source of recreational walking but not utility walking.

There were a few dyads where aspects of the cycling trajectory of the children resonated in types and patterns of cycling with that of their parents. These included;

- a participant who declared she had never seen her parents on a bicycle had not cycled herself beyond childhood,
- a participant who had family cycling holidays as a child and watched both his parents commute to work by bicycle then used a bicycle as his main mode of transport and was a keen leisure cyclist as a young adult,
- a participant who cycled to work like his father,
- a participant whose mother returned to cycling to work three times a week in the summer had adopted a similar pattern of seasonally cycling to work a few days a week
- a participant who witnessed her father return to leisure cycling in his forties and continue cycling, cycled herself for recreation and fitness throughout her twenties.

There were however other dyads which were notable for the dissimilarities in their cycling; for instance the son and daughter whose father cycled to work for thirty years and cycled with them for recreation have only cycled infrequently themselves for recreation in adulthood, and another male who has done a lot of cycling in his adult life for transport and recreation but was not aware of his parents having done any cycling in adulthood.

## **5.8 Summary of findings**

Individuals' engage in cycling in different forms over the life course; utility, recreational and mixed. Continuous cycling or phases that extend over multiple decades were exceptional, most lasted under a decade. Changes in cycling were commonly attributed to life events and transitions. In particular trajectories were affected by locational decisions, role transitions, mobility resources and health. However the trajectories

showed that such events and transitions would often occur without an impact on cycling.

Some experience of cycling in childhood was universal in both cohorts. Boomers' cycling often spanned recreational and utilitarian purposes in adolescence. Access to bicycles had been a limiting factor for some. The minority who cycled to school did so regularly. For most Boomers cycling had permanently or temporarily ceased by the end of compulsory education. Some male and female Boomers cycled for transport in their twenties and thirties. These were mostly spells of a few years, where cycling was a supplementary form of mobility and for some coincided with sharing a car with a partner.

Echoes' childhood cycling experiences were mostly recreational cycling and in close proximity to home. Some had cycled to school occasionally. Cycling diminished early in adolescence for most Echo females but continued for many of their male peers, often through specialist and some utility cycling. There was some displacement of cycling for those males who took up driving at seventeen however most went on to re-engage with cycling in their twenties either as an alternative commute mode or purely for recreation. Many females had brief spells of recreational cycling in their twenties, but these episodes were generally reported as infrequent and not on-going.

Some Boomer trajectories featured adaptive changes later in adulthood which extended their cycling. Boomers who had never cycled in adulthood and some who had had limited experiences were confident that they would not cycle again. Some of their contemporaries were cycling at some level, had plans or expressed inclinations to cycle in their current stage of life. Some of the returns occurred after an absence of a few decades and were made only by those who had cycled for a period of at least a year earlier in adulthood. Some returns were reported as unsuccessful or as an on-going attempt. Bikes acquired through tax-efficient purchase schemes were a feature of trajectories in both cohorts.

From thirty-three biographies an eight group typology was constructed. The first two groups consisted of trajectories where cycling was largely confined to early life. The remaining six identified various patterns of (re)engagement with utilitarian and/or recreational cycling. The typology served to summarise inter-individual similarities and differences in life course patterns of cycling within the study group. This was further simplified to a spectrum that ranged from arrested-restorative-resilience.

Changes in walking were generally attributed to life events and transitions, in particular locational decisions, role transitions and mobility resources. There were some trajectory developments that were not related to events and transitions. For instance the introduction of work place travel plan measures and the recent efforts of some to make more local trips on foot to save money on fuel and get exercise. The trajectories also demonstrated that events and transitions would often occur with no impression on the trajectory. Overall a prominent characteristic of the collection of biographies was the inter-individual variation.

In the longer biographies of the Boomer females childhood and adolescence were recalled as a period when walking was a major contributor to mobility. Walking continued to contribute to mobility in conjunction with public transport and lifts (often from partners) through early adulthood. The timing of the introduction of driving varied across the third, fourth and fifth decades and made an appreciable impression on most walking biographies. This protracted transition to car use distinguished the early adulthood mobility experience of Boomer females from their male peers. Motherhood, which for the majority meant cessation of employment, was recalled as a period with an increase in localised walking when children were at home. When their children all reached school age some mothers took part time, local employment that fitted around school hours which perpetuated a continuation of local walking. For others taking employment at a greater distance and longer working hours brought about a more time constrained schedule with a higher level of car use. Family life was often identified as a

source of recreational walking, usually local weekend walks or driving somewhere to go walking and continued to be a common pastime for many after children had left home. Generally Boomer women expressed an intention to maintain or increase their walking in retirement, intentions that were commonly ascribed to wanting to stay in good health and to manage the ageing process.

For Boomer males walking was likewise a primary mode of mobility in childhood and adolescence. Walking declined for most early in adulthood, as the majority adopted motorized mobility for work and most other journeys. For most walking had not been a regular mode of transport in most of their adult lives though some reported walking to local destinations irregularly. For many walking was confined to recreational walking, either local family walks at weekends, walking the dog or travelling further afield to go for longer walks in natural settings. Some retired Boomers were reporting visiting ageing parents and caring for grandchildren as new sources of walking. Some approached retirement with expectations that they would walk more.

In the shorter biographies of Echo females; childhood and adolescence were again recalled as a period of greater utility walking. However licence to walk to school independently tended to come towards the end of primary. This was later than for the older cohort most of whom had walked unaccompanied almost from the start. For some Echoes walking to school stopped when their mothers went back to work or in the primary-secondary transition when due to increased distance walking was replaced with a lift. All Echo women learnt to drive soon after they reached the legal age and most had occasional access to their parents' cars; however, this was not generally recalled as having the effect of displacing walking. Those that started work quickly got cars and began driving for most trips. Graduates reported university as a period of significant walking and most got cars after starting work. Two did not get cars and persisted with a high level of multi-modal travel. Maternity leave and subsequent part

time work were identified as giving a boost to walking for those who had entered motherhood.

Like their female peers walking was an important mode of childhood mobility for Echo males, most being escorted until their last few years at primary school. Following a similar decline in walking to school over primary to secondary transition walking became a more significant form of mobility in young adulthood. Biographies then diverged with the potential to drive; around half quickly became car owners and driving provided the majority of travel. Some of the early drivers reinitiated walking for some routine trips in post-university years. Amongst those who did not shift to driving at the first opportunity, walking continued to make a significant contribution to their mobility, along with other modes through early adulthood.

A typology of five groups was generated. Occupying the high and stable loci were older women who had not had sole access to a car through their life course and younger adults living in urban areas without dependents. Low and stable trajectories were mostly men, both older and younger, with established patterns of driving to work and most other journeys. Changeable trajectories both low and high were predominately female, mothers from both cohorts, as well as retirees. The volatility of these trajectories was related to health problems, retirement, family career breaks and maternity leave and multiple relocations between areas of different degrees of urbanity. The group with more moderate levels of walking and changeability comprised participants from all four gender-cohort groups. As with the cycling typology the grouping process helped to resolve distinguishing trajectory characteristics and was simplified into a spectrum of diminished-restorative-resilient.

To close it appears that there is a significant role played by locational changes for employment and residence, family roles and relationships and changes in mobility resources and health in determining the opportunity structure for walking and cycling over the life course. Gender differences in these life course factors are reflected in the

trajectories of the older cohort. Gender distinctions were also apparent for the younger cohorts though these appear to diverge in some respects from those in the older cohort.

The next chapter details the aim, development, conduct and output from a knowledge exchange workshop held with members of the policy and practice community and further academics. This advanced the project towards an interpretive account that contextualised individual biographies in terms of micro and macro level developments and an enhanced conceptual framework that integrates the findings, and supports further theorisation and development of practical applications.

## **6 KNOWLEDGE EXCHANGE WORKSHOP**

### **6.1 Chapter Introduction**

In keeping with the traditions of research in health and transport this study was intended to generate findings that had real-world application. A fourth research objective was to consider how the life course perspective might inform policy and practice to promote walking and cycling. To this end a further stage of research was undertaken in which the research findings were shared with members of the academic, policy and practice communities with discussion held on implications and recommendations for policy. This chapter presents the rationale, methodology and findings of this secondary stage of research.

### **6.2 Methodology**

The workshop was conceived as a deliberative dialogue and forum for knowledge exchange with members of the policy and practice community on the nascent findings and conclusions of the study. A group-based format was preferred on the basis that a group discussion might generate a more creative and considered response to the findings than a series of one-to-one interviews. This permitted the researcher to hear the panel's responses to these contributions as the discussion proceeded. The workshop took place towards the end of analysis of the interviews. The findings of the study were considered as unfixed going into the workshop with the expectation that the deliberations of the cases might yield further interpretive insights which could inform finalisation of the analysis and the formulation of insights for policy and practice.

#### **6.2.1 Workshop recruitment**

The exchange from researcher to the workshop panel consisted of background information on the life course perspective, the methodology, individual walking and cycling biographies and the emergent findings and conclusions. In return, the panel



contributed their interpretation of the findings' relevance and implications for policy and practice.

Workshop attendees were regarded as experts on the strength of their involvement in the policy for or implementation of health or transport interventions that promoted walking and cycling, as well as end-users of research. Their background knowledge also positioned them to make an assessment of the coherence and consensus of the emergent findings with their experiences in practice and appreciation of the literature. This meant that the workshop also contributed to the assessment of research quality in establishing the relevance of the study.

The panel was selected to represent a range of professionals involved in policy and practice in the areas of physical activity and travel behaviour. The selection process began with a discussion with the research supervisors that identified candidate individuals through professional contacts. These individuals were then invited and asked to suggest further individuals that met the criteria. Some speculative invites were made to national level organisations without a prior contact however this did not yield any panel members. Other academics working in relevant fields were also invited to broaden the academic scrutiny of the research findings.

A mixed group of academics, practitioners and policy makers agreed to attend the workshop; all worked within the West of England area. The panel consisted of two programme leads from a local authority, one on sustainable travel and the other on physical activity and the built environment; a consultant on active travel and the built environment who held an advisory role with a local authority; a masters psychology student specialising in transport; two public health academics, one a health economist who has collaborated on the evaluation of a national project which delivered walking and cycling infrastructure links, and the other had research interests that included road

safety issues; and an academic supervisor who was a senior lecturer in transport planning.

### **6.3 Workshop structure**

The workshop consisted of a presentation of the project, an exhibition of selected biographies and facilitated discussion. The presentation was interjected by a set of structured questions for group discussion and viewing of the exhibition. This format reflected a deliberate attempt to make the session interactive and was explained at the start of the session. Assent to audio-record the session was obtained from all panel members and recordings of the workshop were made using Endirol Digital Voice Recorders. The presentation consisted of a Powerpoint presentation which introduced the panel to the principles and concepts of the life course perspective, the methodology and analysis and findings of the study. These slides are presented in appendix D, p127-136.

Five questions were posed to the panel over the course of the workshop. These had been identified in the focused session on analysis with research supervisors and colleagues. These were devised to lead the panel through a deliberative dialogue on the content of the biographies and how these insights and approach might be integrated into policy and practice. The researcher introduced the question and then invited the experts to respond. The researcher contributed to the discussion by responding to points, seeking clarification, giving further examples from the biographies and posing supplementary questions to move the discussion into new areas.

The rest of this section explains the content of the presentation and sequence of questions. The presentation began with an introduction of the study, the life course perspective and research design. This led into the first question which was.

- 1) What are the macro level changes that have shaped the context for walking and cycling in the second half of the twentieth century and beginning of the twenty-first?

The rationale for this question was to elicit views on the relevant social changes that have shaped the context for walking and cycling trajectories. This served both as an ice-breaker and as an input into the closing stages of the analysis.

The presentation continued with an explanation of the data processing and analysis. The panel were then invited to view the eight biographies exhibited on the walls. The exhibition consisted of visual and abbreviated interpretive biographies of two males and two females from each cohort. This selection was not made by judgement of any degree of typicality but instead constituted a collection that the researcher considered to illustrate trajectories for both walking and cycling that ranged across the spectrum of arrested/diminished-restorative-resilient spectrum and encompassed changes related to different life events. The panel were invited to annotate these biographies with their thoughts and interpretations on Post-it notes. After viewing the exhibition the panel were invited to comment or raise questions on the primary research.

The presentation continued with the researcher introducing gender-cohort specific observations on the course of walking and cycling at specific life course transitions. These transitions were primary-secondary school education, post-compulsory education, partnering/household formation, becoming a grandparent and retiring. This was followed by a discussion of these transitions as opportunities for intervention in the trajectory. The question posed was;

2) What opportunities for intervention are there at these transitions?

The researcher continued the presentation with an explanation of the grouping process, the resultant typologies and spectrum. The panel were then asked to consider future developments in the cohorts' trajectories and then consider factors that might shape younger cohorts' transition to adulthood. These discussions were introduced as follows:

3) Given their trajectories to this point how might the Boomers trajectories develop as they negotiate retirement and how might the Echoes trajectories develop as they advance through mid-adulthood?

4) How might the trajectories of the cohort born 1985-1995 develop through the transition to adulthood?

Next a nascent version of an enhanced conceptual framework was presented to the panel, depicted in Figure 24 and Figure 25. The enhancements of the original framework specified the micro-level changes that had emerged from the biographies and macro- level changes identified from the literature with consideration of their consistency with the biographies.

Emerging adulthood was explained as a sensitive period in trajectory development when life events clustered and some changes in mobility occurred, which often then had enduring effects when life became more stable beyond this stage. Later working life was more tentatively proposed as a sensitive period on the basis that some biographies depicted life events that were accompanied by trajectory developments. These frameworks are explained in more detail in chapter seven. The panel were asked to consider the framework in their discussion of the implications of a life course perspective for policy and practice. This discussion was introduced with the question:

5) What contribution can the life course perspective make to promoting walking and cycling?

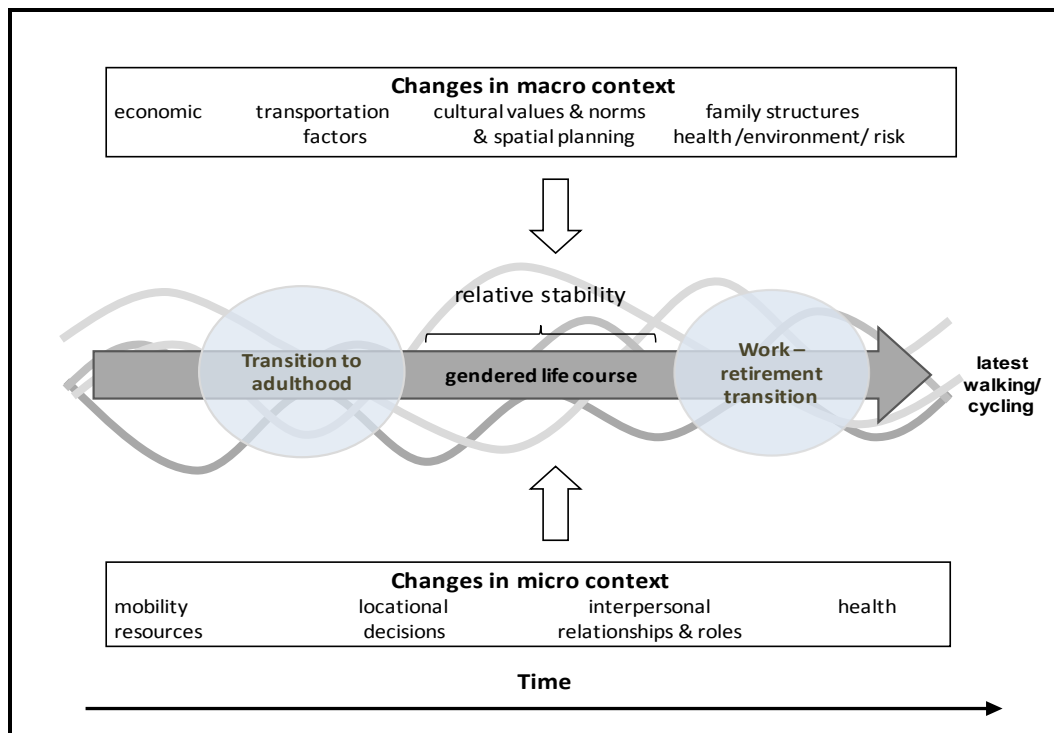


Figure 24 Conceptual framework introducing sensitive period concept

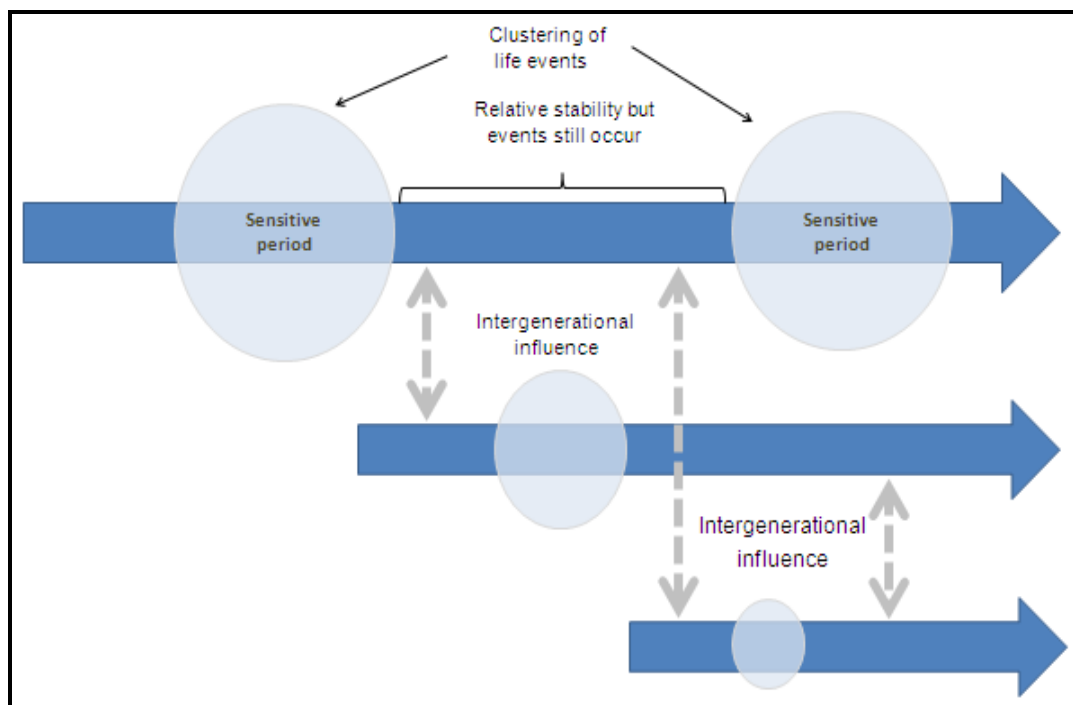


Figure 25 Framework extension illustrating inter-generational influence

The discussion was allowed to develop relatively unguided. In addition to the predefined workshop questions the researcher posed a couple of spontaneous supplementary questions to direct the attention of the group to cohort differences, inviting them to speculate on whether this would differentiate the trajectories in their future development.

## **6.4 Findings**

The researcher composed a summary text of the workshop discussions through a process of listening to the audio recordings of the session repeatedly. Annotations of the biographies were recorded in a table. The summary text and table are presented in the appendix D, 137-146. These outputs were distilled and interpreted into the following account of the panel's response and deliberation of the findings from the biographies and proposed conceptual framework. There was some follow up searching and consultation of the literature by the researcher on some points and references that were made briefly in the discussion. This enabled the researcher to give a fuller account of the discussions. Section 6.4.1 details the panellists' discussion of question one, pertaining to the macro level social and structural changes that have shaped the context for walking and cycling trajectories. The remaining questions are dealt with in 6.4.2 which outlines of the implications that were perceived for policy and practice. These are structured around the life domains of education, employment, family and leisure.

### **6.4.1 Macro-level changes**

The first part of the discussion produced a collective account of macro-level changes that were considered to have shaped the context for walking and cycling over the life course of the two cohorts.

Motorisation was a central theme to this discussion. This encompassed the economic and technological changes that made cars more reliable and affordable for larger

sections of the population, government support of the car economy, growth in traffic volumes and later emergence of two and more car households.

The post-war rebuilding efforts in the 1950s and 1960s brought forward development of the physical environment that dispersed the population into lower density suburban settings, equipped with wider roads and driveways. The term 'windscreen perspective' was used to denote the approach of policy makers and planners in this period which signified an orientation to the needs of the motorist in urban planning. Out-of-town developments including retail and business parks that further dispersed activities and compelled car-based mobility were a feature of 1980s and later development.

The panel discussed the role of social norms in a shift towards an increasingly risk-averse society. Public spaces came to be perceived as holding increasing risk for children from traffic and strangers. Parents, who increasingly perceived the scrutiny of other parents and community, responded by restricting children's independent mobility and unsupervised play to manage both the risk to children and the social risk of contravening social norms of responsible parenting.

There was recognition of a more recent increase in attention to conditions for walkers and cyclists. One panellist cited legislation that was concurrently passing through the Welsh Assembly to make it a statutory obligation for Welsh local authorities to consider the potential for enhancing walking and cycling provision in the development of new road schemes.

Overall the panel emphasised developments in spatial and transportation planning, traffic volumes and levels of car ownership, economic factors and social norms pertaining to risk as structural and social changes that had made conditions less favourable for walking and cycling over this period. The discussion of risk and ideologies of good parenting was a factor which had not emerged in literature sources reviewed.

## 6.4.2 Implications for policy

The panel engaged with the findings by interpreting the contextual influences of behaviour change and trajectory progression through life course transitions that were highlighted by the exhibited biographies and presentation. This drew on their acquaintance with the evidence base and their practical experience of formulating and delivering behaviour change interventions. Greater attention was afforded to the opportunities for intervention in the life course than the underlying longitudinal mechanisms and processes by which trajectories were shaped. This is perhaps indicative of the prominence of targeting context disruption at life events behaviour change in the practice arena. Examples were given of interventions already being implemented or developed that were targeting these events. Events identified specifically were educational transitions, employment and residential changes in emerging adulthood, relocations made in anticipation of starting a family or children starting school; employment changes and downsizing moves in later adulthood.

There were also events and transitions that they had previously identified as opportunities but were not being pursued for practical reasons. An example was an aspiration by one panellist to work with utilities companies to offer personalised travel planning at addresses where a change of household could be identified through change of account. This had not been taken forward due to local issues. An advantage of this is that it would intercept a broader proportion of re-locations than current initiatives which are working through housing developers. It was evident that a leading consideration in practitioners' contemplation of the findings and their implications for policy was routes of access to deliver potential interventions.

### 6.4.2.1 Education

The transition from primary to secondary education was identified as an accessible life event with recognised changes in travel behaviour. Approaches already being implemented and in development were discussed. These targeted older pupils in



primary school and involved cycle training and the offer of personalised travel planning for their secondary school journey. It was described by one panellist as inculcating the idea through a “drip-drip-drip approach” of cycling to secondary school in the last few years of primary school. An aspiration was to conduct led-rides for primary school pupils to cycle to their introductory session for secondary school, which took place in their final half term at primary school. However, it was recognised this would need significant resources to run this across all primary schools.

Parental concerns about the safety of their children cycling on the roads were considered to be a significant barrier to influencing behaviour at this transition and generally children’s mobility and independent mobility. This broadened to a general discussion of how individual agency could be constrained by social norms concerning risk to which individuals were expected to perform. Contravening these norms risked being considered a ‘bad parent’. One panellist queried whether the approach should be to challenge these norms or work within them to equip parents to permit their children to walk and cycle in a way that is deemed safe. One suggested way to proceed was to raise awareness amongst parents and education providers of the evidence that children who are more physically active had better educational outcomes (Sibley and Etnier, 2003). This would therefore position parents who allowed their child to walk or cycle as making a choice that was beneficial for their child.

There was discussion on whether, given parental concerns, greater impact could be achieved by targeting resources at the transition from compulsory education on to post-16 destinations. This was perceived as a time when young people genuinely had more autonomy over their mobility and were making decisions about their future but had limited financial resources. Nevertheless it was generally considered that there was still merit in persisting with earlier interventions, with the aim of preventing children having solely car-based mobility and providing mastery experiences for later interventions to build on. This was deemed as consistent with the general principle of intervening

before behaviours became established. Invoking the typology of cycling trajectories one expert referred to the primary-secondary and post-16 transitions as both “moments when you are going to help a person be a returner” [to cycling].

Panellists also picked up on the fact that in the younger cohort there were greater gender distinctions in adolescent cycling experience; women in the younger cohort tended to report diminishing cycling early in adolescence whilst their male peers more often reported continuing and specialised cycling. Adolescent girls’ desertion of cycling appeared to resonate with the experts’ understanding of when individual cycling is prone to decline. Adolescent girls’ were inclined to walk because of the opportunities this offered to socialise and that cycling was problematic for the adolescent girls’ social identity. Peer-to-peer interventions that had been used to reduce young people smoking was raised as an intervention that could be adapted for cycling.

The panel were accepting of the proposition that emerging adulthood constituted a sensitive period for trajectories on the basis of the concentration of life events, including ascension to legal driving age, ahead of later stabilisation in the life course. The biographies were considered to endorse a strategy of encouraging young people to remain multi-modal in their mobility and delay car acquisition. One panellist saw that the sixteen to nineteen age band was when they needed to “sell the independence and freedom” of using alternatives to the car for transport. A proposed intervention was to highlight to young people the relative costs of car ownership versus multi-modal travel. Sixth form and further education colleges were identified as important access points to this life stage. After 2015 young people will have to be in education or training until the age of eighteen meaning access to future cohorts of young adults will be extended through this sensitive period. The prospects for such an approach were considered to be more favourable in light of current suggestions that the symbolic value of the car has diminished for young people, in preference for items such as smartphones.

#### 6.4.2.2 *Family*

Starting a family was identified by one panellist as a common push factor for couples to get a second car. This was therefore considered a life event which could have a detrimental effect on walking and cycling trajectories within families. However, the researcher pointed out that the biographies collected did not reflect this. Household car ownership had generally been maintained for Echoes who had become parents, whereas the household car ownership changes they had experienced growing up were usually attributed to employment changes or their mothers learning to drive rather than explicitly family enlargement. The biography of Paul, an Echo who shared one car with his partner and cycled to work to make the car available for his partner for travel with their children, was recognised as personifying a segment identified within local travel surveys. This was described as a segment of generally dual income households, living in urban, often more affluent neighbourhoods, where one partner, usually male, commuted by bike. This would free up a car for their partner to use and limit the household to one car. The panel recognised that biographies revealed the context of events and trajectory developments within the life course and the interdependency of trajectory developments between family members.

There was discussion of how to counter the apparent exclusion of cycling for parents when children were too young to ride independently. It was considered that the necessary equipment e.g. bike trailers, child seats and tag-alongs, presented a financial and technical barrier. It was recognised that local authority road safety officers make visits to early years centres and help parents correctly fit bike seats and tag-alongs. However it was felt that, in practice, there was more emphasis on the correct fitting of car seats rather than promoting safe cycling.

It was also emphasised that, within family groups, there were life events that affected travel behaviour prior to children making the transition to secondary school. The

example parents being able to travel independently again once their children started school.

For some the biographies portrayed the impact of spatial planning. This was both through the displacement of walking and cycling in the course of relocations, occupational or residential, to low density, peripheral settings or the restriction of opportunities to walk and cycle in an individual's present setting. The suburbanising move of families to achieve a more family friendly setting and later downsizing moves were seen as important key relocations.

Trajectory developments associated with care of grandchildren was also identified as a potential means of access. It was considered that interventions targeted at school travel should consider that there will be grandparents escorting children on some journeys.

#### *6.4.2.3 Employment and retirement*

Recognising the particularly challenging situation facing young people in wake of the financial crisis, one panellist proposed that whether a person could afford to find work in the area they chose to live in or had to relocate to "follow the work" was a significant influence of early commuting behaviour. The integrated siting of employment, with other uses and infrastructure, was endorsed as a planning measure that could reduce the tendency of walking and cycling to be displaced and excluded during employment. Recent changes to spatial planning frameworks, aimed at promoting economic growth, were perceived as potentially permitting new development that did not promote active travel as more favourable than car-travel.

In response to the multiple examples in the biographies of people acquiring bikes via tax-exempt purchase schemes, it was recognised that some employers operated schemes that were not available to new employees until they had completed a probation phase. This was considered as a factor that worked against the potential for

behaviour change in the course of employment change. Local authorities could encourage employers to address this through their assistance with workplace travel plans.

More generally, the panel saw the need to decouple driving to work from the need to have a car at work for work-related travel. Measures to encourage employers to provide pool mobility tools, e.g. cars, bikes and e-bikes, were endorsed with reference to examples in practice. The biographies were perceived to endorse travel plan measures as a means to positively disrupt even long-established behaviours, and reintroduce travel to work. Other measures proposed to counter the potential of employment to sustain episodes of low walking and cycling activity were the removal of requisite car access on job descriptions and the provision of pool mobility resources by the employer i.e. bikes, electric bikes and cars. It was considered this would mitigate the need to travel to work by car for work-related travel.

The strong coupling of leisure and motorised mobility was perceived as a barrier to reshaping travel behaviour of the current cohort moving into retirement. Identifying a 'golf club mentality', one panellist perceived that there was a proportion of the baby boom cohort who had active lifestyles but for whom being active involved driving to specific locations, for instance the health club, golf club, walking in scenic areas. It was commented in a speculative way that "are we almost saying they [the baby boomers] are beyond hope and we should focus elsewhere" implying resources would be better employed elsewhere.

Overall the deliberations of opportunities for intervention were predominantly about life events and transitions in developmental or maturational phases of life. Fewer opportunities for intervention were identified in response to the trajectory developments of later life. For one panellist this meant downsizing moves were a relatively important transition of later life.

The focus on earlier stages of the life course may be indicative of a perception that younger people can be more receptive to interventions because behaviours and lifestyles are less entrenched than those in later life. Further, whilst large proportions of young people can be targeted through educational settings, equivalent points of access could not be identified for older people. Retirement planning courses and primary care health screening for middle-aged adults were raised as opportunities to encourage individuals to think about the impact retirement would have on their activity levels. For instance health care professionals could at these occasions dispense advice on ways to build activity into the post-retirement routines. However, there was some reflection on the likelihood of getting such messages delivered within the time constraints of health appointments when there is competing health advice and procedures to be carried out.

Related to this, the discussion touched on an area where the priorities of transport and public health diverge. For example in terms of mitigating peak time congestion there is greater potential impact to be made by targeting interventions at younger groups than at age groups who have left or will shortly exit the work force. Whereas in terms of public health older people are more likely to be insufficiently active to benefit their health as well as a population group where there is higher prevalence of health conditions related to physical inactivity. Subsequently the potential health gain of increasing walking and cycling in this population group is greater.

The panel's deliberation of the findings was dominated by opportunities to intervene at life course events. The cumulative effect of earlier experience on current outcomes was less readily addressed. This is perhaps a reflection of the fact that in the pursuit of behaviour change the potential for life events to precipitate travel behaviour change is a more established and usable theory than understanding of longer term processes in travel behaviour. The panellists were generally receptive to the proposal of early adulthood cycling experience as a generative and enabling factor of later returns.

The panel discussed the potential for the biographies to corroborate indications of new trends in mobility from routine transport data. This was referred to as “putting flesh on the bones” of routine data and was elaborated to mean providing longitudinal portraits which explained the evolution of travel behaviour for segments characterised by present travel demand. The example was given of indications that more recent cohorts are driving less in early adulthood and becoming main drivers later (Stokes, 2012). This could be an indication that these cohorts will not proceed to the same levels of car ownership and car use in later adulthood as earlier cohorts. For one panellist the biographies were supportive of the case that some recent high-value transport schemes were “chasing trends that aren’t going to materialise”. This argument holds that such schemes have been predicated on forecasts of future travel demand involving assumptions that younger cohorts will follow preceding cohorts in their car ownership and usage. If indeed mobility biographies demonstrated that younger cohorts were adopting new travel behaviours then this, it was speculated, undermined the case for such transport schemes. In a similar vein, it was proposed that the biographies revealed “more and more people are having an increasingly ambivalent relationship with their cars”. For this panellist this was evidence that local authorities should capitalise on such trends by pursuing more radical policies of rebalancing urban spaces in favour of pedestrians and cyclists.

## **6.5 Chapter summary**

This chapter has presented an interpretive account of the discussions had with policymakers and practitioners at a knowledge exchange workshop on the emerging insights from the biographies. These discussions served to inform finalisation of the findings and formulate implications for policy and practice that are presented in the following chapter.

## 7 DISCUSSION

### 7.1 Chapter Introduction

One important aspect of this study was its attention to time, at both individual developmental and historical scales. In addition to the intra-individual dynamics of behaviour, the study explored how trajectories were shaped by macro level structural and social changes, through comparison of an earlier cohort with a later one. Inter-cohort comparisons of walking and cycling behaviour through early life, transition to adulthood and early adulthood. The younger cohort, having progressed as far as their first and second decade of adulthood, had variously experienced education and employment milestones, partnership formation and dissolution and parenthood. Biographies from the older cohort permitted examination of trajectories through mid to late adulthood. The older cohort had experienced partnering, establishing a family home, parenthood, children leaving home and, variously, partnership dissolution, re-partnering, downsizing from a family home, care of elders, grandparenthood and retirement.

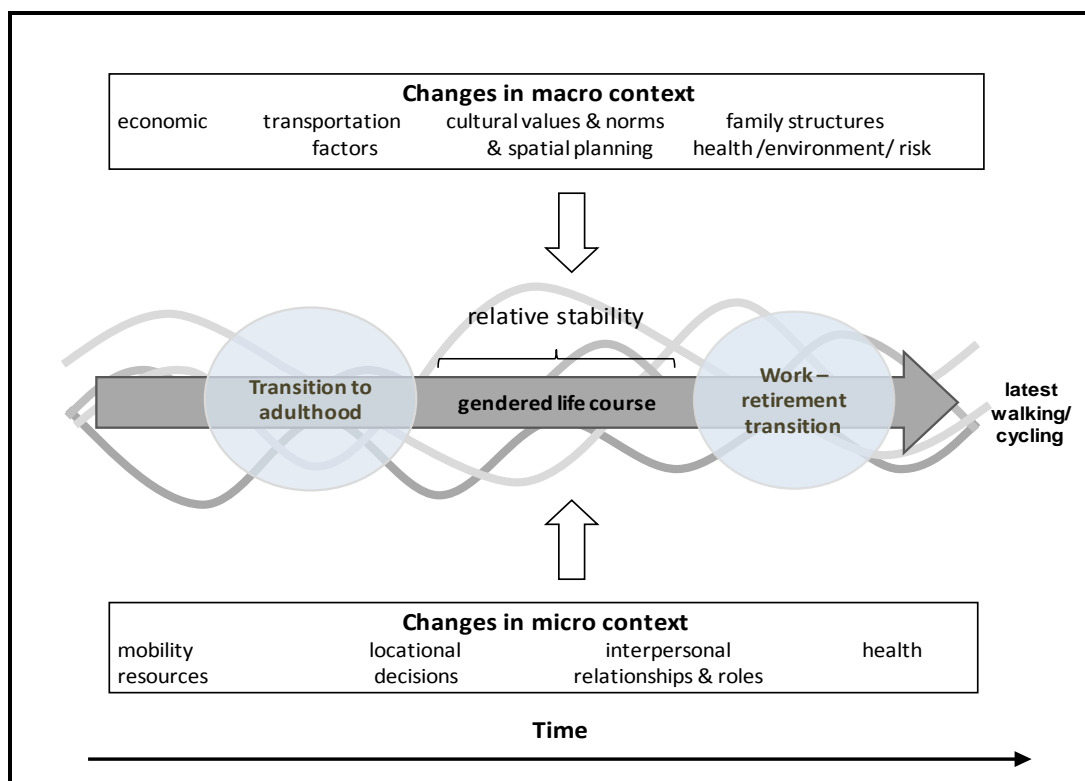
The objective of this chapter is to integrate the research findings; the interpretive biographies, the dialogue with practitioners and policy makers and the review of the literature, into explanatory insights on how individual trajectories unfold within their micro and macro settings. Section 7.2 presents an enhanced framework that synthesises the findings to theorise the development of walking and cycling over the life course. The section introduces and explains sensitive periods and typologies of trajectories that pertain to the temporality of trajectories, before discussing the indications of longer term processes revealed in the biographies. This is followed by a brief summary of the theoretical perspectives on human development and mechanisms of change used elsewhere in life course research that could be integrated to explain longitudinal processes in trajectories of walking and cycling. The chapter is concluded



in section 7.3 with a discussion of the implications of the empirical findings and the framework for policy objectives of promoting walking and cycling.

## 7.2 Research synthesis: presenting an enhanced conceptual framework

The findings of the research (from review of literature and new empirical findings) have been synthesised into a platform that theorises the life course development of walking and cycling. This framework is presented in Figure 26.



**Figure 26 Conceptual framework of walking or cycling trajectory**

This constitutes an enhancement of the original conceptual framework. In addition to the core concepts of trajectory and life course, it recognises gender as a core component, specifies macro and micro level influences and introduces temporal components which theorise the timing of sensitive periods in the trajectory. These components will be explained over the following sections and related to empirical findings and literature.

Firstly, the output is defined as a framework and not a model, on the basis that the latter should advance propositions about mechanisms and processes and represent a

greater degree of integration of the concepts. The time frame meant there were likely to be multiple episodes of change and continuity which contributed to the complexity of the phenomena. In the light of this complexity, a higher, less specific level of theorisation was considered wholly appropriate for an explorative study, and a necessary preliminary step to elucidating long term processes and mechanisms that shape the trajectory over the life course. It also maps the broad scope of factors that influence the development of a trajectory and, in so doing, provides a platform to identify putative influences for investigation and a framework to locate disparate findings. There is scope to integrate, with this framework, models theorising short-term mechanisms of change, for example the model of Chatterjee *et al.* (2013).

Chatterjee *et al.* (2013) identified a greater propensity for cycling turning points to be triggered by life events than changes in the external environment. The propensity for behaviour change to be attributed to life events was found similarly here, in life-long accounts of walking and cycling. Whereas Chatterjee *et al.* (2013) identified personal history, along with intrinsic motivation and facilitating conditions, as mediating factors in cycling change, this study sought to unpack the influence of personal history.

Nonetheless, the biographies lend general support to the notion of intrinsic motivation and facilitating conditions as mediating factors in some trajectory developments.

This study also found, in line with previous work (Chatterjee *et al.* 2013; Bonham and Wilson, 2011), that many changes in cycling often unfold in the context of multiple, inter-related life course developments which may take place in advance, simultaneously or after the actual behaviour change. For instance, a common scenario was for trajectory developments to occur within the confluence of residential relocations and employment change, some of which were linked to a child starting school.

Whilst the biographies were generally congruent with the notion of the disruption of life events making behaviour prone to change, they also made apparent the common inertia of behaviour through life events. This suggests that there would be significant

limitations to an explanation of trajectories that merely extrapolated the notion of behaviour change induced by life events.

The framework persists with the view taken in food choice, that trajectories are constructed by the individual acting within the opportunity structure of their personal circumstance, comprising both opportunities and constraints for walking and cycling. The life course trajectory of walking or cycling is depicted at the centre of the framework, interwoven with the various trajectories of a life course. It is recognised as gendered because there was found to be a gender dimension to most of the macro and micro contextual influences integrated into the framework.

Marriage and motherhood were emphasised as principle constraints on women's mobility in a social historical account of the changes in everyday mobility over the twentieth century (Pooley *et al.*, 2005). This revealed how the mobility of women in cohorts born in the 1930s was transformed by the acquisition of a driving licence and a car later in adulthood. The biographies presented in this study similarly reveal how developments in family, employment and the acquisition of independent automobility shaped the walking and cycling trajectories of women in the older cohort.

One study of physical activity histories similarly emphasised their gendered nature, this effect being mediated through employment and family roles as well as mobility resources (Scanlon-Mogel and Roberto, 2004). Older American women, but not their male peers, had recognised that not being able to drive in young adulthood had meant that walking and cycling had been a significant contribution to their formal exercise during this time of life.

The original framework comprised generic micro and macro level influences on the unfolding trajectory. The biographies provided real life examples of changes and continuity in walking and cycling that identified micro-level contextual circumstances around behavioural developments. These real life examples of micro contextual

change were resolved into categories with reference to previous work on the life events that precipitate change in physical activity or travel behaviour change (Allender *et al.*, 2008; Scheiner, 2006; Chatterjee *et al.*, 2013). The following categories were incorporated into the conceptual framework; Mobility resources, Interpersonal roles and relationships, Location decisions and Health. A fundamental distinction between the reviews of Scheiner (2006) and Allender *et al.* (2008) and this study is that the former were reviews of primary sources that were considering the impact of specific life events on behaviour, whereas this study has considered multiple life events as components of a cumulative personal history that shaped a behavioural trajectory towards a current manifestation of walking or cycling behaviour.

The inclusion of two cohorts permitted examination and comparison of trajectories from life courses which intersected an evolving macro context at different points. The context for walking and cycling in early, mid and late life of the two cohorts were therefore distinguished by structural and social changes. The influence of the macro level social and structural changes were identified through consideration of the inter-cohort similarities and difference in trajectories. This synthesis also drew upon the literature review, presented in 2.5, of the macro structural and social changes in the UK since the middle of the twentieth century and the discussion of these changes with policymakers and practitioners, detailed in section 6.4.1. The generic macro contextual factors of the original framework were refined to Economic development; Spatial and transportation planning; Cultural values and norms pertaining to health, environment and risk, and Family structures. In the course of this synthesis inter-relations between the micro and macro-level factors were recognised; for instance macro level economic changes which encompassed changes in labour market entry, participation and working practices related to micro contextual changes in personal roles and location.

Section 7.2 now continues with a supporting account for the inclusion of these specific micro and macro level contextual changes, making links to other work that offers

insights into the effect of such life events on travel and physical activity behaviour. The account is structured around the micro-contextual changes, with further breakdown in some sections to structure these changes by life stage. As has been noted, many trajectory developments concern multiple micro-contextual changes, and therefore this was found to be an imperfect but pragmatic structure for presentation.

## 7.2.1 Mobility resources

### *7.2.1.1 Childhood and adolescence*

The biographies illustrated the growing feature of automobility in childhood and the shift towards escorted travel between the cohorts. Boomers grew up in households with car ownership of either zero or one, whereas Echoes grew up in households with either one or two cars; some households acquiring a second car whilst they were children. Echoes were predominantly entering parenthood with each parent having a car.

Very few Boomers experienced automobility as routine for daily mobility in childhood. None of their mothers could drive; if their family had a car it was generally used by their fathers to get to work or reserved solely for family outings. They almost universally walked to primary school and walked unescorted. At their transition to secondary some started cycling, catching the bus and walking, whilst others continued in walking to school.

Some of the Echoes' mothers could not drive and the sole car was used by their fathers to get to work, while in others, mothers had use of the car. Most walked escorted to primary school and some were dropped by car on their mother's way to work. At the transition to secondary many switched to the bus, some were driven, many combined the bus, walking and getting lifts and a few started to cycle occasionally. Apart from those who were being driven, most graduated to travelling independently. Those who did a lot of different after-school activities were generally chauffeured to

these activities by their parents. A more common experience was one or two local activities and some of these journeys were made on foot.

The greater propensity for escorted school travel meant that active travel to school was prone to being displaced by employment changes in their mothers' life courses. In some cases Boomer mothers had local, part time work which permitted them to meet children after school and escort them home on foot, and sustain the contribution to the mobility of themselves and their children. For others, location and time commitments for work and school made car travel necessary.

Secular trends in children's mobility in the UK between 1970s and 2010 have been captured in survey data (Shaw *et al.* 2013). These sources confirm that whilst the majority of children do still walk to primary school, active school travel and unaccompanied school travel declined significantly in this period. The proportion that travel unescorted has also declined from eighty-six to twenty-five per cent (O'Brien *et al.*, 2000; Shaw *et al.* 2013). This is consistent with a long term decline in the children's 'licence' for independent, active mobility between the childhoods of the Boomers and Echoes and beyond.

Mackett (2002) argues these trends are explained by children travelling over greater distances to get to school, the increasing proportion of two car families, increasing parental concerns about traffic and child abduction and increasingly complex household schedules. Drawing on oral history, archival research and time use surveys Karsten (2005) asserts that childhood geographies have become more diverse: children spend more time indoors, in the supervision of adults and being chauffeured to structured activities.

Learning to cycle in childhood was a universal experience in both cohorts. The older cohort tended to have more limited access, yet greater spatial freedom, for cycling and greater experience of their bikes as a means of transport. The decline in interest and

participation in cycling in early teenage years amongst Echo females resonates with the female biographies Bonham and Wilson (2011) collected from returner cyclists, and also the accounts from a mixed group of American adults provided by Underwood and Handy (2012). More Echo males remained engaged in cycling through adolescence than their female peers, and their cycling often incorporated specialist cycling as well as cycling for transport. This gender dimension was not recognised in the previous studies. Amongst Boomers, cessation of cycling in adolescence often pertained to lack of, or loss of, access to a bike. Those females who cycled to school located the end of their cycling in youth as the point they left school and started work, whilst for most of their male peers the watershed was acquiring motorised transport. A minority of Boomer males continued to cycle to some extent into adulthood. The observations on adolescent cycling of Bonham and Wilson (2011) and Underwood and Handy (2012) did not pertain to specific cohorts, so there is not the opportunity to corroborate these observations on cohort differences.

The adolescent departure from cycling concurs more broadly with longitudinal studies that show objectively-measured physical activity declines in adolescence (Jago *et al.* 2008; Nader *et al.*, 2008). Carver *et al.* (2011) noted that, as physical activity declined, the correlation with active travel grew stronger, suggesting that active travel becomes a more important source of activity through teenage years. A contemporary study of Australian young people attributed intra-individual increases in active travel from early to mid-teenage years to increased autonomy and independence (Hume *et al.* 2009). Since that particular study did not distinguish walking and cycling, it is possible that the increase was confined to walking and therefore is not taken to contradict an adolescent decline in cycling. Further, it is problematic to interpret the historical insights from the present study with respect to others based on a contemporary cohort of Australian children, because of the spatial and temporal separation of these cohorts. This exemplifies a more general challenge for contextualising the findings in the wider

research field, which is that there is relatively little research which might corroborate the individual changes in earlier periods for these cohorts.

#### *7.2.1.2 Transition to adulthood*

Acquiring independent automobility was transformative in most biographies and commonly resulted in the enduring demotion of walking and cycling as a principal mode of travel. In biographies where this shift did not occur these were characterised by maintenance of walking and/or cycling, use of public transport and lifts with either low or no personal car use. It was noted that in these biographies there were locational decisions which could have made their lack of car access less problematic.

In the Boomer cohort, gender distinctions were apparent in the changes in mobility resources that occurred through their transition to adulthood. Women generally gained independent automobility later. This meant they had a period in early adulthood where mobility was characterised by public transport, walking, getting lifts from friends and boyfriends; only one used a bike in this period. Most who entered the labour market around the age of fifteen first travelled to work by public transport. In contrast many of the Boomer males acquired motor bikes and then cars within a relatively short period of becoming old enough. Subsequently, most established fairly stable patterns of driving for work and other journeys. For the males and females of this cohort who went to university, car ownership came when they started work or later.

The contribution of public transport to walking levels and total physical activity has been demonstrated in contemporary populations (Besser and Danenburg, 2005; Wener and Evans, 2007). Americans who used public transport walked a median of nineteen minutes a day in the course of public transport journeys and twenty-nine per cent met guidelines for daily physical activity this way (Besser and Danenburg, 2005).

Echo females who started work between sixteen and eighteen got cars and started driving to work and for other trips. Those that went to university learnt to drive around



the same age and used their parents' cars. Their university years were then car-free before most acquired one when they started work. The Echo males showed a fairly even split between those that got cars at seventeen or eighteen (and whose mobility then became heavily automobile-oriented) and those who got cars later in early adulthood or had yet to get one. For most of these, walking or cycling continued to be a primary mode of mobility. Unlike their female peers, car ownership was less clearly linked to labour market entry.

The impression that initiation of driving in younger cohorts is diverging from that of preceding cohorts is supported by the work of others. Whilst the historic gender differential in mobility has been eroded by an increase in female mobility over the last few decades, Stokes (2012) demonstrated from NTS data that, amongst young adults, this contraction is instead the result of a decline in distance travelled by young males rather than a rise for young females. The distance driven by young males (aged 17- 30 years old) fell from around 6000 miles to 3500 miles between 1995 and 2010, whilst the miles driven by young females stayed flat. Further, and counter to the trend in older age groups, the proportion of main drivers has fallen. Similar trends have been found amongst young Germans and Swedes (Kuhnimhof *et al.* 2012; Frändberg and Wilhelmson 2011). Kuhnimhof *et al.* (2012) suggested that falling car use has been accompanied by changes in other forms of mobility but no studies were found that demonstrated similar changes in the UK population.

It has been proposed that these shifts reflect the emergence of a new post-adolescent phase when young people increasingly reside in urban settings for higher education where alternative modes of travel are competitive with the car, and the postponing of income and family formation in the course of extended education and becoming established in the labour market which concomitantly delays demand and means for a car (Kuhnimhof *et al.* 2012; Frändberg and Wilhelmson, 2011). Arguably, with the emergence of mass car ownership, the disbenefits of car ownership and travel have

been made more apparent and the car has diminished as a symbol of status. Further successive cohorts have encountered increasing opportunities to be virtually mobile through information communication technologies, which could be a factor in depressing physical mobility by substituting for travel. In the UK, young drivers may also be deterred by the relatively high cost of insurance.

The difference between the cohorts amongst females in timing of car acquisition may, perhaps, be in part a reflection of the differences in their future expectations of career and family trajectories. With generally lower levels of education, Boomer women entered the labour market in lower-skilled jobs which made automobility less affordable or necessary. For these women, starting a family was perhaps more immediate in prospect, which would have come with the restriction of the household income which would make running more than one car more difficult. Expectations and opportunities for careers were probably higher amongst the more highly educated Echo women, and automobility was probably relatively more affordable and useful once they had an income. Future motherhood, based on contemporary exemplars for these women, might have been a less immediate prospect, and envisaged as a shorter break with a return to work facilitated by formal and informal childcare but with complex travel needs. This may have given Echo women a stronger orientation to car ownership and automobility.

In contrast, cohort differences amongst the males in this study could be understood by considering the differences, between these periods, in what car ownership offered young males. For Boomer males automobility offered independent travel as well as status. For Echo males the symbolic value of a car could be achieved through other items and, in the context of congestion and pressure on parking, other modes of transport could be more efficient for some forms of intra-urban mobility. This resulted in some choosing to delay car ownership or return to walking and cycling as a mode of transport in early adulthood.

Re-engagement with cycling in the twenties was a feature in both cohorts. A number of Echo females had short phases of occasional recreational cycling with friends or partners; a couple had cycled for transport. Their male contemporaries had more extensive engagement with cycling during this time, both recreational and for transport, often involving a return to the specialist cycling of their youth. For Boomers who had cycled in their twenties, these experiences encompassed both transport and recreation. Bonham and Wilson (2011) found that some cycling in the twenties was a common feature of women's stop-start-stop cycle histories. Health, fitness, recreation and, invariably, relationships were prominent in descriptions of recommencing cycling at this life stage, which resonates with the accounts put forward by the females categorised as 'twenties dabblers' in the present study.

Availability and affordability of bikes may have been a factor that has distinguished the two cohorts in their cycling through this life stage. Many of the Echoes still possessed the bikes they had had as a teenager, meaning they were equipped to cycle if they wished. In contrast, most Boomers had had to acquire another bike to cycle. The purchase of a bike for even occasional use was probably more affordable for the younger cohort at this stage than it was for the Boomers at the same age.

Bike theft featured in some biographies and in some cases this had been implicated in a change in cycling. Following the one incidence of bike theft amongst the older cohort, the bike was not replaced because its use at the time had been infrequent and declining. Lack of a bike was then an impediment to any future occasional cycling. In all incidences of bike theft suffered within the younger cohort, the bike had been replaced. This gave them on-going access to a bike even if they were not cycling regularly.

Some positive changes in walking and cycling, that related to employer travel planning measures, were a feature of some biographies in the last decade or so, in particular the provision of a tax-efficient bike purchase scheme and introduction of parking restrictions. Brockman and Fox (2011) reported the positive influence of employer

travel plan measures on active travel at a university between 1997 and 2008. Levels of active commuting showed year on year increases that were converse to national trends. The biographies provide examples of where work place travel plan measures had disrupted established behaviours of driving to work and led to introduction of active modes in commuting.

#### *7.2.1.3 Retirement*

In the present study the older cohort were within a decade of state pension age and occupied a range of positions with respect to withdrawal from the labour market. These included being retired, working less than full time, having a planned date for retirement and having no fixed plans for retirement. The prospect or reality of leaving employment and the accompanying increase in discretionary time was widely regarded as an opportunity to change mobility behaviours, with some making the connection to health benefits and managing the ageing process. References were made to recent acquisition or anticipation of a concessionary bus pass, plans to reduce household car ownership and the perception or expectation of an associated positive impact on their walking trajectory. Coronini-Cronberg *et al.* (2012) found levels of active travel were higher amongst individuals with a concessionary bus pass. This, in addition to Besser and Danenburg's (2005) work cited earlier, provides cross-sectional evidence of symbiosis between walking and public transport. This study adds insights from biographical accounts that phases of public transport use are generally recollected as coinciding with phases of greater routine walking.

Trajectory developments later in adulthood demonstrate that some Boomers maintained their cycling in later life by making adaptive changes, including switching to electric bikes or leisure cycling. Dill and Rose (2012) identified electric bikes as an enabling technology that could expand the bicycling population with the recruitment of women, older people and people with physical limitations.

#### 7.2.1.4 *Mobility resources summary*

Throughout the life course some changes in walking and cycling were attributed to changes in mobility resources, specifically gaining a pass for concessionary fares, gaining or losing a bicycle and gaining a car.

Echo males overall have shown greater multi-modality in their mobility in early adulthood than their female peers and Boomer males, with the latter both demonstrating more collective shifts to automobility on entry to the labour market. This appears to be a reversal of the situation in the older cohort where progression to driving was generally later and more variable for women than their male peers.

This adds support to the notion that trajectories of mobility behaviour in younger cohorts are diverging from the experience of cohorts ahead of them. It remains to be established whether these changes in automobility are accompanied by changes in walking and cycling. If this is the case this raises the question of whether this will distinguish their trajectories going forward, or whether these are effects that will be confined to early adulthood.

### 7.2.2 Locational decisions: Residential and occupational changes

#### 7.2.2.1 *Childhood and adolescence*

Collectively the older cohort had experienced a mix of urban, suburban and more rural settings in childhood. There was a similar mix in the residential histories in the younger cohort with suburban settings being the more common experience.

Research on contemporary cohorts has indicated that the proportion of children travelling to school by motorised modes increased over the transition from primary to secondary school, along with the mean distance travelled (Cooper *et al.*, 2012).

Switches to motorised travel or continuing to walk over a longer distance were accompanied by predicted changes in objectively measured total physical activity.

Distance travelled to school was not quantified in this study. However, as a collection,

these biographies indicate some cohort differences in school careers, that suggest it was more likely for the younger cohort to have a locational change when they changed schools which made distance a barrier to active school travel. For instance, some Boomers attended boarding school or a junior and then senior school on the same site whilst some Echoes travelled to secondary schools outside of their educational authority.

#### *7.2.2.2 Transition to adulthood*

Within the younger cohort, locational choices were markedly differentiated by higher education and subsequent employment opportunities. For many Echoes, leaving home for university meant an urbanising move that brought them into higher density urban settings with greater public transport options. Further, those who remained in urban settings after university tended to maintain walking, in some cases cycling, and some have yet to own a car. Post-university phases were characterised by renting in urban areas, multiple locational changes and for some, work and travel overseas.

This move was not replicated by their non-graduate contemporaries, who generally continued living with their parents before renting accommodation in similar settings. This group also had greater experience of employment in peripheral locations, including edge of city office developments, retail centres and industrial areas and an ex-urban business park. Further, for most, automobility has been integral to their work. The relative concentration of higher skilled employment in city centres and along transport corridors and the dispersal of low skilled employment to peripheral settings has been a recognised facet of the evolution of cities in recent times (Clayton, 2011). Individuals in graduate jobs are therefore situated with more favourable conditions to commence or re-establish active commuting. Collectively, the biographies of the Echoes provide support for such an effect.

It was apparent from inter-cohort comparison of biographies that the cohorts were distinguished by their life course experiences in early adulthood. For Boomers the

markers of adulthood - leaving education, entering employment, leaving home and becoming a householder, establishing a long term partnership and having children - were 'accomplished' within a shorter time frame, in most cases by the age of thirty. For most Boomers, their move out of their parents' home was a move in with a partner. Liberalisation of finance in the 1970s made home ownership achievable and many of the older cohort were able to buy homes in their twenties.

For later cohorts home ownership had become less affordable in early adulthood, meaning renting became a much more common situation, and a situation that lasted longer into adulthood. The lower costs of moving in the rental sector made it easier to relocate in response to changes in circumstances, such as change of job, income or household structure. Taken together it would seem reasonable to infer that the activity spaces of Boomers stabilised earlier in adulthood than was the case for most of the younger cohort. Consequently, Echoes generally spent longer in young adulthood as independent adults, without children, living in urban areas in rented accommodation. This lack of dependents, high density living, frequency of locational changes and relatively high disposable income has arguably presented more frequent contextual disruption within physical environments conducive to active travel.

#### *7.2.2.3 Mid-adulthood*

The walking and cycling biographies of the Boomers tended to demonstrate more stability in mid-adulthood when changes in family, employment and housing biographies were less frequent. This accords with the findings of Beige and Axhausen (2008) that there was a higher frequency of long term and medium term mobility decisions (residential and occupational location changes and changes in car and public transport pass ownership) between the ages of fifteen and thirty-five, after which there was relative stability. Migration research has shown that the propensity for households to move diminishes with family size. This tendency to 'settle down' is considered to reflect a judgement that the attendant economical and psychological costs of changing

the activity space of family members are too high once family members have become established in the labour market or social networks (Kulu, 2008).

Most of the younger cohort who had started families had made a move to less urban settings. This endorses the assertion of Scheiner (2006) that locational decisions for dense, compact core city structures are essentially tied to earlier periods of adulthood. After having a family, unfavourable accessibility is often compromised in relocation to achieve a preferred family setting in less dense area. The overall nature and impact of these moves is difficult to judge; some relocated to small commuter settlements and others to suburban centres. Often these were reported as presenting opportunities for local walking and, in some cases, cycling, but generally meant longer journeys for work or to visit friends that entailed driving. It was recognised by one young male living in the inner city that the dispersal of his friends was a significant factor in his need to retain a car whilst he walked to work.

Some life events in later working life disrupted the locational stability of mid-adulthood and family life and brought new opportunities and constraints for walking and cycling. The two Boomer males, who had long term phases of walking and cycling to work that concluded late in their careers, were demonstrable of both the support that locational stability could give to continuous phases of routine activity and the potential of locational changes in later life to disrupt such phases.

The cessation of a walking phase following relocation to a peripheral new housing development resonates with Giles-Corti *et al.*'s (2013) study of relocators in Australia. In the Australian study decline in utility walking was linked to the relocators experiencing a decline in local destinations. However there were indications of counter effects in recreational walking. The authors warned that, although such developments were planned as mixed use in accordance with planning guidance, there was often a temporal lag between residential units being occupied and non-residential uses arriving



which could undermine the potential of increased proximal destinations to promote active travel.

#### *7.2.2.4 Locational decisions summary*

The structure of daily activity in time and space is remodelled over the life course through long term locational decisions as well as medium and short term decisions around the scheduling of activities (Salomon and Ben-Akiva, 1983). The biographies suggest that locational changes in residence and employment are prominent in changing opportunities and constraints for walking and cycling. Particular types of move had predictable implications for walking and cycling trajectories including urbanising moves in early adulthood associated with higher education, suburbanising moves to achieve preferred family settings and downsizing moves after children leave home. In the younger cohort, it was apparent that higher education often brought young adults to urban areas and graduate careers kept them there. This enabled some to re-establish active travel as modes of travel whilst such developments tended to be absent in non-graduate biographies. A general pattern, demonstrated by the older cohort, was for some locational stability once careers and family structures were established. Downsizing moves later in life showed the potential to disrupt established behaviours.

### 7.2.3 Inter-personal roles and relations

#### *7.2.3.1 Parenthood*

Becoming a parent is generally considered to involve a fundamental reorganisation of maintenance and leisure activities. Lanzendorf (2010) found increased and decreased car use, as well as continuations of infrequent car use, were all typical patterns of change in travel behaviour in the biographies of new parents. Schäfer *et al.* (2012) found a general reduction in long distance mobility of new mothers, accompanied by decreased car use and increased public transport use.

This study found similarly that the impact of having children on travel behaviour was variable and complex, with certain gender and cohort dimensions. Family career breaks amongst older women, and maternity leave amongst younger women, were identified as periods of increased walking in the locality. Fatherhood was not attributed to any acute changes in walking or cycling for males in either cohort. However, in some cases, periods of active commuting were presented in terms of making the car accessible to a partner caring for children. Recreational walking with their family often emerged as an important and, in some cases, the only source of walking in middle adulthood in the biographies of older men.

The longer term effect of motherhood on trajectories was influenced by subsequent employment choices. Mothers in the younger cohort, who returned to fulltime work, reported a decline in walking, while those who went part time often identified that their walking was greater on days off. Women in the older cohort had tended to work part time after their children went to school, often working locally in jobs that fitted around school hours which had facilitated the continuation of walking for journeys with their children.

Bonham and Wilson (2012) attributed the disappearance of cycling in women's biographies around motherhood to the impracticality of cycling for their complex travel needs and notions of 'good-mothering', defined by Dowling (2001) as the socially-constituted compulsion to maximise opportunities and minimise risks for children. This positioned carrying a child on a bicycle as irresponsible parenting. The rise of social scrutiny of parenting was raised in the discussion with policymakers as a social change that had been detrimental to children's independent mobility and posed an impediment to getting family groups to walk and cycle.

The longer term impacts of parenthood have not been addressed within the mobility biography framework. The geographies of care literature offers some interesting insights with which to contextualise these findings. Barker (2011) emphasises that

mobility is an important, but under-researched, aspect of care. The term carescape is used to denote the spatial and temporal configuration over which caring practices take place. Barker (2011) highlighted the trend towards the escorted travel of children as an example of a shift in caring practices and carescapes that had produced new spaces of care and dependency. For Barker (2011) and Descartes *et al.*, (2007) children's mobility can be shaped by local cultures of parenting, which transmit expectations regarding the labour market participation of mothers, and good parenting, including the chauffeuring of children by car and values regarding (in)dependence, safety and danger. It was evident from the biographies that whilst, in the younger cohort, primary responsibility for general care and mobility of children remained with mothers, some fathers were taking a bigger role in child care through the flexibilisation of work. Together this suggests that the trajectories of parents and children have become increasingly inter-dependent.

Family cycle rides, often along traffic-free routes, were a common feature of Echoes' trajectories. Often these were one-off experiences, and more often had taken place just with their father. In contrast only one Boomer recalled cycling on occasions with his parents but having a parent who cycled to work for this cohort was common.

Amongst mothers in the younger cohort, motherhood was often reported to have brought an end to a phase of infrequent recreational cycling in their twenties.

In some cases relationship dissolution had an impact on travel behaviour of children and adults; this was either through the trigger of a residential relocation or change of mobility resources. In the instances of parental separation in this study, this had made a positive impact on walking and/or cycling of children.

#### *7.2.3.2 Grandparenthood*

The biographies illustrate that the influence of intergenerational relationships on opportunities and constraints for walking and cycling were not restricted to periods

when there was a child that was dependent on a parent. Care is transferred in families from both older to younger generations and in the other direction. However there has been little research attention afforded to the implications of inter-generational relationships on mobility beyond the parent–dependent child relationship. The opportunity structure for walking and cycling can be shaped by both how inter-generational time is spent together, and how travel to deliver care and support is undertaken. However, the literature offers limited characterisation of the spatio-temporalities of these relationships.

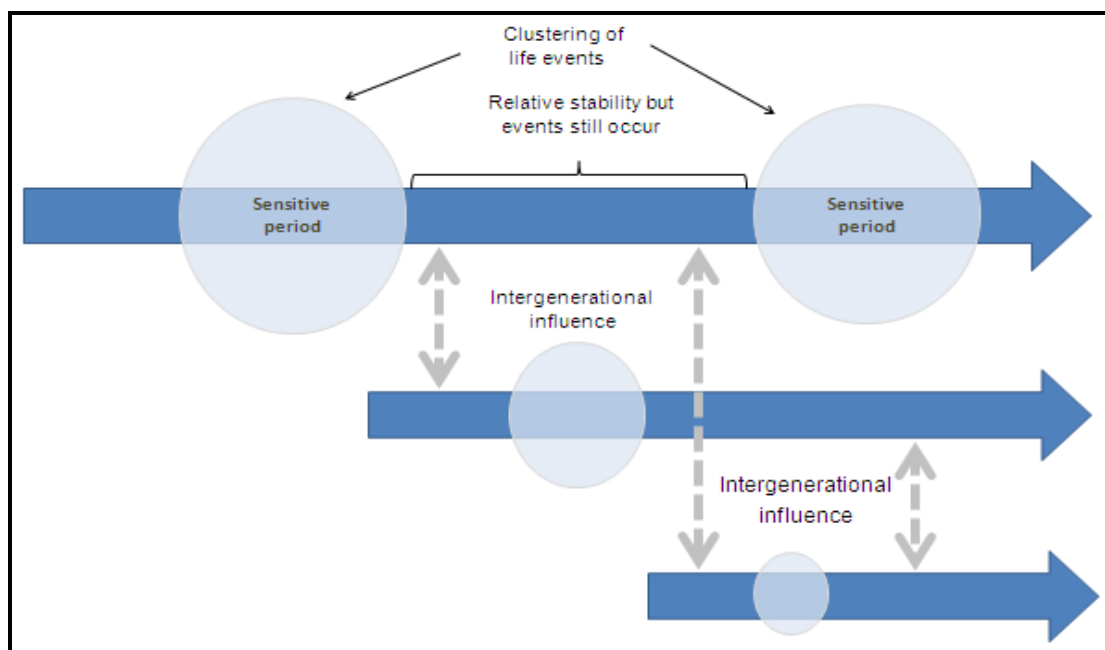
A recognised change over time in caring practice has been the increasing contribution of grandparents in child care, linked to the increasing participation of women in the labour market. A national study of grand-parenting found one in four families rely on childcare from a grandparent (Speight *et al.*, 2009) and 69% of children in the UK have a grandparent living in the same town or within ten miles of them (Griggs *et al* 2010). Tarrant's (2013) study of the spatio-temporality of contemporary grandfathering found that care of grandchildren could be an important legitimisation of older men's use of various public and social spaces.

In the present study, time spent with their grandchildren was often a source of walking for Boomers. Pooley *et al.* (2005) argued that the dispersal of family generations has been detrimental for children's mobility. In accord with this, the present study suggests that spatial distribution of family generations is a factor in whether intergenerational relations provide an opportunity or constraint for active travel and recreation. The relocation of grandparents to live near their children and grandchildren, in some cases long distance relocation, made it possible for inter-generational visits to be undertaken by active travel. Local grandparents were an additional adult to escort children which could enable active travel whilst grandparents' homes were also a proximate destination for children's' independent mobility.

### 7.2.3.3 Elder care

As noted intra-familial care and support also goes in the opposite direction in the form of care provided to older generations. Supporting older relatives over long distances could impose constraints for active travel through the restriction of time for other activities and travel. At some points a middle generation could be simultaneously providing care and support in two directions with an associated displacement of walking and increased reliance on driving. There were also examples of trips to support older generations being made by active modes.

Figure 27 presents an extension of the framework that depicts intergenerational influence of walking and cycling trajectories as a particular form of the influence of inter-personal relations.



**Figure 27 Framework extension to depict potential inter-generational influence**

The hashed lines indicate the two-way influence of trajectories between familial generations. The study found that changes in location, interpersonal roles and relationships, mobility resources and health in familial linked life courses could influence trajectories. A common parental life event impacting on children's trajectories was a mother's return to employment whilst children were at primary school. Whilst in

the other direction children's educational transitions could trigger changes in the parent's travel behaviour. Further down the family life cycle, becoming a grandparent brought opportunities for recreational walking amongst Boomers. The potential for care relations to be the conduit for intergenerational influence of walking and cycling suggests that influence of a linked life course is more likely in periods when there is exchange of care between generations.

The dyads revealed some observations about general similarities in trajectories between parents and children and their perceptions of whether their trajectory was influenced by a particular family member. There were a few dyads where aspects of the cycling trajectory of the children resonated in types and patterns of cycling with that of their parents. There were, however, other dyads where there were no obvious similarities. These examples do not confirm a role of parents as socializing agents of cycling; however they offer an anecdotal indication that cycling parents can be a positive, but not necessary, influence for later adult cycling. There were also biographies where Boomers recognised their children's cycling as a precipitating factor in their returns to cycling in later life.

#### *7.2.3.4 Inter-personal relations summary*

Inter-personal relations develop over the life course as individuals move through different roles in family and occupational life domains. Events in linked life courses have the potential to disrupt established behaviours and precipitate a change in the trajectory. Care relations between generations can have implications for the opportunity structure for walking and cycling. Sometimes these afford opportunities for walking and cycling, whilst, in situations where an individual has multiple care responsibilities, the result can be that active travel is displaced. The spatial dispersal of family generations is a key factor in determining whether such relations afford opportunities or constraints. Inter-generational relations may also constitute a conduit for social influence of behaviour.

#### 7.2.4 Health

Changes in health and functional status were implicated in walking and cycling trajectories. The biographies included instances of injuries, not sustained through walking or cycling activity, that both hindered or prompted activity. In the short term, injuries had been cause to limit or cease activity, whilst there were other examples where walking or cycling were involved in rehabilitation or management of long term conditions.

The biographies suggest health was relevant to trajectories in both a reactive and preventative sense. Negative changes tended to involve reactive change, for instance the cessation of cycling following a back injury, whilst positive changes tended to involve preventative changes, for instance some returns to walking and cycling later in adulthood were attributed to managing stress, weight, rehabilitation and the ageing process. Bonham and Wilson (2011) noted the tendency of younger women to emphasise improving fitness as motivation to return to cycling, whilst older returners added to this the managing of illnesses and degenerative conditions. Whilst the present study did not elicit explicit motivations, mental wellbeing did emerge as a motivation for re-establishing or maintaining walking or cycling for participants of both genders, in both cohorts.

The health events and functional status of a family member were also reported as constraining opportunities to walk and cycle. One older participant described the significant impression her partner's heart attack and subsequent rehabilitation had made on her walking in recent years. Others identified their partners' osteoarthritis or general level of health and fitness as limiting factors for their walking activity and barriers to cycling. In the younger cohort, a child's dyspraxia was considered to have precluded the parent's cycling in adulthood. It has been proposed that for some people, health events act as 'cues to action' to improve lifestyle health behaviours. Humpel *et al.* (2007) found that a third of people who had been diagnosed with cancer, and a

quarter who had a friend or family member with a diagnosis, reported increasing their level of physical activity, specifically walking, post-diagnosis.

#### 7.2.5 Summary: Macro and micro-contextual changes

The preceding subsections have discussed the framework components that represent the contextual factors identified as shaping the proximal settings and distal conditions in which trajectories unfold. Changes in location, mobility resources, interpersonal relations and health events were life course influences through which the opportunity structure for walking and cycling altered. The two cohorts encountered different macro-contextual conditions through which their opportunity structures for walking and cycling unfolded. Economic development, spatial and transportation planning, cultural norms and values towards health, environment and risk and family structures were dimensions of macro-contextual change that were identified as underpinning cohort differences in trajectories. The effect of these macro-contextual changes on trajectories was mediated, in part, through shifts in the timing and structure of the life course. For instance, the Boomer cohort experienced more defined transitions from education to employment compared with the Echo cohort, who had longer, more individualised routes into a more competitive, flexible labour market. The Echoes experiences in early adulthood were, broadly speaking, shaped by involvement in higher education, which channelled and kept individuals in urban areas for longer, which enabled some to integrate walking and cycling as a mode of urban mobility.

The chapter now moves on from the role of micro and macro contextual factors, to address the temporality of trajectories. The section begins with examination of the typologies which were constructed through consideration of inter-individual similarities and differences in trajectories. This is followed by an introduction of the concept of sensitive periods as a developmental feature of trajectories. Section 7.2 is then brought to a close with discussion of generic perspectives of human development and



associated mechanisms of change which, in future work, could be integrated into the framework, to build explanations of how earlier experiences shape the behavioural trajectory.

### 7.2.6 Walking typology

The present study found trajectories of routine walking over the life course to fall within a spectrum depicted as diminished-restorative-resilient.

In diminished trajectories, becoming a main driver of a car was a prominent factor in the displacement of walking, the impact of which tended to be enduring. Older males and younger females had, in a fairly uniform way, shifted to driving at the start of their careers, whereas older females and younger males were more variable in their shift to motorised mobility.

Walking had made a more sustained contribution to the trajectories of those who did not drive, or had limited access to a car. These trajectories were characterised as resilient. In some cases, locational stability was a notable factor in extended periods of walking, suggesting that stable activity space is conducive to establishing and maintaining walking as part of the daily routine. However, at the same time, there were examples of where locational stability was concurrent with long periods of little or no walking for transport. Together this supports the hypothesis that stable locational circumstances can allow behavioural patterns to become entrenched.

Restorative changes occurred with locational changes, changes in mobility resources (driving ban, bus pass, bike theft), changes in employment status (e.g. maternity leave, retirement) changes in external environment (e.g. workplace parking restrictions) and role changes (e.g. becoming a carer). In the younger cohort, phases of higher utility walking accompanied going to university and post-university high density living. For women in both cohorts, suspending employment to have children imposed an upward

inflection on the walking trajectory. Finally, retirement was commonly reported or anticipated as an opportunity to make more trips on foot.

Specific literature searches found no examples of other typologies of trajectories of walking, leading to the conclusion that this is an unparalleled contribution to the literature.

### 7.2.7 Cycling typology

Bonham and Wilson (2012) noted the 'mutability and myriad new paths' that unfolded in the women's returns to cycling. The pathways were characterised, for their intermittency, as start-stop-start cycling histories. Three broad patterns of cycling through the life course were identified within this group; these were women who had returned after a long break since cycling as a teenager, women who had a bike available to them for most of their life time but only rode occasionally, and, finally, women who had episodes of several years cycling which were then followed by long periods of not cycling. Sherwin *et al.* (2012) similarly emphasised the 'varied biographies and fluidity of cycling over the life course' in their study of people who had changed cycling behaviour during a period of significant cycling investment in their local area. More broadly, inter-individual variation has been a common emphasis of the studies that have looked at other aspects of mobility over the life course (Pooley *et al.*, 2005; Lanzendorf, 2012; Schäfer, 2012).

The present study did not recruit participants on the basis of current cycling status, or a previous behaviour change, so the collection of biographies was broader in its range of cycling experience. The longer term dynamics of cycling trajectories were broadly characterised as arrested, resilient and restorative. Arrested trajectories denoted cycling experiences that were limited to childhood; this was a group whose early cycling had been limited, usually restricted to play rather than utility, and most had referred to limited access to a bike.

Resilient trajectories denoted engagement with cycling that had endured for the most part of the life course. The most resilient trajectory belonged to a Boomer male who cycled for much of his career then made an adaptive change to leisure cycling following an injury and subsequent location change. A couple of Echo males had largely unbroken phases of using a bike as a primary mode of transport and for recreation from childhood into early adulthood, thus these trajectories were, so far, displaying resilience.

Restorative trajectories encompassed a range of previous and current cycling practice. Some had multiple phases of cycling. There were some attempted but failed returns to cycling in later life and some intended returns that had progressed as far as the purchase of a bicycle. These later life intended or failed returns all followed phases of cycling earlier in adulthood. The trajectory of one Boomer who had been cycling for leisure since his forties, having previously cycled in his childhood and adolescence, was classed as a restorative but one that was proving to be durable. Within this typology the reoccurring trajectories examined by Bonham and Wilson (2012) and Chatterjee *et al.* (2013) would be considered as restorative in type.

For Bonham and Wilson (2012) the cycling histories of women returners were a challenge to a broader notion in transport research of mobility over the life course as a linear process. This notion, that presumes a one-way transition from walking and being chauffeured as a child to using public transport and then driving, equates gaining independent automobility with maturity. Whether the present study can lend support to Bonham and Wilson's challenge is debatable. On the one hand it is demonstrated in a broader selection of life histories, the potential fluidity of engagement with cycling over life course, in particular illustrating the potential for adaptive and restorative changes after the constraints of employment and family roles diminish. It also illustrates that established active travel remained susceptible to disruption by events in later life. On the other hand, given the consistency with which the biographies demonstrate the

enduring displacement of walking and cycling as means of mobility by driving, it could also be taken that, as a collection, the biographies do more to support than challenge the view of life course mobility as linear.

#### 7.2.8 Sensitive periods in trajectory development

Emerging adulthood and, more tentatively, the later working life-retirement transition are proposed as sensitive periods in the development of walking and cycling trajectories. The concept is imported from models of health and disease development, where these constitute periods of rapid developmental change, when the individual is particularly responsive or sensitive to environmental conditions (Haflon and Hochstein, 2000).

Beige and Axhausen (2008) studying the dynamics of mobility decisions highlighted the greater propensity for personal and familial events between the age of fifteen and thirty-five beyond which, the reduced frequency of residential relocations, occupational changes and changes in mobility tool ownership brought greater stability to travel behaviour. The biographies in this study suggest a similar temporality is characteristic of walking and cycling trajectories. Participants generally experienced a higher frequency of micro-contextual changes in emerging adulthood involving locational decisions and changing activity patterns, interpersonal networks and mobility resources, which was then succeeded by periods of greater stability. Whilst the trajectory did not always depict multiple, corresponding changes, this consistently appeared, in the context of the life course, as a period that was succeeded and preceded by relative stability in behaviour that was foundational for the trajectory in adulthood. Within life course sociology, the transition from youth to independent adulthood is considered a developmentally-dense period involving multiple and inter-related social role changes, including completion of full-time education, entry to the labour market, independent living arrangements and steps towards family formation

(Shanahan, 2000). A difference between the cohorts was that these markers of independent adulthood took place over a longer period in the younger cohort.

The later working life-retirement transition denotes a period when some participants experienced locational, employment, family and health changes, some of which were implicated in trajectory developments. A subsequent period of stability might be expected to arise with the stabilisation of activity space in retirement. For women who reported trajectory developments later in their career these were mostly positive inflections, with the re-introduction of active travel into their travel to work. In contrast, trajectory developments for men in this stage tended to be negative inflections, where active travel diminished in the course of locational change. Health events incurred positive and negative inflections and related to the individual or partners but there was no apparent gender dimension to this. The characterisation of this phase as a sensitive period is more speculative, on the basis that only a few Boomers were fully retired and therefore the differentiation of a subsequent stage was not yet evident. Unlike emerging adulthood, where the start of the period can be pinned down to the end of compulsory education, people's transition out of the labour market can be more difficult to define.

A recurrent theme through analysis was the extent to which gender influenced the opportunities and constraints for walking and cycling across the life course. Successful returns to cycling and reintroduction of walking in later life were all accomplished by women. Further all three of the Boomer women who cycled in early adulthood made a subsequent attempt to cycle again in later life. This was found to resonate with the work of Beige and Axhausen (2008) who found that men experienced fewer mobility decisions (residential or employment changes and changes in car and public transport pass ownership) from which it was inferred that males became more fixed in their mobility. Although Beige and Axhausen did not consider walking and cycling directly, this does reveal a gender dimension to the dynamics of locational changes and mobility

tool ownership, factors which have been shown, in the present study, to have a bearing on trajectories. This is taken to support the claim that women in the older cohort were better positioned by life course experiences to restore active travel in later life. Later acquisition of automobility and employment choices to accommodate care of children brought disruption to trajectories and inscribed locational decisions that generated opportunities for reintroducing active travel in later life. Similar facilitating decisions did not occur to the same extent in the life histories of their male contemporaries. Instead, they were usually in employment continuously and there was apparently less attempt to make employment fit with care roles. Also the fact that all of these women worked in the public sector could be tentatively interpreted as an indication that public sector employers are having some success in changing the way their employees travel to work.

#### 7.2.9 Long term processes and mechanisms of change

Together the biographies offer some indication that prior cycling experiences did have a cumulative and long term influence on the trajectory; cycling in adolescence and early adulthood in particular seem relevant to later outcomes. This sort of influence was perhaps more readily apparent in cycling trajectories due to their episodic quality. It was less apparent that the early walking experiences of those who went on to have sustained periods of routine walking in adulthood differed from those who went on to have less.

Cycling in early adulthood consistently followed cycling experience in adolescence. Adolescent experiences were generally longer in duration and more extensive for those who cycled in early adulthood than those who did not. Likewise, there was a period of at least a year of regular cycling as a means of mobility in early adulthood in the trajectories of those who attempted and succeeded in returning to cycling later in life. Those who attempted to take up cycling in later life without such prior experiences

were generally unsuccessful. There is not sufficient evidence here to support the claim that cycling in early adulthood is a necessary precursor to a later return, or makes it more likely that one will occur. However, there is a strong suggestion that cycling in later adulthood is more likely to be contemplated, and more likely to succeed, with individuals who cycled as young adults.

Despite the fact that this is not an unequivocal demonstration of the long term cumulative influence within trajectories, some consideration is now given to potential mechanisms of change and how the framework could be developed to reflect such a mechanism.

In this study, the life course perspective operated as a high level theoretical framework. Elsewhere, the life course perspective has been used to integrate different theoretical perspectives on human development in theorisation of a particular aspect of development. Three theoretical perspectives on human development and associated mechanisms of change present within life course research are known as normative, stress adaptation and human capital accumulation perspectives.

Firstly these are outlined, drawing on an overview of the life course perspective for research on consumer behaviour (Moschis, 2007; Bailey *et al.*, 2010).

- i) Within the normative perspective, the timing and sequencing of role transitions in the life course are considered to be subject to social norms, where deviations from the prescribed pattern incur sanctions for the individual. Individuals adapt their behaviour to the new role, acquiring compatible skills and attitudes through the process of socialisation. Outside the life course perspective, socialisation has been proposed as a process in the development of travel behaviour (Baslington, 2008) and the influence of parents on children's sports participation (Dollman, 2010). Empirical validation for travel behaviour is limited to identifying a role of parents and peers as socialising agents in the transmittance of car use

habits and norms in young adults (Haustein, 2009). Dollman (2010) proposed socialisation as a mechanism through which parents' orientation to sport translated into their children's participation.

- ii) The stress perspective considers short-term and long-term changes as outcomes of the individual's response to stress. Life course events – positive, negative, or neutral – disrupt homeostasis by presenting environmental, social or internal demands that require adjustment of usual behavioural patterns. Stressors can be acute (the result of objective, discrete events of relatively short duration) or chronic (subjective and persistent, potentially due to the enactment of social roles).
- iii) The human capital perspective considers development as a process concerned with the accumulation of resources, competencies and knowledge (forms of human capital). Capital accumulation begins with intergenerational cultivation and ultimately leads to an education, income and occupational status that establish social status, and permits styles of consumption including travel behaviour. Capital accumulation is influenced by macro-level factors (culture, economics) as well as proximal micro-level settings (family, community). Life course events and role transitions can be considered as sources of intellectual growth, that can bring about changes in patterns of thought and behaviour through the further accumulation of and deployment of human capital.

Moschis (2007) noted that these perspectives were considered to be complementary, and not conflicting or mutually exclusive. The framework does not advance any of these as a mechanism operating singularly within trajectories and neither is any confirmed or discounted.

The biographies include episodes which could be interpreted as both positive and negative effects of socialisation. Examples that could be interpreted as effects of socialisation were the many participants who identified being encouraged to walk to



secondary school as an opportunity to spend time with their peers; a professional dancer who identified her initiation of cycling as a main mode of transport as linked to the fact that it was a common practice amongst her fellow dancers; and an electrician who said he switched from cycling to using the bus, as that was what he saw other apprentices doing. More broadly, the shift to automobility and displacement of walking and cycling could be interpreted as an individual being socialised into the role of independent adult in a society where car use is normative. There is scope to integrate the mechanism of socialisation with the life course principle of linked, interdependent lives, and develop hypotheses around whether inter-generational influence is mediated partly or wholly by processes of socialisation.

Similarly, the biographies comprise episodes of trajectory development which could be interpreted as adjustment of behavioural patterns in response to stress. The woman whose twelve year period of a one hour commute by car ended after a residential and occupational relocation, to begin cycling to work, could be interpreted as an adaptive response to a chronic perceived stress. Her account framed this change as a result of her dissatisfaction with her commute and its impracticality for her children's evolving schedules. Similarly the temporary initiation of walking and cycling to work during a driving licence suspension could be framed as an adaption to an acute stressor. Stress adaptation is coherent with the principle of the individual constructing their trajectory within the opportunities and constraints of their individual circumstances, which are structured at a macro level by their location in historical time and place.

Lastly the observed longitudinal influence of cycling in adolescence and early adulthood could be theorised within the human capital accumulation perspective. This researcher finds Schwanen *et al.*'s (2012) alternative construct of travel habits as latent generative tendencies of embodied intelligence to be compatible with this perspective. Dutch society was given as an example of a cycling culture where, through positive reinforcement in early stages of the life-course, individuals develop the embodied

intelligence to negotiate complex traffic situations on a bike, and the disposition towards cycling which guides them, non-deterministically, to “choose” cycling for certain trips (Schwanen *et al.*, 2012). Positive reinforcement was considered to be delivered formally, through cycle training and informally, through the visibility of other children cycling to school.

The concept of embodied intelligence is found to be useful for the interpretation of the cycling trajectories of this study. It is proposed that earlier episodes of cycling in adolescence and early adulthood were generative of and influential on later attempted returns. It is proposed that, during these earlier episodes, some individuals developed sufficient embodied intelligence and disposition towards cycling to make successful restorative changes in later life. It is expected that the influence of these episodes was sequential and cumulative so that adolescent cycling was both generative of and influential on the success of early adulthood episodes, and, in turn, episodes in early adulthood were both generative of and influential on later episodes. Most individuals who cycled in early adulthood had a later experience. Unsuccessful attempts could be read as an indication that the individual was not equipped with sufficient embodied intelligence - competence and confidence - or an adequate disposition by previous experiences to make a successful return in the individual circumstances of later life. Indeed, most participants identified lack of confidence for cycling in traffic as the principle factor in their failure to re-establish cycling.

The relevance of embodied intelligence to explain walking habits has been explored in respect to everyday urban mobility (Middleton, 2011), but not for its shaping of walking over the life course. Schwanen *et al.* (2012) anticipated the embodied intelligence for walking would be different from that for cycling, but also speculated the existence of spill over effects from cycling experience to walking habits.

### **7.3 Implications for policy and practice**

This section considers the implications of this framework for promoting walking and cycling. It is acknowledged that promoting walking and cycling in pursuit of improving health and environmental objectives is not a value-free endeavour. However, as was detailed in sections 1.2 and 1.3, policy goals to support people to walk and cycle and be active throughout life reflect a general consensus within society that improving health and preserving the environment are appropriate goals. It is therefore reasonable to consider the implications of the research findings for these policy goals, without compromising the neutrality of the research.

One recommendation from this research is that policy objectives relating to the promotion of physical activity and active travel should conceptualise behaviour as the latest manifestations of behavioural trajectories. This extends to the way that population levels of walking and cycling are monitored. Equating the prominence of cycling to the mode share or participation rates that register in cross-sectional population surveys perpetuates the impression that cycling is pursued by the minority. Arguably, a more accurate reflection of the cycling population is the larger collection of those who are cycling at that point in time, together with those who have moved in and out of cycling over their life course. This view is in agreement with the representation of others (Sherwin *et al*, 2012; Bonham and Wilson 2012) and would seem to have greater congruence with a life course perspective. With such a view the objective is then to extend the periods over the life course during which these behaviours are practiced, through measures that support people to initiate, adapt, maintain and restore activity.

A general approach to respond to the findings of this study is to foster the development of competencies and disposition towards multi-modal styles of mobility across the life course, and recognise that earlier phases of walking and cycling, even when brief, can be beneficial to the long term trajectory. The study has revealed various time-related

aspects to walking and cycling trajectories; sensitive periods, macro-contextual change, intergenerational influence and, in the case of cycling, long term intra-individual influence that, together, provide a platform to build an approach to the promotion of life-long walking and cycling.

One element of such an approach could address the sensitive periods in trajectory development when behaviour appears to be more prone to change, due to the clustering of life events, and there is the potential to institute behavioural patterns that endure through subsequent periods of greater stability. These sensitive periods are now considered in turn.

### 7.3.1 Transition to adulthood

Wider participation in higher education and the subsequent channelling of young people to higher density, inner urban settings for study and post-university life presents opportunities to develop the competencies and positive disposition towards multi-modal behaviour. Measures that would support this include the provision of convenient, secure bike storage with multiple occupancy rental accommodation, extension of concessionary fare schemes to young adults and increased car club provision in areas populated with high proportions of young adult renters. Measures that would support multi-modal travel, particularly around entry to labour market and changes in employment location, include prohibiting the inclusion of mandatory car access in job specifications, employer provision of pool mobility resources for work travel and extension of tax-efficient bike purchase schemes to new starters.

The potential for opportunities for active commuting to contribute to socio-economic inequalities needs to be a consideration in the promotion of active travel through employment settings. Higher skilled employment has become concentrated in more accessible locations whilst lower skilled employment has been dispersed to more peripheral, less accessible locations, such as fringe office and retail parks (Clayton,

2011). This positions individuals on graduate career trajectories in settings that can facilitate engagement with active commuting. In addition to exacerbating the socio-economic differences in levels of physical activity (NHS Information Centre, 2009), the spatial marginalisation of lower and unskilled employment means individuals in such employment are further disadvantaged with respect to opportunities to reduce travel costs by choosing alternatives to the car. It is imperative that such effects be countered through the integration of new development with transport infrastructure that offers active commuting alternatives to the car.

Some local authorities offer 'Wheels to work' schemes to overcome transport-related exclusion to work, training or further education. These schemes vary but are mostly targeted at young adults, offering low cost loans to purchase or hire motorised scooters. Some schemes offer pedal and power-assisted electric bikes. As an even lower cost transport option that would engage young adults on a trajectory of active commuting as they enter employment, it is recommended that these schemes place greater emphasis on the pedal and electric bikes option.

The continuation of measures to support development and operation of work place travel plans is endorsed on the strength of substantive examples from the biographies of employer parking restrictions and tax-efficient bike purchase making a positive impact on individual trajectories, even where commuting patterns were long established.

### 7.3.2 Later working life- retirement transition

The biographies reflect what is well-established in research on older people, and in the study of their mobility specifically (Shergold *et al.*, 2012), which is that the older population is heterogeneous in their abilities and aspirations for active living. Whilst some adults are approaching later life adapting to declining physical abilities, many still have the capacity and inclination to be active. Walking was frequently cited by the older

participants as an activity they valued and wanted to integrate into their post-working lives. For a smaller group, cycling was something they intended to continue or commence at this stage. Some limited their aspirations for cycling with the qualification that they would not feel comfortable cycling from their front doors, and instead felt they would need to travel somewhere that was traffic-free to cycle. This highlights a need to ensure connectivity of residential areas to cycle routes, in particular with infrastructure that is usable by persons who may be less confident cycling in traffic and less physically fit.

Driving cessation in older age has been shown to be associated with decline in quality of life through loss of independence and social participation. However quality of life scores were diminished less in individuals who anticipated and prepared for driving cessation (Musselwhite and Shergold, 2012). Preparations included mastering new modes of transport and establishing new destinations. It was posited that women had less detrimental experiences of losing independent automobility because they had a more functional relationship with their cars whereas, for men, cars more closely signified identity and status. Musselwhite and Shergold (2012) proposed that normalising a process whereby older adults were prompted to contemplate driving cessation and develop mobility contingencies and competencies for multi-modal behaviour could ease this transition, with the result of higher levels of life satisfaction through reduced isolation and dependency.

The biographies demonstrated the lifelong potential for trajectories to develop, by revealing some of the diminishing or arresting, adaptive and restorative changes that occurred in later life. This is taken to support the notion of developing interventions to promote walking and cycling in later life, more specifically interventions that support adaptive as well as restorative changes. “Stroll back the years”, “Pedal back the years” and “Silver Cyclists” are programmes targeted at older people that support individuals to re-engage in walking and cycling through led-rides and led-walks that have a

recreational focus (NHS Cornwall, 2013). A meta-analysis found group walking programmes to be efficacious amongst older adults (Kassavou *et al.*, 2013)

As demonstrated in two biographies, power-assisted electric bikes could enable older people to either maintain or re-engage with cycling. Electric bikes could be an enabling factor in restorative or adaptive changes where otherwise health problems or physical fitness might be a barrier. They could also facilitate cycling with others, where a differential in fitness could be an issue. However the relative cost and unfamiliarity of electric bikes could be a barrier to diffusion of this technology. Electric bikes, provided in workplace mobility pool resources, could be a route through which people gain experience of electric bikes.

The biographies' depiction of trajectory developments within the context of the life course could be useful in the development of interventions. For instance, downsizing moves were found to be consequential in two resilient trajectories, resulting in diminishing changes. The downsizing move presents a life event that could be targeted in later life with the aim of preventing diminishing trajectory developments and enabling adaptive and restorative developments. Individuals in mid-adulthood who might be contemplating a future move to downsize their accommodation could be targeted with information that encourages them to consider travel needs and accessibility in their decision on their future location. Such information could emphasise considering how they would travel if they lost the ability to drive and how being more multi-modal could maintain independence and ease the transition to a post-driving phase, the possibility of active travel with increased discretionary time post retirement, the physical and social benefits of active travel for an ageing body and the savings of reduced car use. Shergold and Parkhurst (2010) endorsed pre-retirement Personalised Travel Planning as a way to improve the accessibility profiles of future older people.

More generally these biographies demonstrate that it is important that older citizens are constructed as individuals with the capacity and inclination to walk and cycle rather

than as an individual who would naturally prefer to travel passively, as urban and transport planning seeks to respond to the challenges of an ageing population.

### 7.3.3 Restorative change and embodied intelligence

The findings of this study are considered to advance the proposition that cumulative past experiences influence an individual's readiness to make restorative changes later in their trajectory. Endorsing Schwanen *et al.* (2012), this potential for walking or cycling is proposed to be possessed as embodied intelligence. The biographies have illustrated gender and cohort differences in the opportunity structure for walking and cycling through the life course. By extension, this reveals differentiation in these groups in their readiness to make restorative change. Taking account of this differentiation could make interventions more effective. For instance, for many older males who had early shifts to automobility that were followed by stable patterns of commuting by car, the transition to retirement represents an important disruption to previously stable mobility behaviour. However their lack of opportunity to accumulate embodied intelligence would suggest that they may need specific and extra support to incorporate walking and cycling within their mobility patterns. As suggested by Barnett *et al* (2012), interventions to get older males to increase physical activity may have more success if they emphasise the personal challenge of a lifestyle change. In contrast through later car ownership and multi-modal styles of mobility in early adulthood, followed by employment changes and choices linked to care of children, their female peers developed greater embodied intelligence for walking and, in some cases, cycling which, once responsibility for the travel of children had passed, better positioned these women to make restorative changes.

In a similar vein some Echo males had important mastery experiences of cycling in adolescence which enabled some to re-establish cycling as a mode of transport in early adulthood. Comparatively, Echo females were disadvantaged by the spatial and



functional limitations of earlier cycling experiences and subsequently those who had reinitiated cycling in early adulthood this was largely confined to occasional leisure cycling. This cohort of women may benefit from tailored cycle training to develop competencies for cycling in traffic.

#### 7.3.4 Macro-contextual changes

The study also suggests a need for transport planning and public health to remain alert to arising trends that may alter the life course opportunity structure for walking and cycling and, subsequently, opportunities to support life-long trajectories. One area identified is the implications for trajectories of the evolution of caring practices within families. For instance, it appears that the trend towards maternity leave, and away from longer career breaks, could mean this stage of life provides lesser benefit to the walking trajectories of younger cohorts of women than it did for women in previous cohorts. It could be that this benefit is in part re-distributed to other family members where responsibility for care and transport of children is shared. However it is also likely that such a shift would generate car-based travel in the course of family members travelling to provide informal care, or transporting children to care facilities.

A general policy and practice response is to address the barriers that constrain active travel in families whilst children are young, both for travel with children and for other journeys where children's schedules have to be considered. One issue is the time pressure of trips that combine commute and escort of children to care facilities. This could be addressed through employment practices and childcare provision as well as more practical interventions to support adults cycling with young children. For instance, schemes loaning equipment for carrying or towing children and training for adults on how to cycle with children. At a broader level, the generally positive impact of families living in spatial proximity to one another supports the case for housing policy which

ensures there are affordable and suitable housing options which enable families to do this.

In research terms this shift highlights a knowledge gap on the impact of evolving care practices on travel behaviour and physical activity. The potential inter-generational aspects of this demonstrate the advantages of a theoretical framework orientated to the interdependency of trajectories.

Increased employment flexibility and reduced job tenure were identified as trends that could further distinguish cohorts in their opportunity structures for walking and cycling. If younger cohorts go on to experience more frequent changes in employment, then this will mean more occasions for potential change in commuting behaviour. On the other hand, if faced with a more competitive, volatile labour market it is possible that individuals will perceive greater necessity for a car. Such a trend could be mitigated by flexible working practices and measures to support alternatives to the car. The full effects of such changes are uncertain and difficult to interpret. However, through attention to such changes, our ability to interpret their impact will improve and enable us to apply more considered approaches to behavioural intervention in future.

The workshop discussed the potential of biographies to contribute to the interpretation of routine travel and physical activity survey data. By revealing cumulative personal histories the biographical approach can contribute to understanding of the behavioural pathways that lead to the outcomes revealed in cross-sectional snapshots of population level travel demand, and, subsequently, to substantiate indications of secular changes in mobility behaviour. For example, recent indications that younger cohorts are diverging from prior cohorts in their graduation to car ownership and automobility could be examined by comparing biographies in successive cohorts. This would offer a more holistic view of the impact of these trends on mobility behaviour. For instance, whether in the absence or delay of a wholesale shift to automobility young

people are lift and car-sharing more, and whether walking and cycling have been increased in the context of more pluralistic styles of mobility.

### 7.3.5 Knowledge translation

There was limited attention afforded in the workshop discussion to behavioural interventions that would be targeted later in the life course. This was taken to highlight the potential for policy and practice to be dominated by interventions targeted at the earlier, maturational stages of life. This was interpreted to reflect the perception that the younger population are less entrenched in their behaviours, will contribute to peak time travel demand for longer and were more accessible than older age groups, for instance through education settings and entry to employment. If it is the case that policy and practice is prone to overlook the potential of older people to restore or maintain active travel, then it is necessary for translation of knowledge from life course studies to emphasise the potential for behaviour change in later life. Further, there is a need to convey the relative importance of later life transitions, such as retirement and downsizing residential relocations, in shaping physical activity behaviours in later life.

### 7.3.6 Section summary

This section has addressed some of the implications of this study for policy and practice. It was advocated that the objective for the promotion of walking and cycling be to support life-long behavioural trajectories. Measures should take account of gender and cohort-specific dimensions to prior experiences and subsequent readiness to make restorative change. More specifically, measures were proposed that would seek to prevent diminishing changes, support adaptation and enable restorative changes through sensitive periods in trajectory development. Also emphasised was the need for policy and practice to consider the inter-dependency of the opportunity structure within inter-generational relations of care. In practice, this might involve addressing barriers for active travel in the exchange of care between generations. Finally, it was

recommended that policy and practice remain alert to the impact of changes in macro-level social and structural conditions on opportunity structures in order to take advantage of, or compensate for, these secular trends.

#### **7.4 Chapter summary**

This chapter has presented an integrative discussion that drew together the findings from the biographies and workshop, and placed them in the context of the current literature. The principal output was an enhanced conceptual framework for the life course development of walking and cycling that represents a synthesis of the research findings. The framework comprised macro and micro contextual influences and sensitive periods which pertain to the temporality of trajectory development. Typologies of trajectories surmised the common and distinct pathways of behavioural dynamics. Three perspectives on human development were presented as candidate theories for integration with the framework to elaborate the longitudinal processes and mechanisms of trajectory development. Potential was found with the construct of embodied intelligence to theorise an apparent latent, generative tendency within restorative cycling trajectories. The chapter closed with a discussion of how the findings and framework could be used in policy and practice.

## **8 REFLECTIONS, FUTURE RESEARCH AND CONCLUDING SUMMARY**

### **8.1 Chapter Introduction**

This chapter begins by offering some reflections on the research process, considering in turn the methodology, analysis, recruitment and workshop. Section 8.3 details a number of directions for future research which can build on this study. The final section draws both the chapter and thesis to a close with a concluding summary of the research.

### **8.2 Reflections on the research process**

The aim of the empirical research was to provide contextualised explanatory insights on intra-individual development, inter-generational influence and inter-cohort similarities and differences. As such, the research design did not permit statistical generalisation of insights from the study participants to a population. Nonetheless, it is contended that these insights are relevant concepts for understanding these behaviours more generally.

#### **8.2.1 Methodology**

The study's commitment to securing a whole life view meant that, in the absence of extant longitudinal data, such data had to be elicited using retrospective methods. Life history qualitative interviews, structured with an LHC and conducted over two stages, were used to reconstruct trajectories.

A qualitative approach reduced the possibility for accounts to be framed by *a priori* assumptions about the relevant factors in behaviour change. This meant trajectory developments were contextualised within the life course, and interpretation of the role of certain factors within trajectory developments originated with the participants'

retrospective reasoning of past behaviour and changes. The result was a rich body of evidence that would have been inaccessible to quantitative methods.

On reflection, the inter-generational dimension of the study generated fewer insights than was anticipated. Nevertheless it is felt that this was still a suitable methodology for looking at the inter-generational dimension and that, in a study focused on this aspect, the method could be optimised to explore inter-generational influence more effectively. Modifications could conduct a combination of separate and then joint dyad interviews with the dyad, in order to construct a dyad biography. This would allow interaction and collective memory to stimulate further recall and contradictions to be resolved collaboratively. Inter-generational dyad interviewing is not an established form of interview in the travel behaviour or physical activity field. However, in research on child development they were found to elicit valuable insights on aspects of the parent-child relationship that may not have emerged in separate interviews (Clendon, 2006).

The two stage design also helped build rapport between researcher and participant and allowed time for reflection. The interval meant processing of the data began after the first interview with the construction of a provisional personal time line by the interviewer. This meant it was possible to gain participant validation of the timeline and have misrepresentations corrected. This helped to bring the researcher's representation closer to the participants' understanding of their past walking and cycling and was undertaken to support the credibility of the eventual biography.

It is considered that this process did enhance the consistency of the biography, and thereby credibility, with the participants' understanding of their trajectory. However, the researcher would qualify this by saying that there were instances where the researcher detected ambiguities with timing or sequencing in the translation of some material from the first interview. The researcher then observed whether the participants picked these up when they reviewed the time line. In some instances they did, and in others they did not without prompting. This suggests variation in the certainty of their account and their

willingness to 'challenge' the verdict of the researcher on their trajectory. In the course of the interviews the researcher tried to encourage and empower the participant in this process by emphasising more strongly the purpose of reviewing the timeline. The researcher also would deliberately place the time line in front of the participant and hand them the pen. This did result in more annotations on the time line however there was not a noticeable increase in the correction of misrepresentations, suggesting that the participants generally found the time lines to be accurate.

It would have been possible to go further in establishing credibility by repeating this process of participant validation with the visual and interpretive biographies. However this was discounted on assessment of what was a reasonable level of participant burden. Further it was recognised that, whilst the interviews are founded on collaboration, there needed to be a point beyond which authorship and analysis of the biographies rested with the researcher. The conclusion of the second interview was considered to be a suitable place for this, given that the purpose of the research was to consider multiple accounts for insight on walking and cycling trajectories, rather than understanding the process of collaborative reconstruction of the biographies.

Time was a fundamental dimension of this research making it requisite to consider the implications of the methodology for its accommodation/representation in this study. A life history methodology has some advantages over a prospective method for revealing the associations between life course events and trajectory developments that are separated in time. For instance, one participant started cycling to work a couple of years after a return to employment following children. The return to cycling was constructed as significantly linked to the return to employment despite the time lag. It is thought such associations might be overlooked with a self-completed event history calendar. Equally, there is the possibility with an unsupported quantitative reconstruction that spurious links are made between trajectory developments and contemporaneous but unconnected events.

The visual dimension proved helpful in capturing and communicating the complexity of the biographies with participants, as well as, later, with research colleagues. For instance, a Boomer's return to cycling in her forties followed over a decade of commuting an hour each way by car. Having found this unsatisfactory, a change in travel to work was accomplished in the course of a job change, residential move and her child starting school. After this she was able to walk her child to school and then continue to work by bike. The LHC also helped reveal contradictions in the account during the interview which could then be resolved at the time.

Recall bias is obviously a significant challenge to retrospective methods. There is a general consensus that the reliability of recall data fundamentally depends on the nature of the phenomena of interest. Experiences that relate to key milestones in the unfolding life course are considered to have a stronger memory trace and thus are recalled more reliably than less significant experiences. Verhoeven *et al.* (2008) concluded self-completion recall data of life events and their key attributes in a retrospective travel survey to be sufficiently reliable. The design of LHC has been informed by understanding of how autobiographical memory is encoded. They enhance recall by enabling the participant to construct their account incrementally (Axim *et al.*, 1999; Belli, 1998) so that key life events and initial recollections of past walking and cycling provided a structure to locate additional information and stimulate further recall. Adjustments in timing and sequencing could be made in the light of later recollections.

Compared with conventional interviewing, where unsupported oral dialogue imposes linearity on the account, the LHC has the advantage of making it easier for participants to jump backwards and forwards in their life history, insert new information, make adjustments in light of other recollections and visualise their life history and trajectory. Whilst it is expected that past walking and cycling and behaviour changes do not in themselves have strong memory traces, it is considered that the approach of eliciting generalised reports of past behaviour and behaviour change in relation to life course



events and specific life course domains, supported by the LHC, produced accounts of reasonable reliability. It was found that through probing past locational settings, activities, schedules, ownership of bicycles etc. it was possible to prompt participants to further retrieval of memories of past activity and behaviour changes. It was also felt that the interview format compelled participants to take more time and reflect more deeply on their recollections than would have occurred with a self-completion approach. Others similarly have found this to be an effective way of increasing recall (Dex, 1991).

This is not, however, to ascribe the accounts with unquestioning credibility. It is expected that this method captures, less dependably, smaller incremental developments in trajectories and /or developments that were un-associated with or proximal to life events. Further, it is recognised that remembering involves a process of reviewing the past, and, therefore, the participants' reconstruction of the past will be influenced by social and psychological processes in the intervening period. There is a natural inclination when presenting a life story to construct a rational, linear and coherent account that culminates in, and accounts for, their current situation. Whilst conducive for analysis, this does incur a loss of information.

The presentation of the trajectory would be different if a series of interviews had taken place throughout the life course, as participants would have been reporting and reasoning past behaviour through a shorter length of intervening time. Similarly, it is to be recognised that the cohorts were differentiated by their position within their own life course and therefore their temporal proximity to earlier stages of life. For instance, the Boomers' frame of reference on their trajectory through emerging adulthood included knowledge of the course of their trajectory beyond this. They were therefore positioned to assess the significance of earlier changes in the context of changes over a longer duration of their life course. The Echoes, being closer to the events, perhaps would have had stronger memory traces of the events, but not the perspective to be able to assess how significant they were in terms of their trajectory beyond this.

The issue of recall bias with retrospective methods means these are imperfect reconstructions of walking and cycling trajectories. However prospective panel data too have limitations as discussed in section 3.5. These include the potential ambiguities that result from multiple frames of reference, as well as panel attrition and high expense and time for dataset accrual, which simply make it an unfeasible method for a whole life view.

In summary then, the life history methodology has its limitations. However, the reliability of the accounts was deemed acceptable. In providing an otherwise inaccessible view on the life course development of walking and cycling, the methodology provided reasoned and contextualised insights that can promote understanding of mobility and physical activity behaviour from medium term time frames to whole life views.

### 8.2.2 Analysis

There are also aspects of the analysis that bear reflection. The analysis framework set out *a priori* the dimensions of analysis based on the research questions (i.e. intra-individual, dyad, cohort); however, the analysis was not a predetermined fixed process. The researcher was faced with a rich, complex and large quantity of data from which to build meaningful interpretation and explanation in response to the research objectives. There were very limited accounts in previous mobility biography studies of using whole-life qualitative accounts that could inform handling and analysis of this data.

A particular challenge was how to resolve the longitudinal course of trajectories and deal with the significant inter-individual variation. Transforming the data into visual and interpretive biographies and focusing on the biographical detail, rather than the narrative aspect of the 'told story', were instrumental decisions in progressing with analysis. The biographies were a more manageable and familiar dataset to work with and facilitated comparisons on a case by case or group basis. The analysis then

proceeded as a flexible, data-led exercise, with subsequent steps being resolved by emerging insights. The grouping process and subsequent generation of the typology contributed to resolving common life course patterns of engagement with walking and cycling.

This study conceptualised trajectories as historically-embedded and therefore aimed to generate insights on the impress of macro-level change on individual trajectories. The study drew on the literature and discussions with knowledgeable experts to generate explanatory insights on the biographies within their historical setting.

Confirmability of data processing was established by comparing three visual biographies, constructed by the researcher, with additional constructions provided by the academic supervisors. As discussed in section 4.5, general agreement was taken as demonstration of that processing was confirmable between researchers. A broader approach to establishing the confirmability of the research was pursued through opening up the process to the scrutiny of other researchers in the course of research supervision meetings, a focussed session that discussed analytical procedures and emergent findings and seminars disseminating progress with the wider research community.

Whilst it is considered that confirmability was to an extent established by these efforts, it is also recognised that the case for confirmability is weakened by having a single researcher conduct the interviews, processing and analysis of the data. The relative unfamiliarity of the supervisors and colleagues with the biographies made it difficult for them to interrogate and contest the researcher's presentation of cases and analysis and find contradictory examples. Closer involvement with the processing and analysis, rather than receiving research reports, would have increased their familiarity with the data and empowered them as scrutinizers of the research. A further improvement would be to conduct data processing and analysis as a wholly collaborative exercise, as was the approach of Devine *et al.* (1998).

### 8.2.3 Recruitment

The composition of the participant group brings a limitation to the study. Individuals self-selected into the study, which may have limited the study group to people who were open to sharing their life histories. It is possible that individuals who have experienced more disruption or negative events in their lives such as relationship breakdown, financial hardship and other distressing circumstances, were less likely to have put themselves forward for this. Education level, occupational class and gender of study participants were monitored as recruitment and interviews progressed with the intention of ensuring a range of life experience was captured. It is felt that the final group, although comprising heterogeneity along these dimensions, was biased towards individuals who have experienced relatively few difficulties and have followed fairly standard life course scripts. For instance, all of the participants in the older cohort have had at least one long term relationship and had children; all but one in the older cohort had at least one child who went to university; none reported previous financial hardship or prolonged unemployment and most of the older cohort had achieved home ownership. All participants had reasonable capacity to understand the project and present their life histories. Another dimension to bias is that the younger cohort probably contained a higher proportion of those who grew up in suburban settings than is reflective of their contemporaries in the UK population as whole.

The bias of the study group is believed to be a reflection of the recruitment strategy. Recruitment involved attending community groups to explain the project and invite volunteers to take part as well as using word of mouth snowballing that was initiated through the researcher's own social contacts. Community groups in more deprived areas were attended and some participants were recruited at these. However, these individuals turned out to be relatively socio-economically advantaged, demonstrating that facilities and groups in deprived areas will be attended by more advantaged

individuals. In summary, although some steps were taken to produce a socio-economically diverse sample, the recruitment strategy fell short in this respect.

With this acknowledged bias it would be unjustified to generalize the findings to groups living with greater socioeconomic disadvantage. Understanding the life course development of walking and cycling amongst lower socio-economic groups is a compelling research aim given the established socio-economic gradients in physical activity, and related health conditions, and is therefore a priority for future research.

Despite the shortcomings of recruitment that emerged, a broadly similar strategy would be pursued if the study was to be extended, since presentation of the project and recruitment criteria in person were found to be important for adequate communication of the project and engagement of participants (in particular the requirements for a parent-child dyad). Instead, more time would be committed to identifying and attending community groups and services that were attended by more disadvantaged groups.

#### 8.2.4 Workshop

It is considered that the workshop did serve the research objective of formulating policy relevant insights on the research; however, the way it did this was slightly different to that anticipated in development of the workshop. More than contributing to the process of identifying policy responses on the key research findings, the overriding revelation was how members of the practice and policy community engaged with the findings of a life course study. From this it was possible to draw implications for the translation of the knowledge for policy and practice.

At the time of the workshop, some of the panel were involved in a bid for funding to deliver local sustainable transport measures in the West of England sub region, funding that was later awarded. One work package in this bid involved the delivery of travel behaviour change interventions targeting individuals at life course transitions. These transitions were primary to secondary school education, training and employment

changes for sixteen to nineteen year olds, students moving to university and households moving to major new residential developments. It was clear that this prospective work was a salient reference in their encounter and discussion of the implications of the life course perspective and findings.

The dialogue that emerged suggested that the panel found it easier to identify opportunities for intervention related to short term episodes of behaviour change and life transitions than to engage with longer term behavioural dynamics and the typologies. This, perhaps, reflected the fact that the potential to change travel behaviour in the course of life transitions is a notion that is circulating and being operationalized within policy and practice. The presence at the time of a local bid, to deliver sustainable travel interventions linked to educational and residential relocations, is indicative of this and could also suggest that the panel might have been ahead of the wider practice and policymaking community in their receptivity to a life course approach.

The workshop suggests that the utility of research that reveals the short term changes in behaviour at life course transitions is more obvious than the applications of understanding of complete walking and cycling life histories. In other words, designing population-based interventions targeted at standard life course transitions is a more straightforward enterprise than responding to a collection of life histories that will individually comprise multiple standard transitions and episodes of behaviour change, and collectively show considerable inter-individual variation in timing, occurrence and sequence of life course developments. Uncovering the longer term processes and mechanisms operating through trajectories will make it easier to translate knowledge of the life course influences of behavioural outcomes into measures for policy and practice.

It was found that viewing and annotating of the exhibited biographies was an effective way of acquainting and engaging the workshop panellists with the biographies. This

suggests that interpretive biographies are a useful tool in communicating life course research to relatively uninitiated audiences. It was felt that the framework achieved face validity with the panel as a conceptualisation of the life course development of walking and cycling, thus suggesting it has currency in practice as well as research.

The task then for knowledge translation is to recognise that policymakers and practitioners will readily engage with the notion of life course transitions and their significance for walking and cycling trajectories. However, there is further work needed to establish the practical applications of a life course perspective on walking and cycling behaviour, i.e. their inter-dependency, historical situation and life-long development.

#### 8.2.5 Section summary

The primary research of this study has established a novel semi-structured interview method to elicit retrospective qualitative accounts of walking and cycling over the life course in its entirety. This was matched for innovation with an analysis strategy that resolved insights on intra-individual development, inter-generational influence and inter-cohort similarities and differences as well as trajectory typologies that, together, make a distinctive and valuable contribution to the literature. The workshop generated insights on the task of translating knowledge from life course research for policy and practice.

### **8.3 Future Research**

As noted in section 8.2, this explorative study has provided valuable depth insights on the life course development of walking and cycling that are relevant for understanding these phenomena in the wider population. However, generalizations to the UK populations would be equivocal, because the participants were not recruited to be representative of a population. Further research could, using a larger scale representative sample, establish whether the typologies and the concept of sensitive periods are applicable for the UK population. With a sufficient sample size, statistical analyses could be pursued to ascertain the prevalence of the trajectory types within the population.

It is believed that a modified interview protocol could be developed to make a larger scale study feasible. Whilst the LHC and the interview format are fundamental components to the data collection this could be reduced to a one stage interview on the basis of the general insights and interviewer experience gained in this study. A follow up phone call could be used for clarification. The initial participant-led narrative of walking and cycling history would be retained but reduced to allow the interviewer, working from the LHC, to focus the interview on to trajectory developments and sensitive periods.

As identified in section 8.2.3 the sample was skewed towards individuals who constructed biographies which reflected relatively conventional and secure life circumstances. It would be important to address this through focused additional work with individuals who have experienced less socio-economic security over their life course. Without this broader view it is unjustified to generalize the findings to groups living with greater socioeconomic disadvantage. This is a compelling direction for inquiry given the established socio-economic gradients in physical activity, and related health conditions.



The findings of this study are limited by the use of a solely qualitative methodology. A significant next step would be to integrate the method and findings with longitudinal, quantitative data. Questions or hypotheses about changes and stability in walking and cycling through life course transitions could be initiated from these findings for the interrogation of panel data or extensive large scale sources. *Understanding Society* is a household, longitudinal study tracking 40,000 households in the UK which is generating time series of data on a range of individual and household characteristics (Institute of Social and Economic Research, 2011). However, as was identified in research design, the panel are not currently asked direct questions on walking and cycling, thereby precluding the examination of interrelations between individual changes in behaviour and life course events. It is strongly recommended that questions on walking and cycling be introduced in *Understanding Society* and other such longitudinal studies.

Another important direction for future research is to expound further the longitudinal processes and mechanisms operating along trajectories. In this study the life course perspective has been used as a high level theoretical framework. This less constrained theoretical approach was a deliberate response to the relatively uncharted territory of walking and cycling conceptualised as behavioural trajectories, and allowed useful concepts to emerge from the data. A recommended option for future research is to integrate with the conceptual framework generic theories of human development, to elaborate the mechanisms and processes of trajectory development. Socialisation, stress and human capital accumulation were identified in 7.3.2 as generic and complementary mechanisms of human development that demonstrated compatibility with the behavioural trajectories. Hypotheses pertaining to these could be generated using the thirty-three biographies from this study and tested using the methodology, applying a deductive logic. The interview protocol could be developed to probe appropriate constructs.

Others have proposed integration of life course perspective with other developmental perspectives to theorise individual travel behaviour over the life course. Goulias (2009) proposed a multi-theoretical framework, unifying the life course perspective with Bronfenbrenner's PPCT model of bioecological model of human development and incorporate a Bourdieusian view on social reproduction. This researcher considers the PPCT model to offer an intermediate level of theory that expounds the principles of the life course perspective within the components of Person-Context-Time. As a mechanism of human development this endorses Bronfenbrenner's (2005) processes of progressively more complex reciprocal interactions between an active, evolving biopsychological individual and the persons, objects, and symbols of their proximal settings. The framework is illustrated with a hypothesised mobility biography, theorising the developing mobility behaviour in respect to the four components and the accumulation of forms of human capital (Goulias, 2009). Further research could return to the biographies conducting secondary analysis that applies the unified framework put forward by Goulias (2009).

Another direction would be to focus on a particular contextual change identified in the conceptual framework and reveal, in more detail, how opportunities and constraints for walking and cycling relate to these changes. For instance, future research could undertake a more focused examination of how care relations structure opportunities and constraints for walking and cycling, either attending to a particular care role e.g. grand-parenting, or the implications of all caring roles over the life course. Such a study might consider the implications of the dispersal of familial generations and temporal changes in the distribution of families. Again the interview protocol could be tailored to focus more specifically on care relations and their implications for walking and cycling. The workshop generated hypotheses on the future implications of macro level changes for walking and cycling, particularly in respect of current economic austerity and forecasted economic conditions. For instance, an economically more austere future

might reduce the spatial separation of familial generations, as families seek solutions to child and elder care in the face of more constrained financial resources, and, similarly, rising costs of higher education may deter young people from relocating to study.

A final recommendation for future research would be to conduct the study in a society which is distinct from the UK in terms of the social and structural factors identified here as relevant to walking and cycling. This would serve to validate the framework for settings wider than the UK and potentially reveal more about how such macro level changes translate into individual behavioural trajectories.

#### **8.4 Concluding summary of the study**

This project has been conducted at the nexus of transport and health research, contributing to the multi-disciplinary literature in walking and cycling, a study that applies a theoretical perspective on how lives (and behaviour) develop over time. More specifically in travel behaviour research, this adds, to the emergent seam of mobility biographies research, a study with a primary focus of walking and cycling that adopts a life-long perspective. Similarly, knowledge on physical activity is advanced from prospective longitudinal studies of physical activity over time-limited periods and retrospective qualitative studies focused either on exercise or physical activity generically.

Its methodological contribution lies in the development of retrospective, qualitative interview and data processing techniques to elicit life-long walking and cycling biographies. This avoided a reductive framework where behaviour change was examined in proximity to one pre-defined life event, and attributed change solely to that event. Instead trajectories were accessed through the individual's retrospective reasoning of trajectory developments. The LHC improved recall and accuracy by providing autobiographical cues and helping participants to locate developments in the temporally proximate and distal context of their life course. Analysis involved the

development of a strategy to examine intra-individual development, inter-generational influence and inter-cohort comparison.

The empirical contribution spans descriptive and explanatory insights on the change and continuity in individual behavioural trajectories of walking and cycling over the life course, and understanding how these behavioural trajectories are shaped by intergenerational relations and the historical context. These findings were based on thirty-three individual biographies and trajectory typologies. The findings show that the opportunity structure for walking and cycling is reconstituted over the life course and that, in retrospective accounts, many changes in behaviour are attributed to life events. These life events pertained to changes in location, interpersonal relationships and roles, mobility resources and health. Whilst the findings are compatible with the theory that life events precipitate behaviour change through context disruption, it was apparent that such life events occur often without an impact on the trajectory. Similarly the life course context of developments in the trajectory often implicated multiple, often inter-related, life events. This draws attention to the deficiency of considering events in isolation.

Developments in family and employment life course domains imposed particular opportunities and constraints for walking and cycling that distinguished trajectories along the dimensions of gender and cohort. Older cohorts followed more traditional gender roles in respect of division of labour. Women's changeable burden of care and employment was a source of disruption to their walking, cycling and mobility more generally. Utility walking was important for them in early adulthood and family career breaks. Their male contemporaries were less affected by the balance of these roles, meaning they had fewer locational changes and, subsequently, more stable trajectories. For the older male group walking and cycling was displaced in a more uniform, earlier shift to motorised mobility in early adulthood, after which walking was often constrained to recreational walking and occasionally within their locality. For the

Echoes as children, their mother's return to employment could impact detrimentally on their walking trajectory.

In both cohorts, childhood and adolescence were relatively high phases in their walking trajectories. In the younger cohort, walking was higher during university and post-university urban living. For mothers in the younger cohort, maternity leave was usually a short-lived boost to walking. In later life amongst the older cohort some trajectories depicted adaptive changes to preserve activity, for instance, taking up recreational cycling to replace cycling to work, or walking to local shops after retirement. Care of grandchildren and elders could also have both positive and negative influence on trajectories. The nature of these effects could depend on the level of geography over which these care relationships operated; dispersed care relationships could be a constraint to active travel, whilst more localised relationships could provide opportunities.

There are indications that the gender dimension has evolved as younger cohorts take a different approach to balancing careers and family life. Mothers in younger cohorts have taken maternity leave before returning to work full or part time, after which childcare is covered by formal childcare, flexible working arrangements for fathers and retired grandparents. While women appear to be retaining the prime responsibility for child care, fitting this around work limits opportunities to walk. The benefit lost from women's trajectories in motherhood may be transferred to other family members if more distributed care arrangements emerge. However, this is uncertain and secular changes in family and employment trajectories could equally result in further constraints for active travel.

This study has found that the potential for developmental change in trajectories extends into later life. The biographies depicted trajectory developments in later life that included positive adaptive and restorative changes, as well as unsuccessful attempts to reengage in cycling and diminishing changes. In deliberations with policymakers and

practitioners, comparatively less attention was given to these later life developments. Instead, attention was drawn to the earlier developmental and maturational life course events, transitions and trajectory developments as opportunities to shape trajectories. This is, perhaps, indicative of a lesser orientation within the policy making and practice community towards later life as a time to recruit and sustain adults in walking and cycling. This reflects, perhaps, an underlying perception that shaping trajectories earlier in adulthood is potentially a better use of resources, when individuals are potentially more malleable in their travel habits, more readily accessed through education settings and offer the prospect of shaping peak time travel demand over a longer period.

If this is the case, then this is to be recognised in the translation of knowledge from life course research into practice. Presentation of these and future research findings needs to emphasise that development of walking and cycling behaviour extends beyond maturation into later life and, therefore, interventions targeted at older adults to support adaptive and restorative changes in behaviour are warranted.

The biographies reveal considerable inter-individual variation but, at the same time, commonalities in patterns of change and stability. Trajectories were characterised along typology spectrums that were for walking, diminished, restorative, and resilient and for cycling, arrested, resilient, and restorative.

An enhanced conceptual framework has been put forward that integrates the interpretive and explanatory insights of the study. This theorises walking and cycling trajectories as individually constructed within the opportunities and constraints of the micro context and historically-specific macro context. The framework maps the broad scope of factors influencing trajectory development, whilst offering a longitudinal framework to locate findings on the various psychological, social and structural influences of walking and cycling. At the same time, it provides a platform to elaborate models of the processes and mechanisms operating to shape individual trajectories.

Emerging adulthood and, more tentatively, later working life were identified as sensitive periods when trajectories are more prone to change due to the clustering of life events. These are periods in which subsequent segments of relative behavioural and life course stability are instituted, and, as such, are proposed to represent windows of opportunity in which measures to support individuals to maintain or initiate activity can be targeted. Discussions with policymakers and practitioners demonstrated their orientation to access when considering windows of opportunity for intervention. Whereas education and training settings provide opportunities to access individuals in emerging adulthood, there are not similar opportunities to access older workers in such large numbers. Changes in behaviour did still occur between emerging adulthood and retirement, and these are often associated with locational changes and other life events.

The biographies suggested that earlier cycling experiences are relevant in shaping later outcomes. For instance, cycling earlier in adulthood seemed to be a generative tendency and an enabling factor in later returns. Embodied intelligence, previously outlined as an alternative construct of travel behaviour habits, was endorsed as a description of the longitudinal tendency shaping cycling trajectories and one that merits more focused examination.

Links have also been drawn between macro-level social and structural changes and differences between the cohort in life course development of walking and cycling. Women's increased participation in the labour market and diminishing family career breaks, extension of education and attraction of young people to high-density urban settings in early adulthood, increased dependency of children's mobility, rising car ownership and spatial dispersal of activity locations and change in timing of car acquisition by gender and cohort were identified as changes that were relevant macro contextual factors. Flexibilisation of employment, more distributed child care arrangements between partners and generations, spatial distribution of families,

increasing prevalence of graduated retirement and prolongation of elder care relations with increased longevity were identified as relevant macro contextual changes the impact of which may become apparent in future.

This study has made a novel methodological, conceptual and empirical contribution that advances understanding of individual behaviour. This thesis is brought to a close with a call for more studies on walking and cycling that adopt a life course framework in the fullest sense, with the purpose of elaborating processes and mechanisms of long term individual development and deciphering the imprint of personal history, both macro and micro, on unfolding trajectories.



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