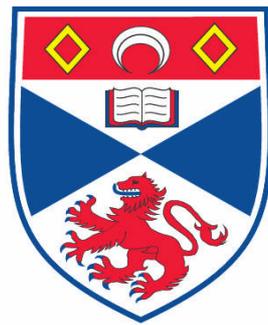


**Ageing and Mobility in Britain:
Past trends, present patterns and future implications**

Sara Tilley



This thesis is submitted in partial fulfilment for the degree of PhD
at the
University of St Andrews

Department of Geography and Sustainable Development
School of Geography and Geosciences
March, 2013

Declarations

1. Candidate's declarations:

I, Sara Tilley hereby certify that this thesis, which is approximately 80,000 words in length, has been written by me, that it is the record of work carried out by me and that it has not been submitted in any previous application for a higher degree.

I was admitted as a research student in September, 2009 and as a candidate for the degree of PhD in September, 2009; the higher study for which this is a record was carried out in the University of St Andrews between 2009 and 2013.

Date Signature of candidate

2. Supervisor's declaration:

I hereby certify that the candidate has fulfilled the conditions of the Resolution and Regulations appropriate for the degree of PhD in the University of St Andrews and that the candidate is qualified to submit this portfolio in application for that degree.

Date Signature of supervisor

3. Permission for electronic publication:

In submitting this thesis to the University of St Andrews I understand that I am giving permission for it to be made available for use in accordance with the regulations of the University Library for the time being in force, subject to any copyright vested in the work not being affected thereby. I also understand that the title and the abstract will be published, and that a copy of the work may be made and supplied to any bona fide library or research worker, that my thesis will be electronically accessible for personal or research use unless exempt by award of an embargo as requested below, and that the library has the right to migrate my thesis into new electronic forms as required to ensure continued access to the thesis. I have obtained any third-party copyright permissions that may be required in order to allow such access and migration, or have requested the appropriate embargo below.

The following is an agreed request by candidate and supervisor regarding the electronic publication of this thesis:

Access to all of printed copy but embargo of all of electronic publication of thesis for a period of five years on the following ground:

Publication would preclude future publication

Date Signature of candidate

Date Signature of supervisor

Acknowledgements

First of all, I wish to thank my supervisors Donald and Allan for their guidance and advice that has made this project possible. Thanks should also be given to Maarten and Paul who helped kick-start and shape the project at the beginning in 2009.

I would also like to express my gratitude to the Economic and Social Research Council (ESRC) and MMM Group (formerly MRC McLean Hazel) for jointly funding this doctoral research. I also want to thank everyone at MMM Group in Edinburgh for their support and enthusiasm for my project, especially Steve who also co-supervised this project.

Thanks also needs to be given to all those I have met along the way of this PhD journey, especially in the School of Geography and Geosciences at St Andrews, who have helped me at various stages over the years. This has been in terms of practical and personal advice, support, encouragement and friendship, particularly Mel, Sarah, Susan, Rory, Fi and Lee as well as all those who have shared Room 601 with me during the highs and lows.

Finally, outside of St Andrews thanks are also due to all of my friends and family for their continued laughs, love and support.

Abstract

Over the next decade the 'Baby Boomer' cohort will increasingly contribute to the proportion of those aged 60 and over in Britain. The issue of how the mobility of older people has changed for different cohort groups has not been considered in a historical context. Ryder (1965) argued that cohort groups could be important in determining behaviour as have other social structural factors, such as socioeconomic status. This thesis merges the disciplines of transport geography and population studies using a novel approach of cohort analysis, which has not been used widely for studying mobility trends.

Using National Travel Survey data from 1995-2008, the mobility trends of older people in Britain are explored by creating pseudo cohorts. Pseudo cohorts are artificially created datasets which are constructed from using repeated cross-sectional data (McIntosh, 2005, Uren, 2006). This technique can differentiate 'age', 'period' and 'cohort' effects in mobility trends. Age effects are differences in behaviour between age groups i.e. changes in mobility associated with age itself. Period effects relate to changes in behaviour in all age groups over a period of time. Cohort effects are those associated with behaviour common to particular groups born around the same time (Glenn, 2005, Yang, 2007).

The influence of the Scottish concessionary travel policy on the mobility of older people at the aggregate level is also considered using Scottish Household Survey data from 1999-2008. This policy is very blunt and based on assumptions about older age. As cohorts differ, these assumptions may no longer hold and therefore the policy may not be effective.

This thesis argues, using a longitudinal demographic perspective, that structural effects shape mobility of cohorts differently over time. The findings reveal although mobility amongst older people is rising in general, there would actually be declining mobility were it not for the Boomer cohort. Amongst younger cohorts mobility is lower. The analysis also shows that women travel further than men, a fundamental break with the past, specific to this generation. This thesis illustrates the importance of cohort membership in explaining mobility change.

Table of Contents

1. INTRODUCTION	1
1.1. Introduction	1
1.1.1. Age, Cohort and Trends Effects in Understanding Change	2
1.1.2. Social Exclusion, Mobility and Age	6
1.1.3. Conceptualisation of Mobility Needs in Older Age in Transport Policy	7
1.2. Research Aims	8
1.3. Thesis Structure	9
2. LITERATURE REVIEW	11
2.1. Introduction	11
2.2. Mobility	13
2.2.1. Concepts of Mobility	13
2.2.2. Measurements of Mobility	15
2.2.3. Policy Context of Understanding Mobility	17
2.2.4. A Mobile Society	22
2.3. Mobility and Quality of Life	28
2.3.1. Social Exclusion	29
2.3.2. Accessibility	30
2.3.3. Deprivation of Place, Ageing and Mobility	33
2.3.4. Unequal Experiences of Ageing	34
2.4. Mobility in Later Life	35
2.4.1. Travel Behaviour of Older People	35
2.4.2. Older People, Mobility and Quality of Life	38
2.4.3. Changing Mobility of Older People: The Ageing Boomer Cohort	42
2.5. Transport Policy for an Ageing Population	46
2.5.1. Background to the National Concessionary Travel Scheme	47
2.5.2. Existing Research on Concessionary Scheme Impacts	48
2.6. Understanding the Meanings of Mobility Trends Amongst Older People	51
2.7. Summary and Critique of Existing Evidence	53
2.8. Conclusions and Research Questions	54
3. RESEARCH METHODOLOGY	58
3.1. Introduction	58
3.2. Methodology Overview	58
3.3. Research Approach	60
3.4. Definitions and Scope	61
3.4.1. Older People	61
3.4.2. Mobility	64

3.4.3. Cohort Analysis and Cohort Groups	67
3.4.4. Policy Effects and Control Groups	71
3.4.5. Summary of Definitions and Scope.....	72
3.5. Availability of Data Sources	73
3.5.1. Data Requirements	73
3.5.2. Description and Processing of Secondary Repeated Cross-Sectional Datasets	74
3.5.3. National Travel Survey (NTS)	74
3.5.4. Scottish Household Survey (SHS)	78
3.6. Conclusion and Summary	81
4. MOBILITY TRENDS OF OLDER PEOPLE IN BRITAIN FROM 1995-2008.....	83
4.1. Introduction	83
4.2. Data and Methods.....	84
4.3. Mobility Trends of the British Population	85
4.4. Results and Findings	86
4.4.1. Number of Trips.....	86
4.4.2. Distance Travelled.....	95
4.4.3. Mode Share.....	104
4.4.4. Trip Purpose.....	112
4.5. Discussion.....	114
4.5.1. Increasing Mobility Amongst Older People	115
4.5.2. Increasing Importance of the Private Car	116
4.5.3. Convergence of Gender Differences in Mobility	118
4.6. Conclusion: The Changing Mobility of Older People	119
5. USING AGE PERIOD AND COHORT EFFECTS TO EXPLAIN THE CHANGING MOBILITY OF OLDER PEOPLE	121
5.1. Introduction.....	121
5.2. Data and Methods.....	121
5.3. Results and Findings	122
5.3.1. Descriptive Results by Age Group	122
5.3.2. Descriptive Results by Cohort Group.....	136
5.3.3. Comparing Distance Travelled Between Cohorts at the Same Age	146
5.3.4. Multiple Regression Analysis	151
5.4. Discussion.....	158
5.4.1. Using Age, Period and Cohort Effects to Explain Change.....	159
5.4.2. Changing Demographics and Future Mobility of Older People.....	161
5.5. Conclusion	162
6. INFLUENCE OF THE SCOTTISH NATIONAL CONCESSIONARY TRAVEL SCHEME ON THE MOBILITY OF OLDER PEOPLE.....	166

6.1. Introduction	166
6.2. Background and Rationale	166
6.3. Data and Methods	167
6.3.1. Data	167
6.3.2. The 'Difference-in-Differences' Regression Technique	168
6.4. Results and Findings	169
6.4.1. Descriptive Analysis: Characteristics and Mobility Trends.....	169
6.4.2. Impact of the Concessionary Scheme: 'Difference-in-Differences'	185
6.5. Discussion	199
6.5.1. Characteristics of Scottish Concessionary Pass Holders	199
6.5.2. Mobility Trends of Scottish Concessionary Pass Holders.....	200
6.5.3. Has the Concessionary Scheme Increased Mobility Amongst Older People in Scotland?	201
6.6. Conclusion	202
7. DISCUSSION	204
7.1. Introduction	204
7.2. Summary of Key Findings	204
7.3. Conceptualisation	206
7.3.1. Structural Influences Affecting Mobility of Older People	208
7.3.1. Multi-Level Forces Stimulating Mobility Change for Older People.....	215
7.3.2. Future Implications for Mobility	222
7.4. Transport Policy Implications for an Ageing Population	227
7.4.1. The Future of the Concessionary Travel Scheme	227
7.4.2. Policy Recommendations.....	230
7.5. Conclusion	235
8. CONCLUSION	237
8.1. Introduction	237
8.2. Key Research Findings	237
8.3. Contribution to Knowledge	239
8.4. Relevance of the Research	241
8.5. Limitations of the Study	243
8.6. Future Research Agenda	244
9. REFERENCES	247

List of Figures

Figure 1.1a-d: UK Population Pyramids 1971 – 2031	4
Figure 2.1: Full car driving licence holders by age and gender: Great Britain, 1975/76 - 2010	
Figure 3.1: Levels in the NTS database.....	39
Figure 3.1: Levels in the NTS database.....	75
Figure 4.1a-b: Average number of trips and distance travelled by mode in 2008.....	85
Figure 4.2: Mean number of trips per week including and excluding commuting, business and education trips amongst older people from 1995-2008.....	88
Figure 4.3: Median number of trips per week including and excluding commuting, business and education trips amongst older people from 1995-2008.....	91
Figure 4.4: Median, 10th and 90th percentile number of trips per week excluding commuting, business and education trips by gender from 1995-2008.....	93
Figure 4.5: Mean distance travelled per week (km) including and excluding commuting, business and education trips amongst older people from 1995-2008.....	96
Figure 4.6: Median distance travelled per week (km) including and excluding commuting, business and education trips amongst older people from 1995-2008.....	99
Figure 4.7: Median, 10th and 90th percentile distance travelled per week (km) excluding commuting, business and education trips by gender from 1995-2008.....	102
Figure 4.8: Percentage transport mode share amongst older men, including all trip purposes, from 1995-2008.....	105
Figure 4.9: Percentage transport mode share amongst older women, including all trip purposes from 1995-2008.....	105
Figure 4.10: Mean number of trips per week by transport mode amongst older men, including all trip purposes, from 1995-2008 (3-year moving averages).....	107
Figure 4.11: Mean number of trips per week by transport mode share amongst older women, including all trip purposes, from 1995-2008 (3-year moving averages).....	110
Figure 4.12: Percentage journey purpose share amongst older men from 1995-2008.....	113
Figure 4.13: Percentage journey purpose share amongst older women from 1995-2008.....	113
Figure 5.1: Mean distance travelled per week (km) including commuting, business and education trips by age group from 1995-2008.....	123
Figure 5.2: Median distance travelled per week (km) including commuting, business and education trips by age group from 1995-2008.....	125
Figure 5.3: Median distance travelled per week (km) excluding commuting, business and education trips by age group from 1995-2008.....	127
Figure 5.4: Median, 10th and 90th percentile distance travelled per week (km) excluding commuting, business and education trips by age group from 1995-2008.....	128
Figure 5.5: Median distance travelled per week (km) excluding commuting, business and education trips amongst men by age group from 1995-2008.....	130
Figure 5.6: Median distance travelled per week (km) excluding commuting, business and education trips amongst women by age group from 1995-2008.....	131
Figure 5.7: Median distance travelled per week (km) excluding commuting, business and education trips by gender and age group from 1995-2008.....	133
Figure 5.8: Median distance travelled per week (km) excluding commuting, business and education trips by cohort group from 1995-2008.....	137

Figure 5.9: Median, 10th and 90th percentile distance travelled per week (km) excluding commuting, business and education trips by cohort group from 1995-2008	139
Figure 5.10: Median distance travelled per week (km) excluding commuting, business and education trips amongst men by cohort group from 1995-2008.....	140
Figure 5.11: Median distance travelled per week (km) excluding commuting, business and education trips amongst women by cohort group from 1995-2008.....	142
Figure 5.12: Median distance travelled per week (km) excluding commuting, business and education trips by gender and cohort group from 1995-2008.....	144
Figure 6.1: Percentage of older people in Scotland who are concessionary pass holders from 1999-2008	171
Figure 6.2: Percentage of older people in Scotland who are concessionary pass holders by gender from 1999-2008.....	172
Figure 6.3: Percentage of older people in Scotland who are concessionary pass holders by area type from 1999-2008.....	173
Figure 6.4: Percentage of older people in Scotland who are concessionary pass holders by income group from 1999-2008.....	175
Figure 6.5: Percentage of older people in Scotland who are concessionary pass holders by gender and household car access from 1999-2008.....	177
Figure 6.6: Percentage of older people in Scotland who are concessionary pass holders by gender and driving licence holdership from 1999-2008.....	179
Figure 6.7: Mean number of trips per day made by older people in Scotland who are concessionary pass holders by gender from 1999-2008.....	182
Figure 6.8: Median distance travelled per day (km) by older people in Scotland who are concessionary pass holders by bus and car-driver by gender from 1999-2008	183
Figure 6.9: Changes made to the Scottish concessionary travel scheme policy in line with the availability of SHS data from 1999-2008.....	185
Figure 7.1: Structural influences affecting the mobility of older people.....	207
Figure 7.2: A dynamic schema of the multi-level forces stimulating mobility change for older people.....	214

List of Tables

Table 2.1: Take-up rate of concessionary passes in Scotland from April 2006-March 2009	49
Table 2.2: Research Aims and Questions	57
Table 3.1: Secondary datasets and analytical methods to answer research questions	59
Table 3.2: Birth cohort group definitions	69
Table 4.1: Comparison of mean number of trips per week including commuting, business and education trips amongst older people using Tukey's HSD post hoc test	89
Table 4.2: Comparison of mean number of trips per week excluding commuting, business and education trips amongst older people using Tukey's HSD post hoc test	90
Table 4.3: Comparison of mean distance travelled per week (km) including commuting, business and education trips amongst older people using Tukey's HSD post hoc test	97
Table 4.4: Comparison of mean distance travelled per week (km) excluding commuting, business and education trips amongst older people using Tukey's HSD post hoc test	98
Table 4.5: Comparison of mean number of car driver trips per week including commuting, business and education trips amongst older men using Tukey's HSD post-hoc test	108
Table 4.6: Comparison of mean number of walking trips per week including commuting, business and education trips amongst older men using Tukey's HSD post-hoc test	108
Table 4.7: Comparison of mean number of bus trips per week including commuting, business and education trips amongst older men using Tukey's HSD post-hoc test	109
Table 4.8: Comparison of mean number of bus trips per week including commuting, business and education trips amongst older women using Tukey's HSD post-hoc test	111
Table 5.1: Age of cohort groups at different years	136
Table 5.2: Number of male respondents by age and cohort group	147
Table 5.3: Number of female respondents by age and cohort group	147
Table 5.4: Median distance travelled per week (km) excluding commuting, business and education trips amongst men by age and cohort group for all years 1995-2008	148
Table 5.5: Median distance travelled per week (km) excluding commuting, business and education trips amongst women by age and cohort group for all years 1995-2008	149
Table 5.6: Difference in median distance travelled per week (km) between men and women excluding commuting, business and education trips by age and cohort group for all years 1995-2008	150
Table 5.7: Multiple linear regression model of distance travelled per week (km) excluding commuting, business and education trips controlling for: year, cohort group and age group; socioeconomic group; area type; driving licence; vehicle access and household structure	154
Table 5.8: Evidence of co-linearity	155
Table 6.1: Mean number of bus trips per day by older men	186
Table 6.2: Mean number of bus trips per day by older women	186
Table 6.3: Mean distance travelled (km) by bus per day by older men	187
Table 6.4: Mean distance travelled (km) by bus per day by older women	187
Table 6.5: Mean number of car-driver trips per day by older men	188
Table 6.6: Mean number of car-driver trips per day by older women	188
Table 6.7: Mean distance travelled (km) by car-driver per day by older men	188

Table 6.8: Mean distance travelled (km) by car-driver per day by older women	188
Table 6.9: 'Difference-in-difference' (DID) multiple linear regression of number of bus trips per day amongst older people by gender controlling for income, household car access, driving licence holdership, area type, before/after NCTS policy, NCTS pass holdership and DID interaction.....	191
Table 6.10: 'Difference-in-difference' (DID) multiple linear regression of distance travelled by bus (km) per day amongst older people by gender controlling for income, household car access, driving licence holdership, area type, before/after NCTS policy, NCTS pass holdership and DID interaction.....	193
Table 6.11: 'Difference-in-difference' (DID) multiple linear regression of number of car-driver trips per day amongst older people by gender controlling for income, household car access, driving licence holdership, area type, before/after NCTS policy, NCTS pass holdership and DID interaction.....	195
Table 6.12: 'Difference-in-difference' (DID) multiple linear regression of distance travelled by car-driver (km) amongst older people by gender controlling for income, household car access, driving licence holdership, area type, before/after NCTS policy, NCTS pass holdership and DID interaction.....	197
Table 7.1: Summary of policy recommendations.....	233-4

1. Introduction

1.1. Introduction

Within developed, and increasingly in some developing countries, the growth in the proportion of older people in society is rising due to a combination of lower fertility and increased life expectancies, contributing to the development of what has been termed an 'ageing population' (United Nations (UN), 2010). These developments are also characteristics of the Second Demographic Transition (SDT)¹. Lesthaeghe (n.d) argues that the SDT brings new social challenges associated with further ageing. The future implications of older people's mobility have not been considered as highly compared to other challenges an ageing population poses such as continued state pensions, healthcare and housing provision.

Studies of transport and travel behaviour have recognised the multitude of travel issues that older people can face in accessing transport systems in urban and rural environments. Research has generally focused on the problem of low mobility amongst older people as a result of lower incomes and increasing frailty in older age (Tacken, 1998, Noble, 2000). Much research has also focused on issues relating to driving cessation (Burkhardt et al., 1996, Marottoli et al., 1997, 2000, Ragland et al., 2004, 2005, Siren and Hakamies-Blomqvist, 2005, Adler and Rottunda, 2006, Davey, 2007, Rosenbloom, 2010). Due to some of the characteristics associated with older age there have also been a variety of studies that explore the issue of low mobility in relation to social exclusion and accessibility (Hine and Mitchell, 2003, Social Exclusion Unit (SEU), 2003, Lucas, 2004, Titheridge et al., 2009, Shergold and Parkhurst, 2012). The implications of older people's mobility on their quality of life have also been examined (Metz, 2000, Banister and Bowling, 2004, Spinney et al., 2009, Ziegler and Schwanen, 2011).

Research on the mobility of older people tends to focus on behaviour at one point in time. There has been a lack of attention paid to the broader consideration of the trends and driving mechanisms behind mobility in relation to the ageing of cohort groups. A cohort approach is important as cohorts grow up during different social, economic and historical contexts, which influence attitudes, expectations and therefore behaviour, yet this has been missed by previous research into the mobility of older people.

¹ According to (Lesthaeghe, 2010) the Demographic Transition refers to the declines in fertility and mortality that occurred in Western countries from the 18th and 19th centuries onward and during the second half of the 20th century in much of the rest of the world. The end point of the First Demographic Transition (FDT) was supposed to be an older stationary and stable population corresponding with replacement fertility, zero population growth, and higher life expectancies. The Second Demographic Transition (SDT), on the other hand, sees no such equilibrium as the end-point. It is characterised by a variety of living arrangements other than marriage, the disconnection between marriage and childbearing, and no stationary population, which is occurring mainly in European and other Western countries. In particular the disconnection between marriage and childbearing and higher rates of divorce has contributed to the changing of household structures.

The thesis links the disciplines of transport geography with population studies using cohort analysis. Descriptive analysis suggests that mobility of the older population has been increasing over time. However, using cohort analysis, the thesis reveals that overall there appears to be a downward trend in terms of mobility since the mid-1990s. This trend has been masked by the uniqueness of the Boomer cohort displaying high levels of mobility due to differing expectations in relation to mobility compared to former cohorts of older people. Gender convergence over time was also revealed with women belonging to the youngest cohorts travelling further than men of the same generation.

1.1.1. Age, Cohort and Trends Effects in Understanding Change

Although the term 'elderly' is widely used in the literature to identify adults aged 60 or over, more recently there has been a move towards using 'older people' or 'older adults', which is generally preferred over 'senior' and 'elderly', which can be discriminatory (Dahmen and Cozma, 2009, p.36).

Mobility in this study is considered as movement outdoors that does not involve a change of residency. It is defined as the ability to move around to access everyday goods and services (Nutley and Thomas, 1995). This aspect of mobility is fundamental for older people to maintain an independent life, not only enabling access to goods, services and amenities, but also for pleasure in itself which is also of importance in maintaining and improving quality of life (Banister and Bowling, 2004, Gabriel and Bowling, 2004, Ziegler and Schwanen, 2011). Older people's mobility has not been comprehensively considered compared to other key challenges identified such as medical and healthcare provision in the context of an ageing population, however, increasing or decreasing mobility of the older population will have economic, environmental and social implications for society.

One key cohort group has begun to contribute significantly to the increase in the proportion of older people in society and will continue to do so over the next decade (see Figure 1.1a-d). They are known as the 'Baby Boomer generation', but will be referred to as the 'Boomers' throughout the remainder of this thesis. This is a large cohort in terms of numbers due to the high birth rates seen after World War II. A cohort can be defined as the aggregate of individuals who experienced a similar set of events within the same time interval (Ryder, 1965). This is usually based on time of birth but numerous types of cohorts can be identified including marriage, divorce, retirement and education cohorts (Rentz and Reynolds, 1981).

Before discussing this cohort in more detail, it is useful to introduce the methods used to study cohorts. Cohort analysis is the term used to describe the methods that are deployed to study the ageing process. Cohort analysis examines cohort membership over time (Rentz and Reynolds, 1981). There is novelty in using this approach in transport studies since cohort

analysis has mainly been restricted to demographic research. The approach uses age, period and cohort effects to explain change in behaviour over time. These terms are defined as follows (Glenn, 2005, Yang, 2007):

- Age effects refer to travel behaviour exhibited by different age groups, with people changing behaviour due to the ageing process. For example, changes in behaviour may be related to age-associated disabilities, or place in the life-course, such as having children and requiring different modes of transport.
- Period effects represent changes in behaviour over time associated with all age groups at the same moment in time, for example an increase in fuel prices or improved public transport vehicles.
- Cohort effects are those which are associated with changes in behaviour across groups of individuals that are exposed to a similar set of factors over a particular period of time.

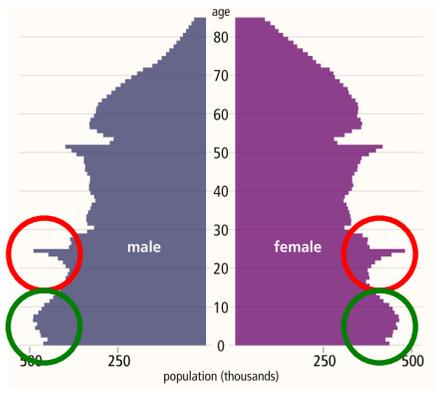
Figure 1.1a-d outlines the actual and predicted change in the UK population age structure from 1971-2031. The Boomer cohort is generally considered to be those that were born during one continuous era of high birth rates after World War II that spanned approximately 20 years from 1946 to 1965 (Greenwood et al., 2005, Quine and Carter, 2006, Zegras et al., 2008, Jang and Ham, 2009). However there is another view that considers two aspects due to the length, during which time two waves of an increase in live births was observed (Falkingham, 1997, McDougall, 1998, Schewe et al., 2000, Macunovich, 2002, Einolf, 2009).

There appears to be no consensus regarding the cause of the 'Baby Boom' which was a social trend that also occurred across many Western countries. The first wave of the Boomer cohort are considered to be those born immediately after World War II and account for most of the immediate 'spike' in births in 1946/47 (Macunovich, 2002). This cohort is indicated by the red circles in Figures 1.1a-d. For many women, births were postponed during the Great Depression in the 1930s and World War II. It is thought these traumatic events led to a decline in fertility in part due to the poor economic outlook which made it difficult to start a family and the absence of men who fought in the war (Macunovich, 2002, Miranda-Moreno and Lee-Gosselin, 2008). The second group within the Boomer cohort are thought to have been born slightly later in the mid-1950s to early-1960s which are indicated by the green circles in Figures 1.1a-d. Economic growth and increasing affluence to be able to support children and developments in new technologies that allowed women to have more time could be said to have contributed to the increase in births during the 1960s.

All four pyramids show that the population of older people is increasing over time, with a higher proportion of older women. The Boomer cohort has begun to reach, what has been determined as 'older' in this study (60 years) in 2011, shown in Figure 1.1c, indicated by the movement of the red and green circles further up the pyramid compared to Figure 1.1a.

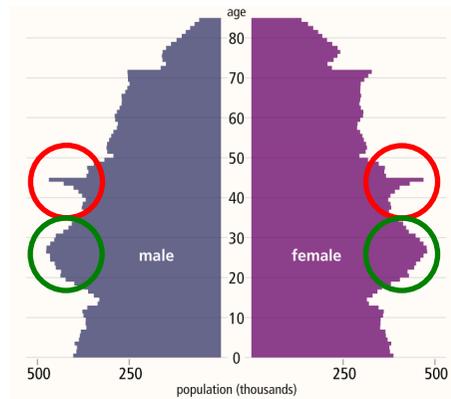
Figure 1.1a-d: UK Population Pyramids 1971 - 2031

Figure 1.1a: 1971



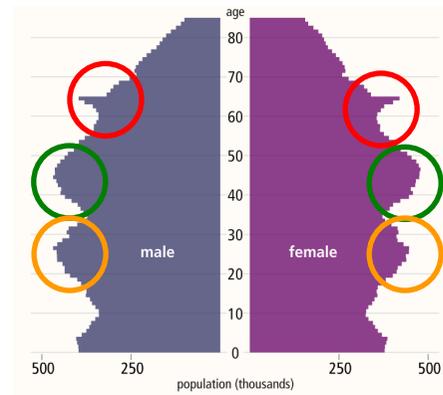
55.9 million people

Figure 1.1b: 1991



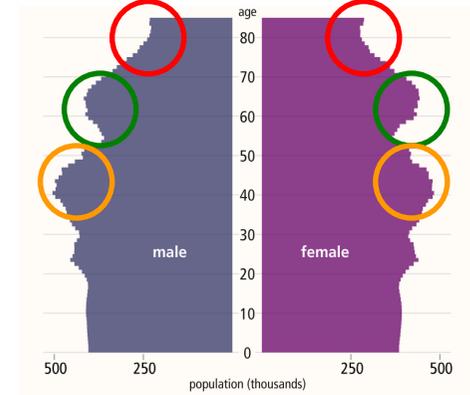
57.4 million people

Figure 1.1c: 2011



62.6 million people

Figure 1.1d: 2031



70.9 million people



Post WWII Boom



1960s Boomers



Boomer Echo

Source: Office for National Statistics (ONS, 2011), Adapted from Bates (2010)

N.B The cut off age of these pyramids is 85 years

Those born in the 1950s and 1960s cohort will retire over the coming decade. The width of the pyramid is increasing in the middle and nearer the top, demonstrating that the ageing population is becoming more pronounced. Although Figure 1.1d is a projection, it shows the ageing of the different cohorts contributing to the older population. The pyramid cut off age is 85 years, but has already been noted, those above this age is the fastest growing in society, so the proportion of the population above this age will be higher.

Cohorts are differentiated by the social, economic and historical contexts they grow up in (Ryder, 1965). Therefore they tend to have different characteristics associated with them. As illustrated with the Boomer cohort, as each subsequent cohort ages with differing characteristics from the former the future older population will become more diverse with different needs, values, views, expectations and desires. As the Boomer cohort ages, many of the previous assumptions, thoughts and challenges surrounding the older population may no longer hold. They may also have higher expectations about mobility compared to former cohorts which will have implications for the mobility of older people in the future.

The Boomer cohort is of interest as they approach retirement age, not just in terms of their size, but its members display different characteristics compared to former cohorts as they hold different views and have different expectations from former cohorts (Coughlin, 2009, Dannefer and Shura, 2009). In general this cohort is associated with privilege and a rejection or redefinition of traditional values, as many grew up in a time of affluence as the economy expanded in the period after World War II (Owram, 1997) along with social and political movements during the 1960s which were new and exciting that broke from traditional conservative values. The world was rapidly changing and led to this cohort holding a different view of the world compared to their parents and previous generations

Living arrangements and family structures of the Boomer cohort are also likely to be different, due to social trends linked to the Second Demographic Transition and less traditional views of the family. Household types are likely to be more varied with dependent children unable to move out until later in life, or living much further away, and the inclusion of step children in households from second or third marriages. There will also be an increasing proportion of single households (Van de Kaa, 1987).

Specifically in the UK the development of the Welfare State including the National Health Service and universal education from the 1944 Education Act provided social security, health, housing and education meaning that, as a group, this was the first generation to experience widespread wealth, health and higher levels of education. Crucially they are also associated with higher levels of mobility having also grown up with the private car (Evandrou, 1997, Owram, 1997, Coughlin, 2009, Dannefer and Shura, 2009, Warnes, 2009). It should also be noted that it is recognised that the Boomer cohort are not considered a homogenous group.

As a large cohort in terms of its size there is also a great deal of diversity within this cohort, as well as between it and other age cohorts in terms of socioeconomic factors such as income and household structure. Such factors have an influence on mobility patterns (Pooley et al., 2005b).

1.1.2. Social Exclusion, Mobility and Age

In a car-centric society, there have been many benefits gained from investment into transport technology and planning which have enabled people to travel further and undertake more activities over time. There are problems, however, when individuals do not have access to a car or if they are unable to drive. The advent of increasing car use and deregulation of the bus industry has led to worsened bus provision in some areas (although some routes and vehicles have improved in other areas) and increased public transport fares.

Existing research has given much consideration to the factors that affect the mobility of older people and why it generally declines with ageing. Mobility is dependent on the resources available to the individual as well as access to transport modes and the location of activities and services (Gilhooly et al., 2002, Giuliano et al., 2003). A natural process of ageing for many is the decline and reduction in physical bodily mobility which can restrict physical movement, making access to transport systems and driving difficult (Metz, 2003, Guo et al., 2010). In addition lowered incomes associated with retirement also impacts on travel choices, such as being able to afford transport in terms of running a car, or purchasing train and air fares. Tacken (1998) suggests that these factors produce lower levels of mobility amongst older people. These potential constraints on older people's mobility can also lead to feelings of reduced independence, isolation, loneliness and depression, particularly with driving cessation if there are no adequate alternative modes of transport especially amongst men (Burkhardt et al., 1996, Marottoli et al., 1997, Ragland et al., 2005, Davey, 2007, Li et al., 2012). As such, the older population have been considered a group at risk from social exclusion due to poor transport (Lucas, 2004, Hine, 2009, Shergold and Parkhurst, 2012). However, it should also be remembered that ageing is also an unequal process with health outcomes and income levels differing widely within the older population therefore it is not necessarily the case that older people will have lower mobility. The links between the mobility of older people and quality of life has been explored (Metz, 2000, Banister and Bowling, 2004, Spinney et al., 2009).

Existing research has generally focused on the mobility of older people at single points in time. Ryder (1965) argued that cohort membership could be as important in determining behaviour as other social structural factors such as socioeconomic group. Cohort analysis is widely used in demographic studies but has only been used in a handful of studies to examine changes in travel behaviour (Hakamies-Blomqvist and Henriksson, 1999, Newbold

et al., 2005, Hjorthol et al., 2010, Frändberg and Vilhelmson, 2011). Whilst these studies have recognised that cohort effects are present in the mobility of older people, these still have only considered the Boomer cohort and current cohorts of older people and none has been undertaken in a British context.

As the Boomer cohort begin to contribute to the proportion of older people in society, it has been recognised that they have different characteristics to current cohorts of older people (Spain, 1997, ECMT, 2000, Newbold et al., 2005, Coughlin, 2009). There is potential to extend the scope of cohort analysis examining changes in mobility amongst older people in relation to an ageing population. Much less consideration has been given to the mobility patterns of the Boomer cohort in retirement and subsequent cohorts, particularly in relation to one another. The ageing of cohort groups has implications for the travel behaviour of other cohorts. Demographic trends are changing the nature of life-course stages, for example the rise of the 'sandwich generation' amongst those of 'mid-life'² age whereby predominantly people belonging to the Boomer cohort are providing dual caring responsibilities for older parents and younger (grand) children (Agree et al., 2003, Pierret, 2006, Demey et al., 2011). This is likely to lead to the production of different travel patterns in the new 'Boomer' generation of older people, compared to former generations. In the instance of care provision, for example, as cohort groups interact with one another.

Due to current assumptions of older people having low mobility and resulting negative impacts on individuals, a closer examination is also required on the mobility behaviour of cohort groups, an area that has been somewhat neglected in both transport geography and population studies.

1.1.3. Conceptualisation of Mobility Needs in Older Age in Transport Policy

UK transport policy adopts a blanket approach towards the mobility of older people through provision of concessionary fares, which has come under scrutiny in recent years due to the high costs involved. This age/life-stage based policy is very blunt in targeting those in need of assistance. This policy is specifically targeted towards older people, providing free bus travel to all those aged 60 years and over, unrestricted by peak times or local area boundaries.

The concessionary fares policy is based on the assumption that older people have low mobility and want to, or can only, travel by bus. This policy was developed in the 1960s and is no longer appropriate. As the mobility of cohorts differs, the age-based concessionary travel policy is outdated, as evidenced by the Boomer cohort having high car-based mobility so they do not have to use the bus, as well as higher incomes, so they do not need the concession.

² 'Mid-life' is seen as a specific stage in the life-course, which is the period after family formation but before retirement. It is considered to be those aged 45-64 in Britain (Demey et al., 2011)

Adopting a cohort approach shows that lifestyles are more important than life-stages; cohorts are more important than age groups.

Recent studies have studied the effects of the concessionary pass on travel behaviour of older people, however, these have tended to be based on modest sample sizes in local areas (Baker and White, 2010, Andrews et al., 2011). There is a need to consider the influence of a policy at the aggregate level using random representative samples to be able to generalise for the population, particularly as this is the basis at which the policy is administered.

Given that the Boomers are considered to be so different in relation to former cohorts of older people, exploration of the mobility of cohort groups in relation to others is required to understand processes of change in the context of the changing mobility of older people. It is crucial to understand how the mobility of cohorts develops to be able to consider the impact on transport systems.

1.2. Research Aims

The following knowledge gaps (discussed in more detail in Chapter Two) are addressed in the thesis:

- There has been a lack of research into the aggregate mobility trends of the older population. Much of the current research considers the mobility of older people at single points in time and there is a need to consider trends over a longer time span.
- Although some existing research recognises the presence of cohort effects in the mobility of older people, these tend to focus on the Boomer cohort, when they were at earlier life-stages associated with 'mid-life' and current cohorts of older people. Much less consideration has been given to the mobility patterns of the Boomer cohort as they enter retirement (due to temporal effects), as well as the mobility of subsequent younger cohorts.
- Although there have been a variety of studies into the influence of concessionary fares, much of this research is based upon modest sample sizes, in a particular locality. There has been a neglect of the use of random representative samples in a Scottish context to be able to generalise the results to the population.

The wider objective of the thesis is to apply a longitudinal demographic perspective to exploring mobility by applying a cohort analysis approach to mobility studies. This will provide new insights into the changing travel behaviour of the older population. In line with this objective, three aims have been developed to achieve this:

1. Explore the mobility trends of older people in Britain.

2. Conceptualise the relationship between cohorts, ageing and mobility of older people, over time and through space.
3. Understand the influence of financial incentives used in transport policy on the mobility of older people, and how this may vary between cohorts and lifestyle groups.

A quantitative approach using cohort analysis has been adopted for this study and is used to address the research aims as it allows for analysis of trends at the aggregate level. Large scale secondary data sources already exist over a long time period. Using these surveys, which consist of large random representative samples, is preferable so that the findings can be generalised to the population.

1.3. Thesis Structure

The background to the existing understanding of the mobility of older people is continued in Chapter Two. Concepts of mobility are discussed with an outline of how it has been approached in existing literature. The determinants of mobility are considered and how these have contributed to a mobile society characterised by population dispersion and high car use. Social exclusion and accessibility issues are discussed before considering existing studies on the mobility of older people. Finally a review of the existing literature on the effects of the concessionary policy on older people's mobility, and critical assessment of it as an age/life-stage based policy, is undertaken.

Chapter Three outlines the research methodology which includes cohort analysis as an approach to understand mobility change amongst older people over time. The innovative 'difference-in-difference' technique to establish pseudo control groups which was used to assess the influence of the Scottish concessionary scheme is described along with a discussion of its usefulness in understanding policy impacts. It also presents and justifies the definitions that have been adopted. The availability of secondary data sources are considered with the National Travel Survey and Scottish Household Survey selected as these provide the most comprehensive detail on British travel patterns, which can be linked to socioeconomic characteristics. A description of each dataset is provided along with a justification of the suitability (and caveats) of each source to address the research questions.

Chapter Four presents the mobility trends of the older population from 1995-2008 using National Travel Survey data to ascertain if there had been increases in the mobility amongst older people; increased use of the private car; and convergence of gender differences in mobility over time. As significant differences were observed in the trends, further investigation into the mobility of cohort groups was undertaken to understand the role of cohorts contributing to these trends, which is the focus of Chapter Five.

Chapter Five uses descriptive cohort analysis in conjunction with multiple linear regression models to identify the presence of age, period and cohort effects to explain the observed change in distance travelled between age and cohort groups. Significant differences in mobility were found. Given that the mobility of the older population is changing in line with the differentials in mobility between cohorts, an assessment of specific targeted policy towards older people is required to ascertain its suitability and whether this will hold over time. Therefore, Chapter Six assesses the impact of the National Concessionary Travel Scheme on older people's mobility in Scotland as the availability of data allows for analysis of the change in mobility patterns amongst older people as a result of a change to the scheme in April 2006.

Chapter Seven seeks to draw together the key findings from each empirical chapter and relate them to the existing literature to develop understanding of the changing mobility of the older population in Britain. A discussion of the wider conceptual issues of the changing mobility of older people in relation to cohort groups is presented. The future implications of older people's mobility are also considered within this context as well as the related policy implications. Finally, Chapter Eight provides a conclusion to the study, outlining how the findings and the use of cohort analysis in understanding changing mobility of older people has implications for the disciplines of transport geography and population studies in terms of how studies relating to ageing and mobility are approached.

2. Literature Review

2.1. Introduction

The mobility trends of the older population have been somewhat neglected in transport geography, particularly in Britain. Existing studies have tended to use cross-sectional data to focus on the mobility patterns, barriers to mobility and experiences of mobility at one point in time. By contrast a longitudinal demographic perspective allows a richer understanding of the drivers of mobility change. For example, it has been recognised that the Boomer cohort are likely to have different mobility patterns in the future when they are of older age, compared to former cohorts of older people (Spain, 1997, ECMT, 2000, Coughlin, 2009). Given these differing characteristics compared to previous generations, it should be questioned as to whether the ageing of the population will result in the future older population facing the same mobility issues and challenges as suggested by existing literature. Existing assumptions of older people being immobile may be less significant.

Cohort analysis includes the use of methods to distinguish between three types of time-related variation; age effects (variation associated with different age groups), period effects (variation over time periods that affect all age groups simultaneously), and cohort effects (changes across groups of individuals who experience an initial event such as birth during the same year or years). It has been widely used to study time-specific phenomena in demography, sociology and epidemiology (Yang, 2007). Examples include: home ownership (Bottazzi et al., 2011); social inequalities in happiness (Yang, 2008); smoking trends (Davy, 2007); depression in adult women (Kasen et al., 2003); and cancer incidence and mortality projections (Bashir et al., 2001).

Cohort analysis has been utilised in some studies on travel behaviour of older people (Hakamies-Blomqvist and Henriksson, 1999, Newbold et al., 2005, Hjorthol et al., 2010, Frändberg and Vilhelmson, 2011). This approach provides a novel opportunity to combine and bridge the disciplines of transport geography and population studies which could benefit from one another. There is scope to broaden this approach, as well as conduct this in a British context, to encompass the mobility of younger cohorts to understand the changing mobility of older people in line with the ageing of cohort groups, particularly as subsequent cohorts will also have higher life expectancies.

As cohorts have different mobility patterns, current policy developed to encourage and maintain the mobility of older people has been based upon the assumption that the cost of transport is considered to be a major barrier to mobility for older people, due to them having low incomes as a result of relying on pensions. Concessionary schemes remove the cost of

transport as a barrier to mobility by providing free bus travel, thus improving the mobility of older people.

There is a growing recognition that due to higher incomes associated with the Boomer cohort, cost as a barrier to transport will become less significant. In the current recession and climate of austerity there are concerns that existing policy is neither effective nor fair. One of the challenges associated with an ageing population is concern about the financial sustainability of continued welfare policy. Zaidi et al. (2010) also note that social sustainability is important, which includes an inter-generational solidarity aspect in addition to ideas of adequate welfare and financial sustainability. The notion of social sustainability requires that a balance is achieved between the distribution of resources across different generations at a single point in time (e.g. between younger and older people).

Inter-generational equity can be conceptualised as fairness or justice concerning the relation between generations in a range of different contexts. This concept can be applied to environmental, financial and social issues (Tremmel, 2006) and can be taken to mean the: “equitable distribution of benefits and burdens across different generations” (Page, 2007, p.453). Higgs and Gilleard (2010) highlight that there has been a resurrection of the theme of inter-generational conflict in modern welfare states due to the financial crisis in 2008 and resulting economic recession. This renewed focus on generation is framed around issues of perceived fairness in the distribution of welfare resources in an era of individualised welfare. In UK there has been particular focus on the increasingly unequal distribution of wealth and housing between generations, most notably between the Boomers (who have largely benefitted from economic growth and the welfare state) and younger cohorts (who are currently experiencing high levels of unemployment in conjunction with a reduced welfare state) (Willets, 2010). Older people, as well as younger adults are eligible for concessionary fares. However, there are differing trends between them with declining driving licence holding and car ownership amongst younger adults, whilst the opposite is true for older people.

The aim of this chapter is to draw together existing research that has been undertaken on changing mobility, particularly in relation to the older population. A consideration of the different concepts of mobility is given with a review of how it has been measured over time. The determinants of mobility, including the influence of policies that have altered transport networks alongside rising incomes contributing to increasing car use in society and how this has led to changing mobility amongst the older population as well as contributing to some of the social exclusion and accessibility issues faced by older people.

A review of existing literature on the mobility of older people will be presented. The importance of adopting a cohort approach into the study of the mobility of older people will be outlined, illustrated by the different characteristics that the Boomer cohort display in relation to

current and former cohorts of older people. An examination of the previous studies on the impacts of the concessionary schemes will also be provided as this policy is specifically targeted at the older population.

2.2. Mobility

'Mobility' is a distinctly different concept to that of 'accessibility'. 'Mobility' can be defined as the potential for movement, the ability to get from one place to another and to move around, whilst 'accessibility' can be thought of as an ability to get what one needs, by getting to places where these needs can be met. However, there may be impedance factors, such as time or cost of reaching a destination. These terms may be confused due to the relationship that exists between them, as mobility, being the potential for movement, is related to the impedance component of accessibility i.e. how difficult it is to reach a destination. It should be noted that people may have good accessibility, but poor mobility, and it is also possible to have good mobility but poor accessibility (Handy, 2005).

As the term 'mobility' has multiple meanings, it is imperative to consider the varying definitions of the concept. Traditionally studies of mobility have operated within quite confined disciplinary spaces (Pooley, 2009). This can be illustrated through the different uses of the term mobility in the disciplines of transport studies and population studies. The concept of 'accessibility' is considered more fully in Section 2.3.

2.2.1. Concepts of Mobility

In a geographical sense, mobility operates at a wide range of spatial scales and temporal periodicities, which can be from shorter distance everyday movements from a permanent home such as commuting, or can involve travelling longer distances for holidays (Nutley and Thomas, 1995). These movements that do not usually involve a change of residency are considered largely within the remit of transport studies, as they usually involve different modes of transport and interactions with transport networks.

This mobility must be distinguished from migration and changing of residential relocation of populations at regional and international scales, as well as seasonal movements. However, mobility in the migration sense is part of a 'mobility continuum' with residential migration at one end of the spectrum and everyday movements in the home at the other (Pooley et al., 2005b). Mobility as residential migration is understood this way largely in population studies, which occurs across various scales from the local to the international. Pooley (2009) suggests there is increasing interaction and blurring of distinctions between these different types of mobility as well as substitution between them as opportunities for greater mobility have allowed at least some people to exchange commuting for residential migration.

Towards the centre of this spectrum, 'circulation' or 'cyclical mobility' occurs which is the movement between two or more homes, such as children moving between homes, which blur the distinction between everyday movement and residential migration. However, Zelinsky (1971) refers to this as 'circulation' which is the movement of people that are short-term, repetitive, or cyclical movement flows of people rather than meaning migration as these circulated movements are those which do not involve a long-lasting change in residence, illustrating that this term and concept is open to varied interpretation. It is also recognised that, although the term 'mobility' is treated differently in these disciplines, each has an effect on the other. Residential location can influence transport modes used (Stanbridge et al., 2004) and there has been evidence of substituting commuting for residential migration (Pooley et al., 2005b) and vice versa (Cooke, 2011).

Mobility in the spatial or geographical sense means making journeys using modes of transport, or by walking, to obtain goods and services (Nutley and Thomas, 1995). This mobility can be taken to refer to everyday movements undertaken as part of a lifestyle routine, which are usually outside the residential home and tend to be shorter and more repetitive in nature, such as shopping. Mobility in this sense is also considered as travel behaviour. This is related to the transport modes that people use and how far these enable them to travel and it is commonplace to measure this mobility in terms of trip frequency, distance travelled and transport mode used (Tacken, 1998, Rosenbloom, 2004, Páez et al., 2007). Attention has also been paid to mobility linkages with activity patterns (Hildebrand, 2003, Scott et al., 2009). Metz (2000) argues that the concept of mobility should include the recognition of several dimensions such as access to places that older people desire, the psychological benefits of travel, benefits of physical movement, maintaining social networks and potential travel. Mobility is also taken to mean the general movement of older people, which can be restricted in later life.

This long accepted understanding of mobility in transport studies is being augmented with the development of the 'new mobilities paradigm' (Shaw and Hesse, 2010). The 'new mobilities paradigm' has broadened the concept of mobility, incorporating the notion that mobility itself has become a significant activity rather than simply a means to travel from place to place (Pooley, 2009). The development of information communication technologies (ICT) has brought about opportunities for virtual mobility (Pooley et al., 2005b) and aside from being a form of mobility, it can also enhance other forms of travel, making them productive working and leisure spaces. Jain and Lyons (2008) have re-conceptualised travel time as a 'gift' under the framework of mobilities research. Law (1999) argues that 'transport' should be replaced with 'daily mobility' to signal a new framing of the topic within social and cultural geographies of mobility. Therefore concepts of mobility are mutable and everyday mobility should be seen as part of a much larger set of interacting processes (Pooley, 2009, Hanson, 2010).

Mobility can therefore be conceptualised as the overcoming of any type of distance between a here and there, which can be situated in physical, electronic, social, psychological or other kinds of space (Ziegler and Schwanen, 2011). This conceptualisation moves beyond the notion that mobility takes place outside residential dwellings, which has been traditionally studied within transport geography. The study of these spatial aspects are usually associated with empiricist (and positivist assumptions) of methods of data collection and modelling (Shaw and Hesse, 2010). Mobilities research has called for the development of new 'mobile methods' that tend to be qualitative in nature (Büscher and Urry, 2009).

This paradigm has not completely redefined the notion of mobility as travel behaviour, with many studies still conceptualising mobility quantitatively. Rosenbloom (2004) defines mobility as the trip rate by all modes. Other indicators such as distance travelled, time taken, activity patterns and journey purposes can be used and continue to be used as a way of understanding changes in mobility. It is also important to note that across many studies 'mobile' is also understood as 'motorised' across western societies (Kaiser, 2009), particularly where studies concern transport and quality of life in relation to the older population.

Pooley (2009) argues that it is also important to consider 'mundane' everyday mobility which tends to be shorter in nature, rather than more 'extreme' long journeys, as this has been neglected within the literature. Everyday mobility can be defined as all travel from the home undertaken on a temporary basis (Pooley et al., 2005b). In line with this, for this research, mobility is to be considered as overcoming outdoors distance using a variety of transport modes, as this is the mobility, the ability to 'get out and about' (Metz, 2000, p.150), that is frequently considered important for quality of life of older people (Mollenkopf et al., 1997, Banister and Bowling, 2004, Gabriel and Bowling, 2004, Schwanen and Ziegler, 2011). This definition of mobility can be measured and monitored using different indicators of mobility that have been traditionally used, such as trip frequency, distance travelled and mode share. This will also allow for comparison with the majority of other studies that consider changes in mobility.

2.2.2. Measurements of Mobility

Traditionally quantitative approaches have been adopted in the study of travel behaviour and mobility. The use of travel surveys of large datasets have been utilised to gather trends of how population groups are behaving in relation to a multitude of variables. Data is available on travel patterns, usually categorised by age groups (Tacken, 1998). Indicators of mobility can be used to understand how populations travel in relation to different variables such as income and influence on transport mode, distance travelled and number of trips undertaken. Su and Bell (2009) suggest that mobility should not be measured simply in quantity terms such as trip frequency and distance travelled, however, it is important to understand travel

patterns and mobility at an aggregate level, particularly as policy for older people has been designed at this level.

Transport has been viewed as a derived demand and one that has no inherent value in itself. People only travel due to the benefits received at their destination (Banister, 1999), usually derived from the pursuit of activities (Su and Bell, 2009). In line with this view it is assumed that most people will minimise travel times and costs, therefore trips should be as short as possible and a close link exists between land use activities and trip generation. The minimisation of travel costs and time is in line with neoclassical theories about behaviour. This is also known as 'value of time', where it is assumed individuals will pay for faster travel (Wardman, 1998, Asensio, 2002). These theories assume that people have rational preferences about outcomes that can be identified and associated with a value. Individuals act as if they are weighing up the costs against the benefits which results in actions that maximise personal advantage. It also assumes that people have access to perfect information and therefore act independently based on this information.

This view on behaviour has been criticised as it makes overly unrealistic assumptions of individual behaviour and by assuming that people act in this rational way, ignores important aspects of human behaviour which are complex. It has been suggested that travel behaviour tends to be habitual as people familiarise with transport modes and routines (Gärling and Axhausen, 2003, Schlich and Axhausen, 2003, Stanbridge et al., 2004). With the development of mobile communications there are also suggestions that travel is valued with people working on the move (Lyons et al., 2007) and that is an embodied act which has meaning (Sheller and Urry, 2006). As mobilities research came to the fore there was a move away from analysing quantitative data at aggregate level towards qualitative research methods.

Consideration of mobility patterns at the aggregate level led to the 'predict and provide' approach to transport policy. This was highly car-centric and catered to car growth. This approach meant that the needs of minority populations without access to a car were overlooked. Observations of increased car use led to more roads being built, coupled with observations of reduced public transport patronage which caused a reduction in bus services (Knowles et al., 2008). The transport difficulties minority groups faced were realised through the adoption of qualitative techniques to understand mobility and limitations of these groups. More recently the new mobilities paradigm has influenced work on older people but this has tended to be smaller in scale and emphasising the nature of in-home movement by employing qualitative methods (Burnett and Lucas, 2010). Broadly there have been shifts from analysis of general trends towards specific issues in travel behaviour research.

Mobility is a complex process and there are many determinants of mobility as there are interactions with a wide variety of factors (Pooley et al., 2005b). Over time there have been great changes in the way people travel in the UK, from slower modes such as walking and public transport to faster modes which enables travel over longer distances. These have arisen in line due to various changing land use patterns, partly as a result of post-war development policies. It is necessary to consider the external changes as the location of people in relation to the amenities and services they require have impacted on the way people choose to travel and how these have been influenced over time.

2.2.3. Policy Context of Understanding Mobility

Firstly, this section outlines the reasoning for state involvement in transport and the various policy and paradigm shifts that have occurred over time in the UK. Transport and land use policies have played a role in changing travel behaviour and the manifestation of social exclusion has been reflected and reinforced through these various policies. This section considers the ability of policy instruments to influence mobility as well as their effectiveness in doing so. How government has attempted to change individual and collective travel behaviour using these instruments, to lessen some of the impacts behaviour has on the wider economy, environment and society, is also considered.

Although the use of transport is ultimately engaged in by individuals, the state is involved in the delivery of transport and land use planning as there are many economic underpinnings and structural issues such as the existence of 'public goods' and monopoly power which create 'market failure' (Headicar, 2009). The state intervenes in order to minimise the negative environmental and social externalities produced from transport systems and to rectify some of these failures.

The aims of UK transport policy are broadly three-fold in nature, concerned with the environment, economy and society and frequently intertwine with each other. For example, infrastructure building to promote economic growth led to increases in traffic growth which has negative environmental and social impacts in the form of air and noise pollution and reduction in public transport, thus reducing economic opportunities for population groups without access to a car.

Broader objectives have been encompassed in transport policy in recent years, which are defined as: stimulating economic growth, alleviating congestion, reducing environmental impacts, increasing mobility and accessibility, improving safety and promoting equity. Different transport strategies are used to achieve these aims and each strategy has different assumptions about how people behave and respond. The strategies used in the UK have changed over time in line with changing ideology from hard investment and development of

infrastructure, towards demand management tools including regulation and pricing, along with the use of subsidies and incentives to promote modal shifts to combat the problems (as well as having created some of them) that are associated with travel by the private car.

2.2.3.1. Transport and Land Use Policy

The first policy instrument available for government to use involves physically altering the transport network to improve the operational performance of networks, as well as lessen negative environmental or social impacts (Headicar, 2009). This falls under the remit of transport and land use policy. Changing land use patterns have contributed to car dependency along with rising incomes and falls in the real cost of motoring. These have also contributed to issues of social exclusion and accessibility.

It has been widely accepted that for economic growth effective transport is a key requirement. (Eddington, 2006, Knowles et al., 2008). Rising incomes are associated with economic growth (Headicar, 2009). In the UK and other countries as incomes have increased, car ownership has also risen and therefore led to an increase in mobility. The move from public to private transport in mid-20th century is reflected through the changing urban structure of cities that have been influenced by policy (Pooley et al., 2006, Power, 2012). Trends in land use have been affected by other factors including rising real income; social change (household structure and demographic change, less nuclear families); increased population diversity; shift to information based economy leading to increased location mobility of economic activity (Giuliano, 2004).

During the inter war period in the UK, there was a process of suburbanisation as the urban population migrated to new suburban estates located on the edges of cities. Post-war urban planning was concerned with rebuilding infrastructure, which was encouraged through the 1947 Town and Country Planning Act, imposing a duty on local authorities to produce development plans. The 1946 New Towns Act and 1952 Town Development Act gave way to planned decentralisation away from cities.

Technology allowed for the location of company headquarters in cities, whilst distribution centres, warehouses and factories could be located on the periphery of urban areas on cheaper land. This contributed to another process which encouraged the migration of people even further away from city centres: counter-urbanisation, the relocation of the urban and suburban population into rural areas. Processes of suburbanisation and counter-urbanisation have contributed to the relocation of employment, services and residencies to peripheral estates giving rise to development of highway networks (Power, 2012).

Transport policies during the 1950s and 1960s promoted car use as trends in travel and land use complemented and reinforced one another. This was also an era of rising incomes which contributed to increased car ownership. As people living in suburban areas tend to have higher incomes, this increases the probability that they will also be car owners (Asensio, 2002). Increased car ownership further generated demand for highways as this was reflected in aggregate level trends, leading to the 'predict and provide policy'. This led to the creating of further highways, as this approach aimed to 'build out' congestion (Giuliano, 2004, Headicar, 2009).

Issues of inaccessibility arose amongst minority population groups without access to car, including older people, caused by this development and the relocation of services to urban peripheries. The presence of large roads through towns also caused the loss of street life and severance of communities. Rising congestion as a result of induced traffic led to concerns about the negative impacts of traffic on communities. Recognition of the conflict between traffic growth and pedestrians in the 1960s came about through two key reports: the Buchanan Report (1963) and the Smeed Report (1964). These reports identified the need for transport to be integrated with land use planning and also led to the abandonment of urban motorway building (Headicar, 2009).

Publication of the Bruntland Report in 1987 ignited awareness of the detrimental impact of motorised transport on the environment, with depletion of natural resources and carbon emissions being of main concern. The Agenda 21 sustainable development action plan in 1992 outlined a shift towards local sustainability. These reports signalled a paradigm shift toward sustainability in policy during the 1990s. Localised, rather than national, strategies were promoted in line with 'new localism' in the urban environmental debate which argues that environmental policy initiatives at the local level will be more effective in the development of sustainable communities (Marvin and Guy, 1997).

As environmental concerns rose higher up the political agenda, the integration of land use and transport planning attempted to redress some of the issues associated with a car-dominated system. This included the promotion of sustainable travel and became central to sustainable development.

Planning Policy Guidance (PPG) 13 in England and Wales was instrumental in placing the issue of transport and land use integration at the centre of local authority agendas (Banister, 1999). PPG13 encouraged denser settlements through the promotion of development in areas accessible by public transport, thereby strengthening existing local centres offering local amenities and reducing the need to travel. This was to achieve broader aims of reducing traffic congestion and carbon emissions and promote sustainability by improving mode choice for people combined with limited parking provision to discourage reliance on the private car.

This policy also assists with redressing issues of social exclusion by improving access to destinations.

In addition a policy shift dubbed the 'New Realism' (Goodwin et al., 1991) rejected the idea that road supply could and should be continually expanded to match demand and thus symbolised the end of 'predict and provide' policy (Docherty and Shaw, 2011). Components of the 'new realism' were based on implementing coordinated packages centred on travel by sustainable and public transport modes. As a result the number of new roads being built declined in the mid-1990s, leading to an increase in congestion. The 1998 White Paper entitled 'A New Deal for Transport' further strengthened the links between regional transport and land use planning leading to the creation of five year Local Transport Plans (LTPs) in England, enacted by the 2000 Transport Act. LTPs emphasised integrated transport solutions in order to encourage sustainable travel.

Transport systems need to take into account the capabilities of the people using them, how safe they make them feel and how much independence they allow those using them in order to be beneficial to wellbeing (Glasgow and Blakely, 2000). It has been recognised that transport policy has contributed to some problems of immobility amongst groups at risk of social exclusion, particularly those without access to a car. Accessibility planning has risen to the fore in transport policy in recent years in an attempt to solve some of these issues. There is now a requirement for Local Authorities to ensure developments are accessible by a variety of transport modes. However, Marsden et al. (2010) found that assumptions made by Geographical Information Systems (GIS) software used for accessibility planning did not cater for the specific needs of older people.

Studies have found that due to age-related disabilities and lower incomes, current cohorts of older people are less likely to drive or own a car owing to driving cessation. Whilst it has been recognised that this may not be the case for all older people and the Boomer cohort, policy has been developed specifically to target the continuing mobility of older people via public transport. However, there has been a substantial decline in rural public transport over the last 50 years, combined with real rising fares as decreases in the real cost of motoring encouraged car use (Pooley et al., 2005b). There were also a series of policy initiatives during the 1980s that contributed to the decline in public transport services.

2.2.3.2. Regulation

The second policy instrument available for government to use is regulation which refers to "legally enforceable conditions required of people engaging in transport" (Headicar, 2009, p.207). These can be used to influence the behaviour of travellers and transport operators in the use of transport networks. This includes the use of fiscal measures to encourage changes

in travel behaviour. Governments have been involved with the changing ownership and regulation structure of the bus system, which along with changing land use policy, have led to increasing use of the private car for transportation and contributed to accessibility difficulties those without a car face.

The 1968 Transport Act made changes to the structure of nationally owned bus companies and Passenger Transport Authorities (PTAs) were created to take over public transport in large conurbations. PTAs' responsibilities were administered through Passenger Transport Executives (PTEs) to whom were transferred municipally owned bus companies in the area. National concession provision was also first included within this Act (Headicar, 2009). The 1985 Transport Act deregulated the public transport bus system, opening it up to competition and was a wider movement associated with the Conservative government at the time. The assumption was that a free market would deliver these services in line with consumer demands as well as reduce costs and promote innovation. This theory has been strongly challenged as the most profitable routes were taken over by private companies leading to oligopolistic control of transport markets, as opposed to competition (Knowles, 2006). Deregulation also led to fare increases, making the car more attractive in terms of costs causing further increases in car use. The gaps that were left in the system were the responsibility for local authorities to fill by providing subsidies for socially necessary services and concessionary passengers to ensure a continuing service.

Under the New Labour Government in 1997, emphasis was placed upon Quality Partnerships between bus operators and local authorities to implement LTPs and bring complementary investment into services, as a way of improving public transport services after deregulation. PTAs were renamed as Integrated Transport Authorities (ITAs) under the Local Transport Act 2008 with Passenger Transport Executives (PTEs) responsible for public transport in local areas. This illustrates the shift away from nationally focused policy, towards localised planning with the aim to provide services that meet the needs of local people.

Public transport vehicles are required to be accessible under the 1995 Disability Discrimination Act (Headicar, 2009). However, other aspects of public transport can result in barriers to its use particularly for older people if there are long waiting times and walking distances are involved. It has also been highlighted that driver behaviour may also prevent older people from using buses (Hine and Mitchell, 2001, 2003, Guiver, 2007, Dobbie et al., 2010).

The regulation of traffic using measures such as pedestrian crossings, reduced speed limits and other traffic calming engineering techniques have been used to change the character of highways to reduce speed of vehicles thus making areas safer for more vulnerable users, particularly pedestrians.

Drivers of private vehicles are required to pass a test in order to obtain a licence to ensure competence as well as being a means of sanctioning drivers convicted of traffic offences (Headicar, 2009). In the UK there is an age limit on driving licences valid until 70 years of age. An application must then be made to renew a licence, which is normally valid for three years. Assumptions of older age are reinforced in this way as age-related disabilities deem older people are unfit to drive, and as such require monitoring.

Demand responsive transport (DRT) includes the use of taxis and 'dial-a-ride' services to meet social needs, particularly for older people who do not have access to alternative transport. Eligibility is determined by local authorities or charities that arrange the times and route of journeys and may also provide funding. Community transport is an umbrella term used to encompass transport services that operate on a 'not-for-profit' basis and are tailored to specific needs compared to public transport and tends to be devolved to charitable and voluntary organisations although they may receive funding from local authorities (Headicar, 2009). These assist in redressing some of the social exclusion issues faced by older people by serving low-density suburban and rural areas and their specific transport needs. These schemes have been long running prior to the identification of socially excluded groups within policy arenas. Other transport policies have been specifically targeted towards older people to cater for their travel needs, particularly through the use of fiscal measures.

Fiscal measures are interventions which affect payments made or received for transport goods and services and are used to influence travel behaviour. This includes the levying of taxes, such as congestion charging, as a means of discouraging or incentivising particular behaviour. Whilst they retain discretion amongst individual travellers, they can also discriminate against those who are unable to pay (Headicar, 2009). Fiscal measures also include the payment of subsidies for the provision of transport services or concessionary fares, usually to bus operators as a combined package for the continuation of these services. Strong effects have been observed when subsidies are used (Willson and Shoup, 1990).

2.2.4. A Mobile Society

Themes of mobility transition have been developed through time-space convergence; that is the shrinking of space through the ability to move faster due to effects of transport innovation (time-space divergence has also been acknowledged by (Knowles, 2006) as well as time-space compression; that is the speeding up of space and time through the need to fit a greater range of activities into increasingly complex lives (Pooley et al., 2006, Urry, 2002b, 2007). This has been brought about by developments in transport and technology.

Long distance communications have improved with developments in rail systems and telecommunications and rural infrastructure. Counter-urbanisation has led to services and

amenities locating further away from city centres. Retail patterns have also changed as larger retail parks and supermarkets have also located in peripheral areas, leading smaller, local shopping units to close. People have also moved into these spaces as it became easier to commute into city centres for employment. This combination has led to the production of increasingly dispersed lifestyles, creating a greater need to travel and increasingly complex cross-city journeys that are hard to accomplish using public transport (Pooley et al., 2005b).

Public transport services have failed to adapt to changes in land use and activity patterns as these tend to be concentrated in urban centres that run on fixed main arterial routes where they are the most profitable. The car is more flexible and enables people to travel further to undertake more activities and enables travel intensive lifestyles (Pooley et al., 2006). The development of ICT and electronic media enabled the ability to communicate other than face-to-face contact. Coupled with car access, this has allowed for more dispersed households and flexibility in activity patterns leading to increasingly complex and dispersed travel patterns. Development in technology and telecommunications has enabled people to carry out tasks via a computer, telephone and internet connections, reducing the need to travel for personal and commercial business purposes. Fixed employment locations are also becoming less important in an increasingly service-based economy (Lyons et al., 2002).

These greater mobility opportunities allowed at least some people to exchange commuting for residential migration, as they choose to travel longer on a daily basis rather than move to a house closer to work. There have also been changes in the organisation and composition of western families which includes a reduction in mean family size and dispersal of kin produced by greater long-distance residential mobility (Pooley et al., 2005b). This highlights that there has been some substitution between different types of mobility (Pooley, 2009).

2.2.4.1. Car Use and Changing Technology

Structural changes have made access to transport modes more accessible (Pooley et al., 2006). Nearly a third of households now have access to two or more cars, which has become higher than the proportion of households without access to a car according to the Department for Transport (DfT, 2010a). Combined with the increase in low-cost airlines and new mobile communications people are able to travel further, faster and more frequently and interactions that previously necessitated face-to-face contact can be carried out virtually (Pooley et al., 2006).

Travel patterns have become highly motorised and people have become dependent on cars as a result of the decentralisation of residencies, employment, goods, services and amenities. People have been often 'forced' to travel further distances to carry out basic activities (Lucas et al., 2001) due to the relocation of services to peripheral locations that are largely

inaccessible without a car. Car use is a significant component of everyday travel and has increased as disposable income has risen, against a backdrop of a small increase in the real cost of motoring and rising real costs of public transport fares. Road traffic in Great Britain has grown substantially: between 1978/9 and 2008 the distance travelled by the average Briton rose by more than 2,000 miles a year, from 4,800 to 6,900 miles with distances travelled by car increasing during this time (ITC, 2010). However, car travel per capita has ceased to grow in recent years in Britain (Lucas and Jones, 2009), leading to some commentators to suggest that traffic growth has 'peaked' (Goodwin, 2012) and that demand for travel has 'saturated' (Metz, 2010). Traffic levels are affected by economic conditions, fuel prices, levels of car ownership and number of drivers.

The increase in travelling by private car is not confined to the UK, but similar developments have also been occurring in other western and developed regions, such as North America, Australia, New Zealand and Western Europe. Between 1971 and 2006, global transport energy use rose steadily by 2–2.5% per year according to the International Energy Agency (IEA, 2009). As the economies of the developing countries increase, car use is also set to rise in these countries as well.

Pooley (2009) argues that there is a strong sense of path dependency in the history of everyday travel. Once certain transport modes are established they acquire such economic, social and cultural significance that it is difficult to change. The car has enabled broadening of travel horizons where they were once restricted to local areas (Pooley et al., 2005b). Subsequent cohorts are becoming more accustomed to travelling further especially with development of low cost airlines, which Pooley et al. (2006) argue has contributed to changes in mobility aspirations.

Mobility has a cultural function as movement acquires meaning and can contribute to the construction of personal identities (Urry, 2007). Everyday movement is also part of the process by which individuals gain knowledge of the space they inhabit and thus helps give meaning to place and space (Holloway and Hubbard, 2001, Urry, 2007). The car itself has become a cultural symbol as it has become more than just a means of transport. It is a possession and a space that can be personalised and used to make statements about the self (Pooley, 2009); for older people they can represent independence (Davey, 2007). Pooley et al. (2005b) also suggest that everyday mobility in a variety of scales from migration to travel to virtual mobility contributed to producing individual and group identities. Routines of travel may be reinforced by habits. This is also leading to construction of new cultures of mobility (Findlay et al., 2001, Pooley et al., 2006).

Other transport modes have different cultures associated with them. For example, a 'jet-setter' will make greater use of air traffic, while a cyclist chooses a more environmentally

friendly mode of transport. It has also been recognised that mobile communications are changing the meaning and nature of travel (Lyons et al., 2007). ICT is also changing the meaning of journeys with Jain and Lyons (2008) referring to travel time as a 'gift' rather than a disutility. It is also contributing to changes in identity (Pooley et al., 2005b). New technology such as the smartphone³ are of increasing importance away from the car, leading to individualised statements especially amongst younger people and perhaps contributing to a phenomenon termed as 'peak car', whereby mileage per capita has 'peaked' (Goodwin, 2012).

2.2.4.2. Gender Differences

The discussion so far has centred around factors that influence mobility that are external to the traveller and reflect structural constraints which include prevailing transport technology, urban structure and transport networks. However, these factors can be mediated by individual circumstances. These include age, gender, socioeconomic group or income, and household structure (Pooley et al., 2005b).

Gender differences in mobility have been well documented in the literature with women usually travelling shorter distances compared to men (Turner and Niemeier, 1997, Law, 1999, Pooley et al., 2005b, Rosenbloom, 2006). These differences arise largely due to the different roles that men and women have in society which produces different activity patterns. These have been largely explained through the division of household roles and labour market dynamics as men tend to travel further to places of employment compared to women. Women tend to have spatially constrained opportunities for paid employment and are more likely to have local part-time work that are close to the home (Sarmiento, 2000, Lyons et al., 2002, McQuaid and Chen, 2012).

Women's demands from transport and experiences compared to men differ as they tend to have multiple roles. Women tend to make a greater number of trips and trip-chain to meet household and childcare needs and employment. Trip chaining is where a journey made by an individual involves undertaking several activities, rather than making a single trip for a single activity (Lee et al., 2007, Primerano et al., 2007, Schmöcker et al., 2009). Due to differences in commuting patterns men tend to travel further than women. In 2008 they travelled 7,560 miles per year on average, whilst women travelled on average about 1,250 miles less (DfT, 2010b). Differences in mode use have also been observed between men and women with women more reliant on slower modes such as walking and public buses (Polk, 2004, Best and Lanzendorf, 2005, Pooley et al., 2006).

³ A Smartphone is a mobile phone that also incorporates a computer operating system to enable internet access and use of computer applications similar to a personal computer.

Men are also more likely to have a driving licence compared to women but the proportion of women having a licence has been increasing at a faster rate (DfT, 2010b). Although men are driving nearly twice as far as women on average, since 1995/97 there has been an increase in average distance travelled by 23% by women as car-drivers. In contrast, the average distance travelled as a car-driver for men fell by 11% (DfT, 2012). Traffic congestion could partly explain the decrease in distance travelled by men, if they choose to work closer to home or ICT is assisting people to work from home.

Combining all modes, the average distance travelled rose by 10% for women, whilst men's average distance travelled fell by 6% (DfT, 2010b), suggesting that the gender gap in distance travelled is reducing. Other studies have also found that gender differences in mobility have been converging at the aggregate level (Noble, 2005, Rosenbloom, 2006, Frändberg and Vilhelmson, 2011, McQuaid and Chen, 2012). Pooley et al. (2005a) suggest that constraints of both childcare and ageing are substantially less for women today than they were in the 1960s.

There has also been a wealth of literature on the impact of fear of crime on behaviour, particularly of women, including older women (Pain, 1995, 1997b, Koskela, 1999, Koskela and Pain, 2000). However, Pooley et al. (2005a) observed that men may have similar concerns in older age.

Due to differences in transport by men and women there have been calls for consideration of gendered mobilities and greater need for disaggregation of mobility to consider the differences between men and women. There is a growing recognition of gender and mobility and its link to mobilities research (Law, 1999, Hanson, 2010).

2.2.4.3. Unequal Mobility

One enduring feature of everyday travel is the relatively unchanging nature of mobility inequalities. Contemporary mobility theory emphasizes the large-scale changes that have occurred within society, but not everyone has participated equally in these changes, such as the increase in car ownership (Pooley et al., 2005b).

Knowles (2006) puts forward the notion of time-space divergence and argues that transport networks have helped to shape patterns of development. These networks have led to the differential collapse of time-space, rather than a widely assumed uniform time-space convergence. Collapses of time/space have been uneven spatially, economically and socially and have created a 'misshapen world' in terms of travel time, accessibility and personal mobility.

Lucas (2004) argues that transport networks have been designed to cater for movement rather than improving access to services. There has been a history of locating services without considering residential location of populations needing them. Suburbanisation has also created disadvantaged neighbourhoods that consist of low-income households in cut off or severed communities. Car ownership tends to be lower yet these areas experience greater levels of traffic due to the dispersal process which encourages traffic growth and polarisation of neighbourhoods (Power, 2012).

Access to transport is unequal both within and between areas, restricted by income, disability, age and gender as well as by location (Knowles, 2006). Women have experienced more mobility disadvantage than men, whilst both the young and elderly are likely to have restricted mobility (Pooley et al., 2005b). Low income households spend a greater share of income on transport but drive and travel shorter distances (Knowles, 2006). Those on lower incomes are also more likely to walk, use buses (which may not visit the 'right' destinations at the 'right' time) or taxis (which are expensive) as well as rely on lifts from family and friends (Hine and Mitchell, 2003, SEU, 2003, Lucas, 2004).

As economy and society have become highly mobile, problems arise if people are not mobile in the same way (Lucas and Jones, 2009). Increased car use has enabled most people to keep up with this need for mobility; however, 25% of households in Britain do not have access to a car (DfT, 2010a). For those relying on walking and public transport there is a mismatch between where they need to go and whether they can get there.

The 'new realism' in transport led to an interest in the concept of accessibility as means of addressing mobility deprivation, especially in terms of its uneven distribution (Goodwin et al., 1991). This produced growing recognition of the mobility gap or accessibility deficit and social exclusion as a result of poor transport. Social exclusion can be reinforced by transport if transport provision and the location of services are not in accessible places for people. These issues can affect people with low incomes, the mobility-impaired, the very elderly and ethnic minorities and women more than men (Law, 1999, Hall, 2004, Lucas, 2004). Factors associated with older age such as lower incomes and disability can also prevent people from driving and from using public transport. In addition, if older people can no longer drive or afford a car it will have an impact on their mobility requirements and their transport solutions become more complicated. Therefore, the following section turns to consider the development of the social exclusion paradigm in relation to transport studies and why it is important to consider in the study of older people's mobility as well as travel research more generally.

2.3. Mobility and Quality of Life

As discussed in the previous section, in all area types services have generally relocated to metropolitan peripheries where main access to these places is by private car. Transport policy has led to developments around the private car, which have contributed to a highly mobile society. To enable participation in such a society, people require adequate transport to facilitate access to goods, services, amenities and activities. Social exclusion arising from various constraints on the level of mobility needed to enable participation in society, or mobility based exclusion is the: “process by which people are prevented from participating in the economic, political and social life of the community because of reduced accessibility to opportunities, services and social networks, due in whole or in part to insufficient mobility in a society and environment built around the assumption of high mobility” (Kenyon et al., 2002, p.210-11).

Social exclusion can affect the quality of life of individuals (Levitas et al., 2007). Quality of life is a term used widely within the literature in a range of contexts, but reflects both macro-societal and socio-demographic influences on people as well as the personal characteristics and concerns of individuals (Gabriel and Bowling, 2004). It consists of both objective and subjective components (Farquhar, 1995), such as health, and will vary between different population groups.

It has been recognised over the past decade that outdoor mobility is inherently beneficial for the quality of life of older people, particularly for the older population. Having access to services and amenities including transport has been found to contribute to older people’s quality of life as this assists older people in retaining their independence and continued participation in society (Farquhar, 1995, Mollenkopf et al., 1997, 2011, Tacken, 1998, Metz, 2000, Banister and Bowling, 2004, Davey, 2007, Spinney et al., 2009, Stanley et al., 2011). Mobility is inherently beneficial to older people as it not only enables independent living (a recurrent theme in many studies), there are also psychological benefits from being ‘out and about’ (Metz, 2000), particularly those gleaned from ‘discretionary’ or ‘on a whim’ trips (Davey, 2007).

The private car in particular has been highlighted as a key element for social inclusion and quality of life for older people (Davey, 2007, Hensher, 2007). Factors associated with the ageing process, such as visual impairment and physical mobility difficulties, can make car use as well as other forms of public transport difficult to use due to a range of barriers. These barriers can result in older people finding it harder to maintain levels of mobility required to continue to participate in society as activities have become increasingly dispersed. Therefore older people are considered to be at greater risk of ‘transport disadvantage’ (Hine and Mitchell, 2001) which can result in increasing isolation (Titheridge et al., 2009). This section

will explore the concepts of social exclusion and accessibility that are important to consider in the study of mobility.

2.3.1. Social Exclusion

It has been identified in a variety of studies over the past decade that there is a link between poor transport and poor access to goods and services making it difficult to participate in society, thus resulting in social exclusion (Hine and Mitchell, 2001, 2003, Lucas et al., 2001, 2004, Lyons, 2003, SEU, 2003, Preston and Rajé, 2007). There is no consensus on a definition for social exclusion but it has been recognised that it is a multidimensional process of progressive detachment of groups and individuals from social relations and institutions, preventing them from full participation in the society in which they live.

Age is one just social factor that can influence the risk of 'transport exclusion' (Jones et al., 2013). Gender, household income and level of access to a car are also significant determinants of travel behaviour (Hine and Mitchell, 2003). In the consideration of transport-related social exclusion there is emphasis upon the interactions between a combination of such causal factors at the individual level and factors related to the structure of the area such as lack of public transport, and those that lie at the economy level in terms of re-structuring of the labour market or cultural influences (Lucas, 2012).

Differential access to transport across the population also occurs due to income and wealth inequalities within and between different age cohorts. The lowest income households are less likely to own a car and will spend a greater proportion of their household income maintaining it if they do have one (Lucas, 2004). Those living in deprived areas are also more likely to experience transport disadvantage (Hine and Mitchell, 2003). A greater reliance on walking and public transport to access services, amenities and activities within increasingly dispersed places can mean that people are likely to face greater financial and physical barriers to access.

However, it is not just due to poverty but extends beyond this towards a more dynamic concept of deprivation, due to system or societal structures and discrepancies between individual wants and abilities (Church et al., 2000, Lyons, 2003, Hine, 2009, Lucas, 2012). Hensher (2007) links social exclusion to the ability to be able to drive a car in a highly motorised society.

Kenyon et al. (2002) highlight the accessibility and mobility dimension of social exclusion by recognising that some populations are prevented from participating in society because of reduced accessibility to opportunities, goods and social networks, due to insufficient mobility in a society that has developed around the assumption of high mobility. This definition

highlights the relational aspect of social exclusion. Social exclusion is a situation in which certain members of society are, or become, separated from much that comprises the 'normal' activities in that society (Farrington and Farrington, 2005). It is also not a fixed state; it is more dynamic as it can change over space and time and during individual lifetimes (Stanley and Lucas, 2008, Lucas, 2012).

Church et al. (2000) identify seven categories of the transport system that contribute to the exclusion of different population groups, highlighting the multidimensional aspect of social exclusion. These include:

- Physical exclusion: these include physical barriers due to vehicle design or lack of information prevents access to public transport services;
- Geographical exclusion: where residential location type can prevent access to transport such as services by being located in rural or urban peripheries;
- Exclusion from facilities: distance of key services and facilities in relation to residential home can prevent access;
- Economic exclusion: high costs of travel can prevent their use, particularly if on lower incomes;
- Time-based exclusion: the duties that people have, a combination of work and care for example reduces the time available to travel;
- Fear-based exclusion: fears for personal safety can discourage the use of particular transport services or being in particular public spaces;
- Space exclusion: where security or space management prevent access to public spaces e.g. gated communities.

Due to these different dimensions of social exclusion, Lucas (2012) asserts that there is no one-size-fits-all solution to transport exclusion as it operates at different levels and therefore it is difficult to know at which level to implement interventions. Social exclusion research tends to consider the issues relating to particular populations or issues that certain locations experience (Cass et al., 2005, Delbosc and Currie, 2011b).

2.3.2. Accessibility

Historically there has been a mismatch in planning services in relation to residential locations (SEU, 2003). The centralisation of services has reduced access for those without access to a car and greater consideration needs to be given to the availability of services at the times people need them (Lyons, 2003). Accessibility is a key concept in transport geography and is linked to social exclusion; it is the degree to which services and activities can be reached, of which mobility is only one aspect (Gray et al., 2006, Gutiérrez, 2009).

Farrington and Farrington (2005) situate the concept of accessibility within a framework of social inclusion and social justice, arguing that it is a necessary condition for these, although social inclusion and social justice cannot be universally or totally achieved (inequality and some level of fairness is inescapable). They define it as the: "ability to reach and engage in opportunities and activities" (Farrington and Farrington, 2005, p.02). This definition incorporates a spatial element indicating that mobility is important, however, there are other forms of separation, such as age, ethnicity and income. It also recognises that spatial separation can be overcome by other means aside from transport and that ICT devices may have a role to play as improving access to services virtually, but it is not a complete replacement for mobility (Kenyon et al., 2002, 2003). However, the distribution of access to the internet is not only geographically uneven, but also socially (Knowles, 2006, Gray et al., 2008, Boulton, 2010, Digital Britain, 2009).

Farrington and Farrington (2005) posit accessibility within the following conceptual framework: that greater social justice cannot be achieved without greater social inclusion. Social inclusion is taken to mean that people are participating in society, the opposite to social exclusion whereby people are unable to partake in activities that are deemed 'normal' relative to the society in which they live. Within this framework social justice is a means to achieving 'happiness', that is, political philosophy's 'first order good'. It should also be noted that meanings of social inclusion and social justice are interpreted differently between places and people, as well as over time. For social justice to be achieved social inclusion is required, alongside other enabling factors such as those relating to financial issues. To achieve social inclusion, participation in society is required, which generally involves having access to activities that others do and therefore greater accessibility. This in turn often implies mobility but also an absence of other barriers relating to financial and cultural issues as well as service provision.

Opportunities to participate in society translates into having the ability to engage with a reasonable range of activities in society. What is considered reasonable is dependent on the society, therefore the normative dimension of accessibility requires consideration. That is, the extent to which people are excluded or are unable to access amenities should be considered by normative and relational aspects. Farrington (2007) highlights that this dimension is missing from the new mobilities discourse, as well as many other current discourses of transport and human geography.

Farrington and Farrington (2005) argue that accessibility needs are context specific to different societies, therefore relativism is necessary when considering accessibility. However, difficulty arises in defining 'normality' and deciding when accessibility falls below acceptable levels as there are varying perspectives on values and judgements about acceptable accessibility. Important here are the normative values derived from specific societies.

However, if accessibility is defined by normative levels relative to a society, is that to the whole society or to normative levels by specific populations that share similar characteristics, for example, by age? In the case of accessibility for older people, should accessibility meet that of normative levels of other older people or by society as a whole? The use of targets and measures as 'normative' attempts to 'rectify market failure' by specifying a proportion of the population are described as utilitarian, where the goal is the greatest good of the greatest number. Nothing is said about those who are not within the proportion and therefore is a blunt and simple approach to achieve accessibility (Farrington and Farrington, 2005). Titheridge et al. (2009) and Marsden et al. (2010) have also found that accessibility assumptions tend not to meet the needs of older people.

There are four ways of describing notions that are tied up with the theory of social justice: rights, needs, deserts and wants (Farrington and Farrington, 2005). Notions of 'universal' and 'relative' rights are important to consider in the concept of accessibility (Farrington, 2007). These are significant as they affect definitions of accessibility rights in different societies. However, accessibility 'rights' are coupled with 'needs' of which there are no single accounts. Farrington and Farrington (2005) highlight that critics of 'welfare rights' argue that needs are insatiable and are culturally relative. However, needs for access are defined by normative standards.

Farrington and Farrington (2005) also highlight that although individuals have certain rights in choosing where to live and whether to own a car, these choices can be constrained by individual factors, such as income or disability. Needs for participation in activities that are defined by society arise after such choices have been made. These needs can be met by people themselves, or by state welfare. The issue of deserts arises here. If people choose to live in areas where they are remote from the amenities they need access to, do they deserve to be provided with opportunities to have that access? As service providers have to make trade-offs between social cost and benefits there will be shortfalls. Although people may be able to satisfy their own needs if they locate in remote areas, there is a temporal dynamic; as people age or become ill, needs increase (Farrington and Farrington, 2005, Stanley and Lucas, 2008, Lucas, 2012).

There are various issues surrounding the definitions of needs which are: "difficulties in defining and prioritising needs; growing needs as societal expectations increase; growing needs in rural areas without access to cars and fewer alternatives; growing needs as populations age" (Farrington and Farrington, 2005, p.06). The issue of accessibility needs in the context of an ageing population are recognised by others with Lucas (2006) asserting that accessibility problems are likely to deteriorate due to a combination of driving cessation of older people and their residential locations resulting in a lack of alternative modes of transport. Farrington and Farrington (2005) posit that although wants are often assumed to be

universally high with respect to accessibility, they are actually tuned to the realities of people's situations. This has also been realised in other studies (Delbosc and Currie, 2011a, Noack, 2011). Ziegler and Schwanen (2011) find that older people may compensate reduced mobility for other forms of mobility, and therefore access.

2.3.3. Deprivation of Place, Ageing and Mobility

Place is an important theme in experience and therefore experienced accessibility. Issues of social exclusion and accessibility will vary by locations, as well as population density, patterns of settlement and service provision and income level. The concept of accessibility is inherently spatial and brings location into structural construction of social issues such as poverty (Farrington, 2007). This section will focus on the perspective of older people as it is most pertinent to this study.

Older people tend to reside in different locations to the younger population which has led to the rural population ageing faster than that of urban areas. This is due to ageing in place of older people, the out-migration of younger people and in-migration of older people (Rogers, 2002, Champion and Shepherd, 2006). Older people living in remote or isolated rural areas at a greater risk from exclusion and poverty due to issues related to accessibility (Dwyer and Hardill, 2011). Higher proportions of older people tend to live in rural or coastal areas in most countries around the world (Wenger 2001, Giuliano, 2004, Rosenbloom, 2004, Atterton, 2006, Champion and Shepherd, 2006, Hensher, 2007, Uren and Goldring, 2007, Bayliss and Sly, 2010).

In rural areas people tend to be more dependent on cars and public transport tends to be of a poorer quality compared to urban realms (Gray et al., 2001, Velaga et al., 2012). The mobility of these populations can be restricted if people cannot drive, which can have negative impacts on their well-being (Delbosc and Currie, 2011a, Noack, 2011). However, people in deprived urban areas also have problems accessing services as a result of lower incomes, poor transport and aspects of the urban environment (Hine and Mitchell, 2001, Hine, 2004, Power, 2012). The presence of heavy traffic and inadequate pedestrian crossings can make crossing roads fearful and can result in older people restricting their mobility. There is also evidence that suggests that older people restrict their mobility due to fear as a result of the presence or perception of crime and antisocial behaviour in deprived urban areas (Pain and Townshend, 2002, Pooley et al., 2005a, Sixsmith and Sixsmith, 2008).

Lack of support networks can contribute to the social exclusion of older people. Within large cities, older people tend to be less integrated into community networks compared to their rural counterparts, although Wenger (2001) argues that older people tend to have strong networks wherever they live. Due to increasing dispersal of family units and social networks, there

tends to be less support from family for older people and older people may be more reliant on friends and support networks in their locality (Mollenkopf et al., 1997, Rosenbloom, 2001, Cass et al., 2005, Pooley et al., 2005a).

Older women are more likely to live in single households compared to men, and this is a trend that is set to rise not just within the UK but also globally with 19% of older women living alone compared with 8% of men across the world (UN, 2005). There is an on-going trend towards independent living in developed countries, combined with women having longer life expectancies and older women being less likely to be married compared to men.

2.3.4. Unequal Experiences of Ageing

Older people are generally associated with lower incomes, as a result of receiving pensions in retirement. Retirement is a life-stage that is associated with ageing and older age. Retirement resources typically include public and private pensions, financial assets and property. The relative importance of these resources varies across countries; however, the largest value of household wealth in many countries is housing value. In the context of an ageing population, this value could fall if large numbers of older homeowners try to sell houses to smaller numbers of younger buyers (Powell, 2010). Retirement usually means living on a much lower income than someone may be previously used to. Adapting to this change can prove difficult and having a decent income is considered vital to preventing isolation for older people as many social activities cost money. Transport can be expensive especially if an older person is continuing to drive. Those without cars tend to be concentrated among households in the lowest-income groups and in the most deprived neighbourhoods. Older people have been identified as a group that are less likely to live in a household with access to a car (Clifton and Lucas, 2004). There is also a higher use of taxi services, which are expensive to use.

This is not the case for all, with some older people being very wealthy, which results in unequal experiences of ageing amongst the population. Using household income as an indicator of this inequality, the likelihood of being in the top fifth of the income distribution is relatively low for pensioner households, with 18% of pensioner couples and 10% of single pensioners in the top fifth in 2006-07. Although pensioner households were less likely to be in the bottom fifth of the income distribution compared to other household types, single-pensioner households, and those of women in particular, are clustered in the bottom two-fifths (Scharf, 2009). Bond and Corner (2004) also highlight this unequal distribution of income among older people. Older people in the top quintile of the income distribution had four times the median income of those in the bottom quintile. These inequalities continue to increase as the relative value of the basic state pension continues to decline whilst the savings and investments of those well-off have provided returns above inflation for the past thirty years.

Generally, those older people with higher incomes can afford to purchase transport solutions, along with possible equipment and care and support services. Wealthier older people have more opportunities to go out, have better facilities as well as access to them, enjoy better health and are less lonely (Demakakos et al., 2006). Older people on low incomes have little chance of rectifying this themselves given the lack of opportunities, possible ill-health and low physical mobility as well as lacking access to services.

The discussion up to here has considered the determinants of mobility and how structural factors have contributed to higher incidence of social exclusion amongst older people as a result of increased car use amongst society. This discussion highlights the importance of mobility for quality of life, in particular for older people. It is important to consider older people and mobility in further detail as mobility implications have not been considered greatly in the context of an ageing population compared to other challenges such as health care. The following section reviews and considers the existing literature on older people and mobility.

2.4. Mobility in Later Life

Due to the ageing of the population, it has been of interest to study the mobility of older people over the last decade, particularly as the Boomer cohort have recently begun to reach the age of retirement, a life-stage linked with 'older age'. There is no agreed definition of an older person (Tinker, 2002) due to the social construction of 'old age' (Johnson, 2005, Hopkins and Pain, 2007, Phillipson et al., 2008, Schwanen et al., 2012b)

The growing proportion of older people is often thought of negatively, due to the perceived increased burden on society, such as the need for more health care (Tinker, 2002). This perception is not limited to these challenges but also perceived in terms of mobility. Much of the literature surrounding older people and mobility tends to focus on largely negative issues related to driving cessation and transport disadvantage (Morris et al., 2006). Older people are more likely to have lower mobility due to lower incomes and physical disability (Tacken, 1998). It is important to consider the mobility of older people as continued mobility is important for independence in older age as it links practices that are within and outside the home, therefore enabling wellbeing in later life (Mollenkopf et al., 2011, Schwanen et al., 2012a).

2.4.1. Travel Behaviour of Older People

Studies into the mobility of older people find that it differs from that of the younger population, with older people usually having lower levels of mobility (Noble, 2000, Su and Bell, 2009). Research into the mobility of older people has tended to explore the factors that affect older people's mobility and why it diminishes with ageing. Differences between older people and

younger people are explained primarily by age itself and by differences in socioeconomic and demographic characteristics (Giuliano, 2004).

Due to changes in physical functionality associated with ageing, people's transport needs change as the ability to drive or access particular transport modes can be affected (Tacken, 1998, Su and Bell, 2009). Research has shown that older people self-impose restrictions on their mobility due to lack of alternative transport options, particularly after driving cessation (Davey, 2007). Older people are more likely to use slower modes of transport as mode choice can be constrained due to physical disability associated with older age (Schwanen et al., 2001, Rosenbloom, 2004, Metz, 2003). Older people with health conditions and disabilities can face barriers to outdoor mobility, caused by the design of the physical environments, such as high kerbs, not enough seating and lack of handrails (Marsden et al., 2008, Wennberg et al., 2009, Risser et al., 2010).

Barriers to using public transport can stem from people's increasing frailty as they age, combined with the characteristics of vehicle and infrastructure design (Holland et al., 2005). This is slowly being rectified in the form of drop down kerbs and lowered buses in accordance with the Disability Discrimination Act (1995) (Metz, 2003, Hine, 2008, Headicar, 2009), but only in the development of new or improvement infrastructure schemes which tend to be in urban areas. Other barriers to public transport use include long walks to bus stops, lack of seating at bus stops, bad bus driver behaviour and the availability and ease of access to information. Bad experiences of bus use in the past can also affect future ridership (Stradling et al., 2007, Dobbie et al., 2010).

Fear of crime tends to be higher among older people on, and whilst waiting for, public transport, which can prevent them from using it (Lucas, 2004, Dobbie et al., 2010). Safety and security outdoors is also as important as perceptions of fear from others due to feelings of vulnerability that older people may have (Risser et al., 2010). Existing research suggests that older people consciously restrict their mobility due to fear as a result of the presence or perception of crime and antisocial behaviour (Pooley et al., 2005a, Sixsmith and Sixsmith, 2008).

DRT 'dial-a-ride' services may be provided to older people who are unable to access public transport; however, even specialised transport services may not meet the needs of older people (Lucas, 2004). Ahern and Hine (2012) found it particularly did not meet the needs of men. It can result in long waiting times on the service as people are collected, as well as at places waiting to be picked up again.

It has been identified that travel purposes change during the course of people's lives due to different roles associated with various stages (Zimmerman, 1982, Rosenbloom, 1993,

Oppermann, 1995, Pooley et al., 2005a, Ryley, 2006, Su and Bell, 2009). In retirement and older age time and money constraints are altered, with older people generally having more time, but less money (Su and Bell, 2009). The activity patterns of older people are also different compared to the population as a result of retirement, tending to engage in leisure activities and increasingly caring roles for younger grandchildren (Hildebrand, 2003, Pooley et al., 2005a, Cooke, 2011).

However older people are not a homogenous population group in terms of their mobility. One key aspect of this heterogeneity is of that relating to chronological age, with studies making a distinction between the travel patterns of those considered as 'younger older people' (generally considered to be aged 60-79) and those thought of as 'older older people' (aged 80 and over) due to the sharp drop in mobility that has been observed amongst those aged 80 and above (Bowling et al., 1989, Noble, 2000, Alsnih and Hensher, 2003, Giuliano, 2004, Newbold et al., 2005, Su and Bell, 2009, Wennberg et al., 2009, Mercado et al., 2010).

Within the literature it has been identified that 'older older people' display very limited travel patterns. However, there is no consensus in defining 'old older people', as this classification ranges between 75 and 85 years, which when studying this particular demographic, represents a large difference (Currie and Delbosc, 2010). The latter age of 85 perhaps reflects the changing demographics of an ageing population, with an increase in the proportion of older people in society and fewer people under this age experiencing serious impairments.

Other factors can lead to differing mobility patterns amongst older people. These differences can be attributed to gender as older women tend to have lower levels of mobility (Siren and Hakamies-Blomqvist, 2006, Rosenbloom and Herbel, 2009, Frändberg and Vilhelmson, 2011, Li et al., 2012, Su and Bell, 2012). In their study of travel patterns between men and women over the life-course amongst a birth cohort b.1932-1941, Pooley et al. (2005a) observed gender differences in travel patterns over the life-course which have contributed to different patterns in older age. Women travelled over shorter distances and use slower means of transport than men at each life-course stage, which was also observed by Rosenbloom (2004). Women had more constrained mobility patterns due to marriage and family responsibilities. However, in older age women of this cohort have greater mobility as a result of increased real incomes and car access. They also found that men were more reliant on the car in older age, which has been reflected in other studies (Ahern and Hine, 2012). Residential location will also influence mobility patterns (Giuliano, 2004), as well as the availability of social and support networks (Schwanen and Páez, 2010).

2.4.2. Older People, Mobility and Quality of Life

It has been widely recognised that mobility is necessary for independence and well-being in later life (Mollenkopf et al., 1997, Tacken, 1998, Metz, 2000, Banister and Bowling, 2004, Kaiser, 2009, Spinney et al., 2009, Hazer and Boylu, 2010, Mollenkopf et al., 2011, Stanley et al., 2011, Ziegler and Schwanen, 2011). In particular, mobility through the use of the private car provides great benefits to older people, especially in relation to independence and accessibility, contributing to increased quality of life (Gilhooly et al., 2002, Mollenkopf et al., 2002, Banister and Bowling, 2004, Eby and Molnar, 2009, Oxley et al., 2010).

Stanley et al. (2011) find that transport mobility serves a greater purpose than enabling people to access amenities. It enables people to engage in particular experiences, producing feelings of being in control and competency and connected with others. Therefore there is a need for considering the mobility of older people, where these issues are potentially at risk.

2.4.2.1. Older People and Car Use

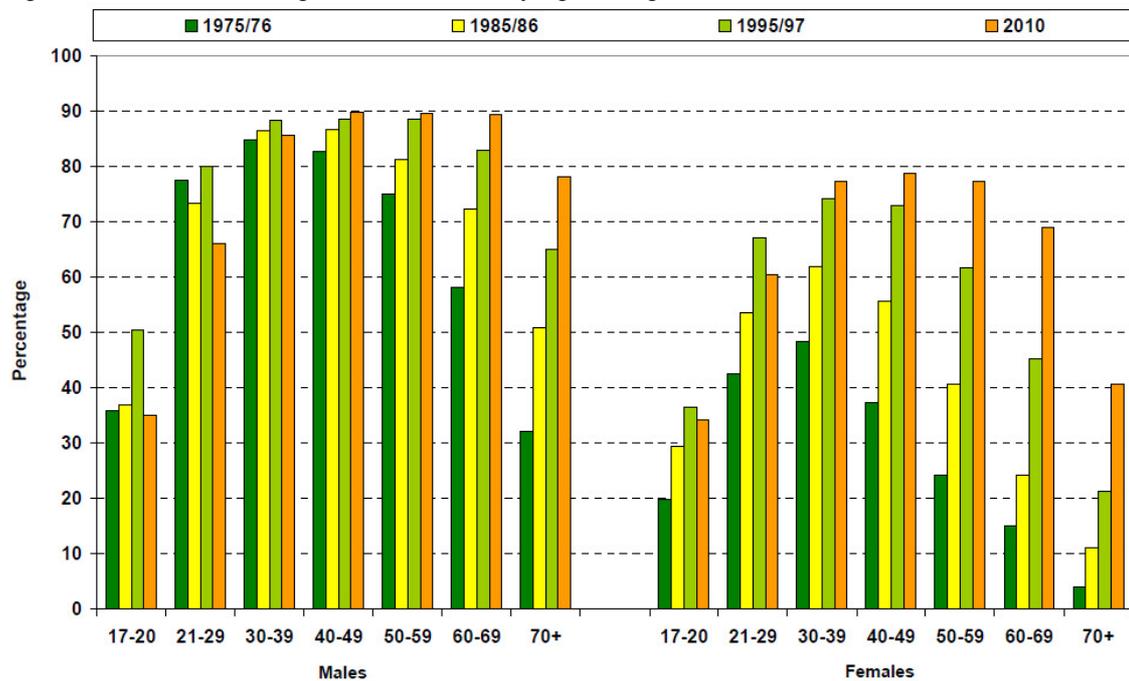
Improved healthcare has enabled a higher proportion people to carry on driving into older age than before. Much attention has been given to the implications surrounding driving practices of older people. Older people undertake shorter trips and are more likely to have newer cars than younger drivers. Developments in car technology have made them easier to drive. Older drivers also make wasted trips as a result of getting lost; may practice a trip before having to travel; and engage in avoidance behaviour such as avoiding left/right turns, motorways and congested areas (Rosenbloom, 2001).

Increasing car use or 'automobility' (Rosenbloom, 2001) amongst older people has been perceived negatively in terms of safety concerns. Indeed an 'older driver problem' has been identified (Scott et al., 2005, Oxley et al., 2010) due to increased accident risk as a result of decreasing capability. There are also environmental concerns about increased car use amongst older people, for example increased incidence of 'cold starts', whereby an engine does not become hot enough for catalytic converters to be effective (Rosenbloom and Ståhl, 2002).

There are also gender differences associated with car use. Older women tend to have lower levels of driving licence holdership compared to their male counterparts, however, this is changing. In Britain and other countries such as the USA, Canada, Australia and other western European countries there have been observed increases in the proportion of older men and women holding driving licences (Burkhardt et al., 1996, Noble, 2000, Rosenbloom, 2001, 2010, Rosenbloom and Ståhl, 2002, Browning and Sims, 2007, Eby and Molnar, 2009, Hjorthol et al., 2010, Mercado et al., 2010).

Figure 2.1 shows that in Britain, since 1975/76, there has been an increase in the proportion of both men and women holding a full driving licence across most age groups. Since the mid-1980s to the mid-1990s, the proportion of men holding a driving licence has remained fairly constant, however the biggest increases in holding a driving licence have been significant for older people and women, which could partially be attributed to an ageing population and the changing role of women in society. As the Boomer cohort have begun to reach retirement age, they are adding to the proportion of the older people in society and as such, large increases are observed in the proportion of people aged 60 years and over who hold driving licences. The Boomer cohort has been recognised as one that is associated with high levels of driving licences and ‘automobility’ (ECMT, 2000, Rosenbloom, 2001, Coughlin, 2009).

Figure 2.1: Full car driving licence holders by age and gender: Great Britain, 1975/76 - 2010



Source: DfT (2010a)

According to Figure 2.1, since 1975/76, the proportion of men aged 60-69 years holding a driving licence has increased from 58% to 89% in 2010. Amongst women, the increase in the proportion of this particular age group holding driving licences has been even greater, rising from 15% in 1975/76 to 69% in 2010. These dramatic increases are also reflected in the proportions of men and women aged 70 and over who hold a driving licence. For men this increased from 32% in 1975/76 to 78% in 2010, whilst for women, it rose from 4% to 41%. These are very significant figures indicating that the older population are highly mobile compared to those of 30 years ago.

The increase in the proportion of younger women holding driving licences is also of particular interest as much of the literature suggests that this demographic group face barriers to transport more than males. This may be in part that women were previously less able to drive

or had access to a car (Hine and Mitchell, 2003, Lucas, 2004). Due to the changing role of women and reduced costs of motoring the gender gap in driving licence holdership is converging and this particular barrier may not be as pronounced in the future.

As the Boomer cohorts, as well as and subsequent cohorts (who also have higher levels of holding driving licences) become older, they will take these skills into older age. The ability to drive among males has remained relatively stable. Unlike former cohorts of older women, women belonging to the Boomers in the future are likely to be more independent and have higher levels of mobility if they are able to continue to drive. With the Boomer cohort and successive cohorts being healthier life expectancies are higher and so driving cessation may not occur until much later in life compared to the current population of older people. This suggests that levels of mobility among the Boomer cohort will be much higher and many previous arguments and problems related to immobility due to lack of access to a car in the literature may not be applicable to the same extent.

The costs of running a car, however, may increase as fuel prices rise. Dramatic increases have been seen since the economic crisis of 2008 as well as the impact of international political tensions affecting oil production and availability. There have been developments in technology such as electric and hydro powered cars which may be more widespread in the future. However, a reduced rate of driving licence holdership is observed amongst the 17-20 age groups and 21-29 age groups, most notably amongst men. These subsequent younger cohorts then may have lower mobility when they enter older age, which raises concerns about the mobility of the older population much further into the future should they not learn to drive. Car ownership and access to transport are associated with higher perceived quality of life (Gilhooly et al., 2002).

Driving cessation is likely to be of great concern as more recently there has been increasing mobility observed amongst the older population if measured by trips taken and miles travelled, particularly in terms of car use (Tacken, 1998, Noble, 2000, Rosenbloom, 2001, Rosenbloom and Ståhl, 2002, Browning and Sims, 2007), which is in line with suburbanisation and decentralisation (Giuliano, 2004, Rosenbloom, 2004). The implications and effects have been examined in a number of studies, particularly in relation to quality of life.

2.4.2.2. Driving Cessation

Declining driving ability and financial constraints will mean that many older motorists will eventually have to adjust their driving practises and ultimately give up their cars, thus threatening the benefits of car use, which in the long-term can lead to reduced well-being and psychological stress (Gärling et al., 2002). Driving cessation contributes to a loss of

independence as people restrict their movements if there is a lack of suitable alternatives. Older people may have to rely on other people for transport which for some may diminish the sense of control over their own mobility that can be crucial to self-esteem (Ragland et al., 2004, Adler and Rottunda, 2006, Browning and Sims, 2007, Davey, 2007, Rosenbloom, 2010).

There are also gender differences in driving cessation, with women more likely to give up driving earlier than men suggesting they will be more vulnerable to social exclusion (Burkhardt et al., 1996, Hakamies-Blomqvist and Siren, 2003, Ragland et al., 2004, Siren and Hakamies-Blomqvist, 2005, 2006, Adler and Rottunda, 2006, Davey, 2007). According to Pooley et al. (2006) during the 1960s female access to the private car was highly restricted and for many women their main experience of car travel was as a passenger. Although some women learned to drive, they were less likely to own a car and therefore rarely developed their skills. Others disliked driving or were put off by increasing traffic. This cohort of women not developing their driving skills and taking them into older age could explain greater accident rates observed amongst women and willingness to give up driving in later life sooner compared to older men. In addition the driving cessation amongst men will impact on older women if men are more likely to have been the main driver in the household.

Due to car dependent lifestyles amongst men, throughout their lives, men seem to be less prepared for life without a car than older women (Ahern and Hine, 2012). Morris et al. (2006) find that there is a general reluctance for people to plan for the possibility or eventuality of driving cessation. Once driving cessation occurs men are less likely to use alternative means of travel if they have always used the car, whilst women are used to alternatives to the car, such as walking and using public transport and are therefore more willing to give up driving earlier (Pooley et al., 2005a).

2.4.2.3. Ageing in Place

Research has indicated that the majority of older people want to 'age in place' in domestic environments (Tinker, 2002). Ageing in place is viewed as beneficial to quality of life as it enables maintenance of social networks and independence, and provides a sense of familiarity (Sixsmith and Sixsmith, 2008, Wiles et al., 2011). Giuliano (2004) highlights that most older people prefer ageing in place in older neighbourhoods having chosen residences earlier in life, when having the ability to drive and access to a car, rather than relocating to take advantage of improved access to transport.

Driving cessation may be delayed if older people are living in the suburbs as it is easier to drive in these spaces as they are generally quieter (Giuliano, 2004). However, there are concerns about ageing in place in all area types: urban, suburban, rural and coastal areas

particularly after driving cessation and having no suitable alternative modes of transport given the relocation of services to metropolitan peripheries where main access to these places is by private car. Gilhooly et al. (2002) highlights that older people living in rural areas can become very isolated if they have been forced to give up driving due to a real lack of alternatives. It is well documented that within the system of UK bus services, many rural and peripheral services do not meet the needs of the population in terms of frequency or route specification (Lucas, 2004, Gray et al., 2008). Under privatisation the decline of bus services has been exacerbated given low demand in rural areas. With planned local authority cuts, this trend is also set to continue, which may pose problems in much older age given driving cessation. These concerns about older people's mobility are likely to increase as an ageing population develops.

The ability of older people to stay mobile is an important aspect of life, but can present problems for those growing old where there is a lack of support. Due to the dispersal of family networks, support from local friends and neighbours is more accessible and reliable (Giuliano, 2004). Rosenbloom (2001) indicates that relatives may be required to add new trips or lengthen existing ones to be able to provide support if they live further away. The proportion of single households is also set to rise, with many of them being occupied by older women (Glaser, 1997). Rosenbloom (2004) put forward the notion of the 'Feminisation of ageing', whereby women will live longer and make up a greater proportion of older people. Women are also more likely to live alone, particularly as their male partners (if any) often die earlier. Having outlined issues of earlier driving cessation and relying on male partners to drive, and dispersal from family networks, older women in the future may have greater mobility issues, particularly in rural areas and those areas where there is a lack of alternative modes of transport to the private car.

2.4.3. Changing Mobility of Older People: The Ageing Boomer Cohort

Previous discussion is largely focused on the mobility of current and former cohorts of older people as existing studies have only tended to consider mobility based on older age groups at particular points in time. The mobility trends of older people have generally been neglected; although some studies have found that there is a trend of increasing car use amongst older people (Rosenbloom, 2001, O'Fallon and Sullivan, 2009, Le Vine and Jones, 2012). The Boomer cohort have different characteristics to current and former cohorts of older people and will likely continue to contribute to this trend as they begin to reach the age of retirement.

Characteristics associated with the Boomer cohort include: improved health leading to higher life expectancies and reduced disability; higher wealth having grown up during periods of economic growth; have been more exposed to technology; and have higher rates of driving licence holdership compared to former cohorts of older people (Evandrou, 1997, Falkingham,

1997). Existing literature has recognised that as a result the Boomer cohort will have different mobility patterns, particularly through the use of the private car (ECMT, 2000, Cobb and Coughlin, 2004, Mercado et al., 2007, Coughlin and Tompkins, 2009, Su and Bell, 2009).

Women of the Boomer cohort will be different in older age, compared to former cohorts of women (Spain, 1997, Rosenbloom and Ståhl, 2002). The feminist movement in the 1960s redefined the role of women in society and there has also been an increase in the proportion of women receiving higher education and many now hold higher qualifications and participate in the labour market, with different economic positions, indicating a shift in gender roles (Rosenbloom, 2000, Pooley et al., 2005b, Crane, 2007). Women of the Boomer cohort also have high levels of driving licence holdership (DfT, 2010a). This suggests that women belonging to this cohort will have higher levels of mobility compared to current cohorts of older women.

Members of the Boomer cohort are likely to have higher expectations about mobility (Coughlin, 2009, Dannefer and Shura, 2009). As the Boomer cohort ages they will be less likely to: "tolerate negative and constricting role definitions that appeared almost normative for elders through the 20th century" (Dannefer and Shura, 2009, p.750). Therefore they will be also be less tolerant of injustice and be less accepting of authority as they have generally had a higher standard of living and better quality of life, which they are unlikely to compromise on in older age (Warnes, 2009).

Therefore a question exists as to whether the same theories and assumptions about mobility will hold true for the Boomer cohort, as well as subsequent cohorts, in older age. There appears to be an assumption that revealed mobility trends among current cohorts of older people will apply to subsequent cohorts in older age, such as increased car use amongst the older population and issues related to driving cessation, without consideration given to the changing composition and characteristics of ageing cohort groups.

Studies of the future travel patterns of the Boomer generation have found mixed evidence with Currie and Delbosc (2010) suggesting that the Boomers demonstrate a trend of increasing public transport usage, contrasting with the existing over 60s' declining trend in the use of public transport in Melbourne, Australia. Other research has suggested that as the Boomers are more car dependent than previous cohorts, travel by public transport will decline (Rosenbloom and Ståhl, 2002, Coughlin, 2009). The UK may display a different picture of public transport use, as at present, there is a policy of providing free concessionary bus travel to those over 60. The sustainability of this scheme into the future may have a further impact on how the Boomer cohort will travel in comparison with former cohorts of older people.

Travel studies have generally been concerned with particular population groups, usually based on age, with little consideration to the changing composition of these groups as a result

of different cohorts. It is important to consider cohort effects as there is a danger in generalising about the trends of older people (Tinker, 2002). Whilst some studies into mobility have recognised that cohort effects are present (Hakamies-Blomqvist and Henriksson, 1999, ECMT, 2000, Newbold et al., 2005, Hjorthol et al., 2010, Frändberg and Vilhelmson, 2011) these have largely focused on the Boomer and current cohorts of older people.

Each generation has had to cope with new forms of transport technology and negotiate the impact of new mobilities on society (Pooley et al., 2006). Travel patterns in older age will, in part, reflect the experiences people had when they were younger. Women who gain employment when they are younger may have higher incomes in their older years as a result (Rosenbloom, 2004), which could contribute to increased mobility in later life.

The changing mobility of older people will be influenced by the mobility of different cohort groups. In an ageing population, the older population group will increasingly consist of different cohorts. The concept of path dependency has been used to explain why the car has become the dominant feature of travel (Pooley, 2009). This concept can also be used to understand how cohort groups will travel as they age, explaining outcomes of high or low mobility. There has been a lack of attention paid to the path dependencies of cohorts and the implications for different mobility outcomes in older age. Therefore it is important to understand the mobility of younger cohorts in the context of an ageing population.

Travel trends will oscillate with recessions and other structural changes. Periods of economic growth and recession influence levels of employment and therefore levels of disposable income at the individual level. This affects the affordability of transport modes.

The current economic downturn is having greater negative impacts on current younger cohorts in comparison to older cohorts. There are greater levels of youth unemployment in the current recession (Eurofound, 2012) and they also face high cost barriers to learning to drive (DfT, 2010a), compared to the Boomer cohort when they were of younger age who had greater economic opportunities and access to cars (Coughlin, 2009). Rather than these current younger cohorts having similar mobility patterns to the Boomer cohort, they may be more similar to the 'silent generation' in older age. This generation was born during the Depression era of the 1930s and were considered too young to join the war (Strauss and Howe, 1991 in Lehto et al., 2008). Young people aged 15-29 belonging to current younger cohorts have been referred to as the 'lost generation' (Eurofound, 2012, p.139) due to record high levels of unemployment amongst this demographic in Europe. Understanding the mobility of cohorts now and the larger shifts in changing mobility patterns, situated within structural factors is critical and of profound importance for policy.

Due to the heterogeneity in the travel behaviour of the older population, especially with the ageing of the Boomer cohort, there is a need to re-think 'age' in travel and transport as it is all too often assumed that chronological age is associated with declining mobility. Different combinations of socioeconomic factors, such as income and health status, amongst older people lead to unequal ageing which contributes to producing inequality in mobility. Such differences in socioeconomic status also contribute to differences in mobility generally across the wider population. Chronological age may be less significant in the future and abilities and lifestyles components may be more important to look at when exploring and explaining changes in travel patterns and trends.

Life-cycle and life-course concepts have been used to consider changes in mobility over the life of an individual as they transition into older age (Rosenbloom, 1993, Oppermann, 1995, Pooley et al., 2005a). The life-cycle and life-course concepts refer to the socially constructed, age-related sequence of stages that individuals pass through from birth (Alwin, 2012). The life-cycle concept places greater emphasis on reproduction and generation and tends to construe family life as a fixed sequence of stages that families go through as members age and family size changes. The life-course concept is more dynamic as it takes into account historical and socioeconomic contexts at the individual level as well as wider structural, social and cultural contexts. This concept provides for greater heterogeneity and fluidity beyond staged chronologies and linearity associated with the life-cycle concept (Schwanen et al., 2012b).

Life stages can be defined as: "phases in a sequence of age-graded statuses and/or roles" (Alwin, 2012, p.208). These may be developmental phases, with biological, psychological, and social characteristics, through which individuals pass over the course of their lives, such as infancy, childhood, adolescence, adulthood, and older age. Life stages can also be defined as a specific, optional event such as learning to drive, moving home or moving job (Ryley, 2006).

Whilst these concepts are useful for considering change at the individual and household level, it is not appropriate to use this approach to consider change at the population level due to the lack of standardisation of life stages in travel behaviour research, which makes it unsuitable to compare changes over time amongst the older population (Schwanen et al., 2012b).

There are variations in the number of stages one might experience and the age groups used to classify different stages. Zimmerman (1982) identifies five household types using the life-cycle concept, whilst Ryley (2006) classifies ten different life-stages also closely linked to family formation. Successive birth cohorts will have causal implications for the life-courses of individuals (O'Rand and Krecker, 1990). Events in the life-course are subject to change over time with each cohort (Bailey, 2009), giving rise to fluid life-course stages that are influenced

by structural effects and therefore not comparable over time. Age and life-course are viewed as socially constructed categories (Pain et al., 2000, Hopkins and Pain, 2007, Dannefer and Shura, 2009, Tarrant, 2010) which are not necessarily fixed (Jarvis et al., 2011). Comparing cohorts over time is more consistent. Although the characteristics of the cohort are not homogenous, the distribution of its heterogeneity tends to be fixed in shape that differs from other cohorts throughout its life. The cohort will experience various events simultaneously, making it different from others who also experience similar events but at different ages. This approach provides a novel perspective on the changing mobility of older people by combining the disciplines of transport studies and population studies, which has not been undertaken in a British context.

2.5. Transport Policy for an Ageing Population

Previous discussion has examined the wider context in which transport policy is situated. Older people tend to have specific transport needs in a highly motorised society, the options for which have been significantly affected over time by changes in transport policy. However, there is some evidence that suggests the mobility of older people is increasing through the use of the private car (Rosenbloom, 2001, 2004, O'Fallon and Sullivan, 2009, Le Vine and Jones, 2012). Much of the literature when considering transport policy for an ageing population calls for solutions to the provision of suitable alternative means of transport for older people, which will be required when eventual driving cessation occurs in line with increases in older people driving (Metz, 2003, Morris et al., 2006, Mercado et al., 2007, 2010). Continued mobility amongst the older population is important for quality of life (Metz, 2000, Banister and Bowling, 2004, Spinney et al., 2009) therefore mobility (as well as knowing mobility can be achieved) is seen as inherently beneficial for older people i.e. 'a good thing', the premise upon which this thesis is based.

In the UK, the mobility of older people has been affected by the shifting strategies employed by government social and welfare policies. Issues of social exclusion and accessibility have been highlighted as a result of increased car use amongst other populations. Current policies have tended to assume that older people tend to have lower incomes and higher rates of disability associated with older age. This assumption is reflected in the administration of concessionary schemes in the UK. The policy of free concessionary bus travel aims to improve older people's mobility, by eliminating the cost of public transport. However, older people as a group have different needs, which are far from homogenous, and cost is not the only barrier to using public transport. It is important to consider the impacts of this specific 'one-size-fits-all' policy on the mobility of older people.

The New Labour Government enacted devolution in the late 1990s, resulting in Scotland, Wales, and Northern Ireland having asymmetric forms of devolution. England does not have a

devolved Parliament or Assembly, however, within England London is a devolved territory. Different territories were granted different powers and institutional arrangements leading to differing transport policies (Shaw et al., 2009). A concessionary scheme exists in each devolved territory in the UK but has evolved differently within each one. Prior to schemes being introduced by devolved administrations, concessionary travel was initially administered by local authorities. This policy has gone against the tide of the 'new localism' as these schemes are no longer administered at the local level. This section outlines the background to concessionary scheme and reviews existing research that has been carried out examining the impacts of the concessionary scheme on older people's mobility.

2.5.1. Background to the National Concessionary Travel Scheme

Concessionary fares were first introduced under the 1968 Transport Act and re-enacted under section 93 of the 1985 Act, which gave local authorities discretionary power to provide concessionary fares (Headicar, 2009). The Transport Act introduced in England in 2000 made provision for a new national minimum for concessionary fares, which was further funded with extra national government subsidies. Local authorities were also able to enhance this concession provided they paid to do so.

The Act also enabled the Welsh Assembly to amend the scheme and so since 1st April 2002 older people aged 60 and over have been entitled to free bus travel without restriction in the country. In England, the concessionary scheme developed into a free concession, although travel was limited to local authority areas. However, on 1st April 2008, older people aged 60 years and over were entitled to free national bus travel, although peak hour restrictions apply. In April 2010 measures came into force to increase the eligibility age from 60 to 65 in line with the changes to the female state pension age that were introduced by the preceding Labour government (Butcher, 2011).

The Transport Act in Scotland in 2001 made provision for free concessionary travel in the country to women aged 60 and over and men aged 65 and over, which was introduced on the 30th September 2002. Free bus travel was allowed after 09:30am weekdays, all day during weekends and bank holidays but only within the concessionary scheme area. On 1st April 2003 the scheme was extended to allow men aged 60-64 to receive the same travel benefits as women (Transport Scotland, 2009). The scheme was extended even further on 1st April 2006, by removing peak hour and local authority boundary restrictions.

The rationale for administering the scheme at the national level rather than a local one was due to the cross-boundary nature of many bus trips. After institutional fragmentation, as a result of local government reform in Scotland and Wales during the 1990s, these cross-boundary trips were not eligible for free or reduced fares as concessionary travel was paid for

by the local authority for travel within the issuing authority. It was thought that a national scheme would overcome this issue and provide efficient savings over a large number of local schemes (Shaw et al., 2009). In addition as issues of social exclusion gained prominence during the 1990s, these were promoted through the national roll out of concessionary travel as a way of tackling these issues and immobility amongst the older population. It also aimed to promote modal shift from the car to public transport, also contributing to environmental objectives.

2.5.2. Existing Research on Concessionary Scheme Impacts

This section considers the existing research that has been undertaken to assess the impact of concessionary fare schemes. It is important to consider the impact of these schemes as the use of this incentive based subsidy to encourage and promote use of public transport among older people has come under scrutiny and criticism due to the high costs involved in administering the scheme and its effectiveness. However, current governments have stated that they remain committed to its provision (Butcher, 2011, Transport Scotland, 2012).

Since 2008 the UK has been experiencing effects of a recession which has led to widespread public sector budgetary cuts following the election of the Conservative-Liberal Democrat coalition government in 2010. In the current climate of austerity measures there are concerns regarding the financial sustainability of concessionary policy in the context of an ageing population. According to Butcher (2011) current spending by the UK Government on the scheme totals over £1bn per year. In Scotland, in 2010 the Confederation of Passenger Transport agreed to concessionary travel budgets of £174.2m for 2010/11, £180m for 2011/12 and £187m for 2012/13 (Transport Scotland, 2012). Based on current levels of concessionary journeys and a range of fare increases, Audit Scotland (2010) projected that the uncapped costs of the concessionary scheme could reach between £216 million and £537 million a year by 2025.

Due to the universal availability of the scheme anyone meeting the age criteria, despite income, is eligible to claim. Not all older people have low incomes therefore this policy makes very broad generalisations about this population. Take-up of the scheme has been found to vary among regions and between socioeconomic groups. Rye and Mykura (2009) find concessionary pass take-up varies with the generosity of the concession and the move from local authority to national one has stimulated take-up of the pass.

Concessionary pass holding varies between countries, with Scotland having higher rates than England and Wales at 84% compared to 73% and 65% respectively. Take-up rates also vary within countries. Concessionary pass holding tends to be higher in urban than rural areas (Scottish Government, 2009, Humphrey and Scott, 2012). The highest take-up rates were

found in the London boroughs at 91%, with the lowest found in rural areas in Wales at 49% (Dargay and Liu, 2010). This is likely to reflect uneven spatial development, and bus service provision and geographical variations in the quality of services. Take-up was found to be related to the quality of bus service close to a person's home (Rye and Mykura, 2009, Humphrey and Scott, 2012).

Humphrey and Scott (2012) also found that take up rates varied amongst older age groups in England. The highest take-up rates were found for those aged 80-84 years at 85% and the lowest amongst people aged 60-69 at 73%. Take-up rate amongst those aged 70-79 was 82%. They also found that take-up rates fell amongst those aged 85 years and over with 74% of this age group holding a pass. A similar pattern was reflected in Scotland, which is presented in Table 2.1. Rye and Mykura (2009) also observed that take up declines after the age of 80 in Scotland. After the introduction of the free concession in England in 2006, Baker and White found that increases in the take-up rate were greatest amongst those aged 60-69.

Older women are more likely to have a concessionary pass compared to men (Welsh Assembly Government 2008, Scottish Government, 2009, Humphrey and Scott, 2012); however, there has been a higher rate of increase amongst men after the introduction of a free concession (Baker and White, 2010). Those on lower incomes are more likely to have a concessionary pass (Humphrey and Scott, 2012) but there has been increasing take-up amongst wealthier older people (Rye and Mykura, 2009). Those with access to a car had lower levels of pass ownership, but Rye and Mykura (2009) found that take-up has increased amongst car owners.

Table 2.1: Take-up rate of concessionary passes in Scotland from April 2006-March 2009

Age	Percentage
All 60+	81
60 - 64	74
65 - 69	81
70 - 74	87
75 - 79	84
80+	81

Source: Transport Scotland (2009)

Concessionary passes tend to induce bus travel (Mellor, 2002, Rye and Mykura, 2009). Using National Travel Survey data for England, Dargay and Liu (2010) found that the introduction of free concessions had increased trip rates by 26.5% in metropolitan areas and 45.4% in shire counties. Studies that used modest, localised samples also showed increases in bus travel after the introduction of free concessionary travel in England. Baker and White (2010)

estimated that there has been an average increase in bus trips of 17% in Salisbury. Andrews et al. (2011) found that 59% of concessionary pass holders increased bus trips in Southwest England. There are also gender differences with women tending to use their passes more than men (Scottish Government, 2009, Transport Scotland, 2009, Humphrey and Scott, 2012).

Rising car ownership among older people also appears to have a 'dampening' effect on the increase of bus use in the medium to longer term (Rye and Scotney, 2004, p.139). Increases in car ownership and the ability to drive would lead to a decline in concessionary travel (Rye et al., 2002). However, in more recent studies Rye and Mykura (2009) found that the biggest increases in bus usage are amongst affluent car-owning male pensioners. Baker and White (2010) also find that older people with car access have made greater uses of buses. The Scottish Government (2009) also suggests there has been some modal shift from car to bus.

Some research has concluded there are potential health benefits from concessionary fares. Coronini-Cronberg et al. (2012) found health benefits amongst concessionary pass holders as they were more likely to use the bus, therefore increasing physical activity associated with increased walking to access bus services. Webb et al. (2012) found that older people who had a pass were less likely to be obese, due to physical activity induced by increased bus use as a result of having a concessionary pass.

Research has also found that quality of life has improved amongst older people from the introduction of concessionary travel (Rye and Mykura, 2009, Andrews, 2011, Hirst and Harrop, 2011). However, there appears to have been very little social inclusion impact (Rye and Carreno, 2008a, 2008b, Transport Scotland, 2009) as the concession remains limited for many as there are other barriers to using public transport aside from cost. Aspects of the physical environment can present barriers to accessing public transport. Walking trips can be difficult for older people to make due to uneven paving, hills, ramps, steps, heavy traffic making it difficult to cross roads and lack of public seating to rest at during journeys (Hine and Mitchell, 2003, Lucas, 2004, Marsden et al., 2008, Wennberg et al., 2009, Risser et al., 2010, Hess, 2012), particularly if bus stops are located too far away. Other aspects of public transport such as the absence of shelters and seating at bus stops can make it difficult for older people to wait for transport for a long period of time, especially if they have shopping.

Another perspective suggests that in order to increase bus patronage among the devolved administrations, it was politically easier to provide concessionary travel subsidies to bus operators rather than attempting to re-regulate the bus industry (Knowles and Abrantes, 2008 in Shaw et al., 2009). Therefore, concessionary schemes could be viewed as essential in sustaining non-profitable bus services, particularly in rural areas. This ensures a continued service that is available for other people to use who are not eligible for the benefit, so

indirectly, concessionary policy perhaps meets some of the wider social inclusion aims and objectives.

Whilst existing research suggests that older people benefit from the concessionary scheme, these benefits have been contested due to the high costs involved in providing the scheme. Rye and Carreno (2008b) found that bus operators were being over-reimbursed for concessionary fares. Schemes tend to induce demand, provide little towards economic development and are unevenly distributed in a number of ways. Firstly, other population groups who may be in greater need for free travel, such as young people, students, unemployed people and single parents are not entitled to any such benefits. This has led to concessionary fares being regarded as a 'political gimmick' (Mellor, 2002, p.10) as it is targeted towards older people, who tend to be more likely to vote. Secondly, despite its universal availability, research has shown that take-up varies due to the quality of bus services and ability to use buses, therefore only benefiting some older people. This brings into focus the effectiveness of financial incentives in the form of payments to individuals in influencing behaviour. Public transport needs to be attractive in terms of more routes, higher frequencies of services and additional bus stops.

Much research on the impact of concessionary scheme tends to be based on modest sample sizes in local areas: Andrews et al. (2011) study was based on 487 concessionary holders in Southwest England; Baker and White (2010) study was based on 796 respondents in Salisbury; and Mykura (2003 in Rye and Mykura, 2009) was based on 144 respondents in Edinburgh. Dargay and Liu (2010) used the National Travel Survey in their study which is a random representative sample but to date there has not been much research using similar random samples to be representative of the population in Scotland over a longer time period, to be able to generalise the results to the population.

Of particular interest is who is using the concession and how mobility has changed as result of removing boundary restrictions, particularly in relation to bus and car use. This is particularly pertinent as car use amongst older people has been increasing, in conjunction with increasing concerns about the financial sustainability of the scheme as the proportion of older people eligible to claim concessionary fares is rising as the Boomer cohort ages.

2.6. Understanding the Meanings of Mobility Trends Amongst Older People

The thrust of this chapter has been to explore what the literature has identified as the key features shaping mobility of older people. This has involved recognising that older people's movements can be thought of as part of a wider literature on mobility in general. Given that most older people are retired and therefore not involved in the labour market, the chapter

narrowed the focus to the literature on movements unrelated to employment, highlighting instead issues associated with quality of life. This led to consideration of the specifics of what is known in the literature about the travel behaviour of older people in particular and of policies aimed to shape their mobility. By its nature, however, this review of what is known about mobility amongst older people is constrained by the rather limited conceptual frameworks adopted by most researchers working on these topics.

In coming towards the conclusion of this chapter, a rather different question is now asked – namely what kind of meanings might be sought in analysing mobility trends of older people, when the research lens is refocused at different scales of investigation. In particular what might be knowable about mobility trends when the researcher shifts attention (a) away from behaviour and decisions at the individual decision-making scale and (b) when the time scale is shifted to change over decades, rather than short-run behaviour change as revealed from cross-sectional study?

Conceptualising the research issues raised in this literature review as being much more profound than offering partial understanding of personal decisions taken at one point in time, opens the door to recognising the significance of the contributions of wider social theory in mobility studies (Bailey, 2005). It admits the possibility that studying the travel behaviour of older people involves more than simply observing the empirical processes captured in cross-sectional spatial datasets (in Gregory's (1978) terms, mobility as part of the spatial patterns of social exchange) and it hints at the value in seeking explanations that are shaped by spatial structures and schema over space-time. Fielding (2012), for example, has taken this argument about the significance of different levels of socio-spatial structures and applied it to wider mobility research in relation to his search to explain temporal trends in internal migration in the UK between 1950 and 2010. In the context of this thesis the same approach using a similar conceptual translation would involve recognising that travel patterns of the older population shift over time (for the reasons discussed earlier in this chapter), but that analysis need not be limited only to the empirical level driven by individual decisions, but that mobility trends of older people may also be shaped by deeper levels of meaning associated with social, cultural and economic structures. Furthermore, these deeper structures will themselves change over time, producing significant shifts in mobility behaviour as the meanings of terms such as 'old' and 'elderly' are re-negotiated as well as there being alterations over time in the meaning of 'mobility' in later life.

The starting point for analysis in this thesis remains the empirical level at which the movement patterns of older people may be observed and mapped. However, the conceptual thrust of the thesis is to deploy longitudinal demographic analysis to reveal longer term trends in mobility and to search for a more dynamic understanding of how these trends might be understood at different socio-spatial scales of investigation.

2.7. Summary and Critique of Existing Evidence

This section provides a summary and critique of existing studies that consider the mobility of older people using a cohort approach. Some existing research recognises the presence of cohort effects in the changing mobility of older people; however, these tend to focus on current cohorts of older people and the Boomer cohort when they were at earlier life-stages associated with 'mid-life'. Newbold et al. (2005) found that car trips made by older people in Canada increased during 1986-1998 and that it is likely that the cohorts considered in the study will continue to depend on cars as they age. Pseudo cohorts were also developed to examine mobility patterns however; the study only included existing older cohorts to understand the changing mobility of the older population. The cohorts in the study were also based solely on age, rather than being linked to demographic cohort groups.

Hjorthol et al. (2010) found significant period effects in car ownership and use, particularly amongst women and that older people are travelling more than comparable age groups in 2005-06 than 1981 and 1985 in Denmark, Norway and Sweden. This study also only focused on older age cohorts in the study also solely based on age. Frändberg and Vilhelmson (2011) considered the mobility trends amongst the Swedish population from 1978-2006. Cohorts are also based on age, and younger age cohorts were included in the analysis. They found that the mobility of older people has increased due to increased car access, gender differences in mobility are converging due to the fall in mobility amongst younger males. These were attributed to generational differences.

In these studies much less consideration has been given to the mobility patterns of the Boomer cohort as they enter retirement (due to temporal effects), as well as the mobility of subsequent younger cohorts. These studies also developed cohorts based on age, which are not consistent over time as they have been based on age groups at cross-sections. As the values, attitudes and behaviours of cohorts are shaped by differing historical socioeconomic contexts it is hypothesised that different generational cohorts will have different mobility patterns, particularly in older age. Cohort analysis of mobility trends has also not been undertaken in a British context. Mobility trends are particularly important to consider due to the continued public financing of the concessionary travel scheme in Britain. This policy largely aims to maintain and improve older people's mobility as a way of promoting social inclusion.

A greater in-depth demographic approach is required in order to make clearer links between socio-demographic trends and the mobility of cohorts to develop deeper insights into the changing mobility amongst older people than these existing studies currently offer. Cohort analysis is one aspect of such a demographic approach. Demographic trends can be incorporated more effectively into this technique.

2.8. Conclusions and Research Questions

The challenges posed by an ageing population in the UK are becoming of increasing importance in a number of academic as well as policy arenas. Increasing life expectancies are contributing to this trend and in the short to mid-term the ageing of the Boomer cohort will begin to contribute to this population. Although some studies have recognised that cohort effects are present, this has largely focused on the Boomer cohort and there is a lack of research using a wider cohort approach to examine the changing mobility of older people in a British context. Cohorts that have been developed in previous studies have not been explicitly linked to demographic trends. There is a need for further examination of the mobility trends among the older population and study into inter-cohort and intra-cohort mobility patterns to gain an understanding of these cohort differences. This interdisciplinary study links transport geography and population studies using a cohort approach which is a methodological approach used more widely in population studies. This section provides a summary of the existing gaps in research that require further consideration and presents the relationship between the research aims (Chapter One) and specific research questions addressed by the thesis (Table 2.2).

Firstly, there has been a lack of research into aggregate mobility trends of the older population. Much of the current research considers the mobility of older people at single cross-sections in time and there is a need to look at trends over a longer time span. There is also a need to consider what modes are being used and how these are changing. There are concerns that older people are increasing use of the private car which may lead to problems when driving cessation occurs.

This thesis addresses this gap by considering the broad aggregate level of mobility trends in terms of trips made and distance travelled. In addition, measures used to identify potential for mobility, such as car access and driving licence holdership, can also be proxy variables for quality of life and social exclusion, to indicate the likelihood of these issues for the future older population. However, it is recognised that this is not always true, especially for those living in cities.

The changing nature of mobility amongst older women has not been looked at extensively in relation to an ageing population. Existing research into travel behaviour has identified that gender differences exist; however, these differences may not be as pronounced in the future. Women belonging to the Boomer cohort differ greatly from current and former cohorts and are also more likely to hold driving licences. Therefore previous assumptions and debates about older women may become redundant. The analysis in this thesis has been disaggregated by gender to compare the mobility trends between men and women belonging to different cohorts.

Second, although some existing research recognises that cohort effects are present in the mobility of older people in more recent studies; these tend to focus on the Boomer cohort and current cohorts of older people. The mobility patterns of subsequent cohorts have not been given as much consideration. Adopting a demographic approach is novel in mobility studies, with cohort analysis being an aspect of this. Broadening the demographic perspective particularly in relation to cohorts is crucial when investigating the changing mobility of older people given the different views, values and expectations between cohort groups that have developed as each birth cohort has grown up in different social, economic and historical environments (Ryder, 1965). Understanding these cohorts will assist in generating clues for the mobility of older people in the future.

Cohort analysis and the identification of age, period and cohort effects is considered a useful approach to develop insight into the changing travel behaviour of older people as previous studies have shown that what was once thought to be a phenomenon of ageing, was indeed due to cohort effects.

Earlier in this review of the literature, it was identified that there is a reducing rate of driving licence holdership amongst current cohorts of younger people. Should they not obtain a licence there may be implications for their mobility as they age. An encompassing study of the mobility of all cohort groups is undertaken in this thesis to be able to adequately consider, not only the short to mid-term, but also the longer term implications of future mobility for the older population given that the 'echo Boomer' cohort is also a significantly large cohort.

There has been a lack of assessments on the impact of concessionary schemes on the mobility of older people in a Scottish context using large scale representative surveys to be able to generalise to the wider population. The concessionary travel policy in the UK is specifically targeted towards maintaining the mobility of older people and has undergone changes from a local scheme to a national scheme. As this is current policy that aims to maintain the mobility of older people in the UK and with pressure on public spending there are concerns regarding the effectiveness and financial sustainability of the scheme.

An examination of this policy will assess what influence an incentive based policy has on the travel behaviour of older people. More specifically investigation is required into who is using the concession over time, the mobility patterns of concessionary pass holders, and the direct impact of the policy on mobility after the implementation of the scheme on bus use and car use.

As a result of the knowledge gaps identified, the overall objective of the thesis is to apply a longitudinal demographic perspective in examining the changing mobility of older people by adopting a cohort analysis approach. Table 2.2 links the existing gaps in research to the wider

aims of the thesis and presents the specific research questions to address these. A quantitative approach using cohort analysis has been adopted to undertake this research. The research methodology is presented in Chapter Three.

Table 2.2: Research Aims and Questions

Gap in Existing Research	Aims	Research Questions	Specific Sub-Questions
<p>There is a lack of research on the aggregate mobility trends of the older population. Existing research considers the mobility of older people at single points in time.</p>	<p>Explore the mobility trends of older people in Britain over a longer time span.</p>	<p>1. What are the mobility trends of older people in Britain in terms of using the following mobility indicators: trip frequency; distance travelled; mode share and trip purpose?</p>	<p>a. Is mobility increasing among older people in terms of trip frequency and distance travelled? b. Are older people making increased use of the private car? c. Are gender differences in travel behaviour converging amongst older people?</p>
<p>Whilst some more recent studies recognise the presence of cohort effects on the mobility of older people, these tend to focus on Boomer cohort and current cohorts of older people. Much less consideration has been given to the mobility patterns of subsequent cohorts.</p>	<p>Conceptualise the relationship between cohorts, ageing and mobility of older people, over time and through space.</p>	<p>2. To what extent do age, period and cohort effects explain the change in the trends of older people's mobility in terms of distance travelled?</p>	<p>a. How does ageing affect mobility? b. How do the cohort groups differ in terms of mobility? c. What structural factors, or period effects, are influencing these levels of mobility?</p>
<p>As cohorts differ, concessionary policy may not be appropriate for new generations of older people. Research into the impact of concessionary schemes on mobility has previously been based on modest localised sample sizes. The use of large scale representative surveys, especially in a Scottish context, has been neglected.</p>	<p>Understand the influence of financial incentives used in transport policy on the mobility of older people, and how this may vary between cohorts and lifestyle groups.</p>	<p>3. What has been the aggregate level impact of the National Concessionary Travel Scheme (NCTS) on the mobility of older people in Scotland?</p>	<p>a. Who is using the concession and how has this changed over time in line with changes made to the policy in Scotland? b. What are the mobility trends of concessionary pass holders in Scotland? c. Has the NCTS increased mobility?</p>

3. Research Methodology

3.1. Introduction

An older population is becoming more prevalent in Britain as the first wave of the Boomer cohort (classified as those born in the period directly after the end of World War II from 1946-55, (McDougall, 1998, Einolf, 2009) are beginning to reach the age of retirement. There are social and policy implications arising from this that have not been widely considered in the context of mobility. In order to explore mobility trends of British older people at the aggregate level appropriate methods need to be established which will be explained within this chapter.

Firstly, this chapter will provide a summary of the quantitative approach used to address the research questions to meet the aims and wider objective of the thesis. Secondly, the research approach that has been adopted is outlined. Thirdly, it will define the key working terms to be used in the research along with the scope. Fourthly, it will consider the data requirements in further detail and critically evaluate the quality of the data available. Fifthly, it presents the analytic methods used in the thesis. Finally the chapter will conclude.

3.2. Methodology Overview

This section presents an overview of the quantitative methods and techniques used to address each research question using available appropriate repeated cross-sectional datasets. Table 3.1 provides a summary of each research question along with the appropriate data source selected to address each question and brief description of analytical methods used.

Firstly, to glean a macro view of what trends are occurring over time descriptive analysis was carried out using the National Travel Survey (NTS). The mean and median was calculated for number of trips and distance travelled per week by 3-year moving averages using all available data from 1995-2008. Confidence intervals were also plotted in order to test statistical significance of the results. Tukey's HSD post hoc tests were used to compare the means between years, whilst the Mann-Whitney-Wilcoxon test was used to compare median values between years to test for statistical significance. Percentage mode share and trip purpose were also plotted from 1995-2008.

Using all available data allows for trends to be examined over time and fluctuations in travel behaviour can be identified. Analysing changes in trends over time can indicate future mobility trends. Further exploration of the trends will assist in deciphering the driving mechanisms behind the changing mobility of older people.

Table 3.1: Secondary datasets and analytical methods chosen to answer research questions

Research Question	Data Sources	Analytical Method
<p>1: Mobility Trends</p> <p>What are the mobility trends of older people in Britain in terms using the following mobility indicators: trip frequency; distance travelled; mode share and trip purpose?</p>	National Travel Survey (NTS)	Descriptive analysis on travel trends including mean and median change in distance travelled and trip frequency; calculation of percentage mode share and trip purpose over time.
<p>2: Cohort Effects</p> <p>To what extent do age, period and cohort effects explain the change in the trends of older people's mobility in terms of distance travelled?</p>	National Travel Survey (NTS)	Cohort analysis using descriptive analysis and a multiple linear regression model.
<p>3: Policy Effects</p> <p>What has been the aggregate level impact of the National Concessionary Travel Scheme (NCTS) on the mobility of older people in Scotland?</p>	Scottish Household Survey (SHS)	Descriptive trends on characteristics of concessionary pass holders and mobility in terms of trip frequency and distance travelled by bus and car-driver. 'Difference-in-differences' regression model using control and intervention groups.

Secondly, although cohort analysis has been used widely in demographic studies to explain change it has not been used widely to examine changes in mobility, particularly for the older population. This thesis is interested in this approach and the use of age, period and cohort effects to explain changes in mobility patterns as it is hypothesised that cohorts have different characteristics and expectations of personal daily mobility and therefore exhibit different mobility patterns to former cohorts of older people. It is felt that this approach will bring a novel perspective and greater insight into the changing mobility of older people and the drivers of change observed over time.

Detailed descriptive analysis is used in conjunction with regression analysis. Plotting 3-year moving averages of distance travelled from 1995-2008 by cohort and age groups enables comparison of older people to other groups to capture age and cohort effects. Using all available data from 1995-2008 enables period or 'trend' effects to be captured and separated from age and cohort effects. Multiple linear regression analysis was used to control for other variables that influence mobility, such as area type and household car access, to identify how age, period and cohort effects are influencing mobility trends.

Finally, in order to assess the influence of the concessionary travel scheme on the mobility of older people in Scotland descriptive analysis is required alongside the use of a 'difference-in-difference' regression model. The descriptive analysis examines the characteristics of concessionary pass holders over time in line with changes made to the policy. The mobility patterns of older people who held a concessionary pass were also plotted over time. The control group used in the 'difference-in-differences' regression model were those aged 60 and over without a concessionary pass. The intervention group comprised of those aged 60 and over who stated that they held a concessionary pass.

3.3. Research Approach

In order to gain an overview of the changing mobility of the older population, a quantitative approach to examine trends at the aggregate level is felt to be most appropriate to adopt for this thesis.

Analysis derived by datasets can generalise from a random sample of the population regarding mobility trends, which can then be applied to the older population. Statistical inference can ensure that these findings are applicable. Trend analysis has some limitations as whilst trends can be revealed, Weerasekera (n.d.) argues that this can provide little insight as to how, or why, the changes have taken place. Individuals may change their attitudes or behaviour as they age. Qualitative approaches can be used to reveal such information, although this can only be undertaken on a small scale. Another possibility is that people's behaviour changes due to external events or circumstances.

As the broader objective of the research is to develop further insight into the changing mobility of older people, cohort analysis is one approach that can be useful to explain change over time in relation to the changing behaviour of cohorts. This approach is useful in explaining change as these methods have resulted in an increased understanding of the ageing process and phenomena once thought to be attributed mainly to the ageing process have been instead related to the cohort membership of the groups studied (Rentz and Reynolds, 1981). Using repeated cross-sectional data, pseudo cohorts can be constructed and used to explain observed changes in trends (McIntosh, 2005, Uren, 2006, Rafferty and King-Hele, 2010).

Cohort analysis has not been used to explain changes in the mobility of older people at the aggregate level in Britain. Cohort analysis is a strategy for examining data and a group of methods designed to separate out age, period and cohort effects (Rentz and Reynolds, 1981, Glenn, 2005) and has not been used widely to assess changes in mobility patterns except for a handful of studies (Hakamies-Blomqvist and Henriksson, 1999, Newbold et al., 2005, Hjorthol et al., 2010, Frändberg and Vilhelmson, 2011).

In the context of an ageing population, cohort analysis is useful in examining changes in mobility as it can help distinguish between three types of time-related variation; age effects (variation associated with different age groups), period effects (variation over time periods that affect all age groups simultaneously), and cohort effects (changes across groups of individuals who experience an initial event such as birth during the same year or years) (Yang, 2007). This thesis is interested in these effects in explaining change as it is hypothesised that cohorts have different characteristics and expectations in terms of personal daily mobility and will therefore exhibit different mobility patterns, especially as they age.

Different effects can be partially observed when fluctuations in mobility occur. Results from the cohort analysis can be linked to the existing literature to provide meaning to the influence of age, period and cohort effects on the changing mobility of older people and further understand changes in mobility. It is understood that older people are a heterogeneous group and there are a variety of other factors that influence travel behaviour. Therefore in the examination of changes in trends it is considered appropriate to consider the effects on a broader scale to be able to apply generalisations to the population.

Large scale government conducted secondary data sources that collect information on travel patterns exist, which aim to provide representative samples of the British population. These are available over a longer time period that would not be achievable to collect in the scope of this thesis. These data sources will be explored more fully towards the end of this chapter. The key working terms to be used in the thesis need to be defined, which is the focus of the following section.

3.4. Definitions and Scope

This section will examine the conceptual definitions of older people and mobility given the focus of this research. It will also explore the scope of the research whilst considering these definitions. It will examine the issue of using age, period, and cohort effects as well as policy influence to explain changes in older people's mobility. Following this discussion, the section will provide definitions for all the key working terms in the research thesis. It will also examine the issue of constructing appropriate cohort and control groups to compare mobility behaviour between different groups.

3.4.1. Older People

This section explores the meaning and concept of being of 'old age', discussing what constitutes being old before providing the definition for use in the thesis. Although the term 'elderly' is widely used in the literature to identify adults aged 60 or over, more recently there has been a move towards using 'older people' or 'older adults', which is generally preferred

over 'senior' and 'elderly', which can be discriminatory (Dahmen and Cozma, p36). There are various ways in how older people can be defined. The most popular is usually based on age; however there are alternative classifications such as life stages.

When using age to define an older person, there is no agreed definition (Tinker, 2002). The age at which someone becomes 'older' varies greatly and in travel studies the classification can start from the age of 50-55 (Tacken, 1998, Noble, 2000). Distinctions have also been made between 'young older people' and 'oldest old people' based on mobility patterns. Those who are 'young old' can be aged from around 50-65 years of age to approximately 75 years. The 'oldest old' are considered those to be aged from around 75-85 years due to the sharp decline in mobility after 80 that has been observed in a number of studies (Bowling et al., 1989, Noble, 2000, Alsnih and Hensher, 2003, Giuliano, 2004, Newbold et al., 2005, Su and Bell, 2009, Wennberg et al., 2009, Mercado et al., 2010).

Life-cycle and life-course concepts have been used to examine variations in mobility patterns at different stages over the lifespan of an individual, most often associated with changes in family structure (Rosenbloom, 1993, Oppermann, 1995, Pooley et al., 2005a). Life stage is thought to influence travel behaviour (Oppermann, 1995) and can be used to define older people. Life-stages can be defined as specific optional events such as moving home or retirement (Ryley, 2006, 2008).

Using this concept to establish older age could be useful in looking at travel behaviour during a life-stage associated with older age, such as retirement. However, this approach is not appropriate for use in this study. The concept of the family life-cycle is based on the assumption that the nuclear family is the typical or ideal structure (Zimmerman, 1982). Family structures have become more complex over time in line with the Second Demographic Transition (SDT) whereby social trends in society are changing and impacting on demographic structures.

As a result, problems may arise when attempting to define older people using the family life-cycle concept if there are no children present in the household for example. Other demographic trends such as single parent households or single households may conflict with using this for the basis of defining older people.

There are also variations in the number of stages one might experience and the age groups used to classify different stages. Zimmerman (1982) identifies five household types using the family life-cycle concept, whilst Ryley (2006) classifies ten different life-stages. Due to the lack of standardisation of life stages in travel behaviour research, it is unsuitable to use this approach to compare changes in mobility over time amongst the older population (Schwanen et al., 2012b).

It can also be difficult to determine the age at which people retire, in part because older people who have become economically inactive may give different reasons for their inactivity – retirement, ill-health, inability to find suitable work – even though their situations are the same (ONS, 2012b). There is also a large age range where retirement can take place. With an ageing population it is likely that older people will be working until they are much older. There is evidence to suggest that this is occurring. The average age at which men leave the labour market rose from 63.8 years in 2004 to 64.6 years in 2010. For women, it rose from 61.2 years in 2004 to 62.3 years in 2010 (ONS, 2012b).

At present, the current pensionable age in Britain is 65 years for men and women. From December 2018 the State Pension age for both men and women will start to increase to reach 66 in October 2020. Current law provides for the State Pension age to increase to 67 between 2034 and 2036 and 68 between 2044 and 2046. However, it was announced by the government on 29th November 2011 that State Pension age will increase to 67 between 2026 and 2028, although this is not yet law (Directgov, 2012). It is also the case that some people take early retirement, usually those who are wealthy. Also, a larger proportion of men than women take early retirement (ONS, 2012b). As such those in retirement may either belong to the 'oldest old' or could be wealthier 'young old', therefore able to retire early, rendering a very large and diverse group of older people from which to draw overall trends and comparisons in travel behaviour. There may also be a gender imbalance when looking at travel behaviour using life stages to define who is an older person in this research study.

The criterion for being an older person in this research is exclusively based on the age of the individual, that is being the age of 60 years or over. The age of 60 has been chosen as this was formerly the age for obtaining a state pension in Britain for women. It is also the eligibility age for a number of universal benefits that people have been able to claim as they age in Britain to compensate for lower incomes. These include receivership of winter fuel payments and travel concessions, as well as being the previous age at which women became eligible to receive a state pension. Defining older people based on the age 60 years and over has been used in a variety of studies regarding older people (Tinker, 2002, Kalache et al., 2005).

However, it is recognised that the older population are not a homogenous group (Alsnih and Hensher, 2003, Spinney et al., 2009, Hjorthol et al., 2010), which extends to their transport needs. As such, using age as a criterion to explain travel behaviour of the older population needs to be treated carefully (Tacken, 1998). Lifestyle and socio-demographic characteristics can lead to different transport requirements (Mercado et al., 2010). Given that there is much heterogeneity in the older population and as this research is based on macro level trends, socioeconomic characteristics such as income and area type, which can influence travel behaviour, will be controlled for in the analysis.

3.4.2. Mobility

According to Ziegler and Schwanen (2011), mobility can be conceptualised as the overcoming of any type of distance between a here and there, which can be situated in physical, electronic, social, psychological or other kinds of space. For the purpose of this research, mobility refers to the physical travelling of distance and trip making that takes place outside the residential home in the everyday and local context in order to acquire goods or services or to take part in activities rather than embodied mobility or longer term residential relocation and migration of populations, commonly referred to in 'mobilities' research and population studies respectively.

Mobility for the purpose of this research focuses primarily on the ability of people to gain access to goods and services through movement (Metz, 2003, Hine, 2008). This is achieved through making journeys by transport modes, or by walking (Nutley and Thomas, 1995) and is can be taken to refer to everyday movements undertaken as part of a lifestyle routine. This is observed from actual trips that are undertaken outside the residential home. 'Mobile' is also understood as 'motorised' across western societies (Kaiser, 2009), especially where studies are related to the transport and quality of life, and in particular for the older population. Therefore mobility is also often related with the ability to drive a car (Spinney et al., 2009). The focus of this research is not solely on travel movements by car, although it is considered. However, referring to mobility in this way can fail to take into consideration the incidental benefits of the journey such as the psychological benefits gleaned from being 'out and about' (Metz, 2000, p.150).

The 'new mobilities paradigm' posits that the intermittent and intersecting movements of people, objects, information and images across short and great distances are fundamental components of social relations. From the perspective of the 'new mobilities paradigm', movement is re-positioned at the centre of social relations (Burnett and Lucas, 2010). It focuses on the actual embodied movement that is taking place rather than the movement that occurs between places. In the context of exploring quality of life of older people examining behaviour from this perspective would lead to more information about the journeys being made from a personal perspective. However, for the purposes of this research it is felt that this would not be achievable on a macro population level scale.

When examining the concept of mobility it is also important to consider immobility. Immobility as a result of poor transport amongst older people can have negative impacts in terms of isolation, loneliness and depression (Bowling et al., 1989, Help the Aged, 2008). Poor transport combined with additional structural factors such as low income can contribute to restricted mobility amongst older people. Immobility can also result from physical disability, possibly due to age-related disease and frailty and can influence decisions about whether to

travel as aspects of the physical environment may be problematic to navigate (Marsden et al., 2008, Risser et al., 2010). There may be concerns with regards to fear and personal security on, or whilst waiting for, public transport (Lucas, 2004, Stradling et al., 2007, Dobbie et al., 2010). It should be noted that whilst these issues have been presented in the context of older people, they do not exclusively concern older people and can impact on women, those on low incomes, children and disabled people.

However, it is also important to note that immobility does not necessarily lead to a frustration of the need or want to travel. Immobility can be a choice if there is no requirement to undertake travel. Residential migration may also be undertaken as an alternative to high mobility if a choice is made to reduce travel. Metz (2000) puts forward a concept of mobility that includes an element of potential travel where there is knowledge that a trip could be made even though this might not be undertaken. The issue of capturing immobility is problematic as it is not possible to 'see' trips that have not been made or potential trips, particularly ones that need to be made at short notice, for example in an emergency. Collection of these 'potential' journeys could be difficult to capture. Therefore immobility in the context of this study is the same to that in Tacken (1998), that is, people did not make a trip on the reported day, which is not the same as being completely immobile. It is necessary to consider and to measure what can be seen.

Mobility tends to be more or less used synonymously with travel and as such travel behaviour is measured, which is then discussed in terms of the implications for those concerned (Metz, 2000). The notion of everyday mobility or daily travel that is defined as travel from the home undertaken on a temporary basis (Pooley et al., 2005b) is central to this study. It is these shorter distance, higher frequency trips that are most important when examining travel behaviour of older people as these are important for quality of life (Mollenkopf et al., 1997, Metz, 2000, Schwanen and Ziegler, 2011).

In addition to this notion of defining mobility as all types of trips outside the home either on foot or by any other means of transportation (Nutley and Thomas, 1995) a view has been reached that mobility needs to be considered in a tangible way. Therefore, for this research it has been felt necessary to consider the physical movement of older people outside the home which is determined by trips taken and distance travelled by different transport modes. From this the implications for the mobility of older people can be made (Metz, 2000).

Mobility is defined by Rosenbloom (2004) as the trip rate by all modes. Trip rates are defined as travel from an origin to a destination to undertake activities, however, mobility can be particularly ambiguous when defined by trip rates, despite being popular (Alsnih and Hensher, 2003). In the context of older people this is due to the substitution of trips for delivery of goods or accessing services online. This can be reflected as a reduction in mobility, although it may

not be detrimental and could be observed as beneficial. As such, this suggests a measure of mobility requires a combination of different measures. Distance travelled and transport mode used are common indicators of mobility (Tacken, 1998, Rosenbloom, 2004, Páez et al., 2007). Combining number of trips made with distance travelled is felt to provide an improved picture of how aggregate levels of mobility amongst older people are changing.

Changes in daily distance travelled per week are important in this thesis. As incomes have risen, car ownership has increased, leading to higher car use and greater distance travelled (Pooley et al., 2005b, Lucas and Jones, 2009, Metz, 2010). Car use is likely to increase amongst older people as there has been an increase in the proportion of older people holding driving licences (DfT, 2010a). The analysis also only focuses on daily mobility rather than longer distance travel. This 'mundane' everyday mobility which tends to be shorter in nature has been neglected within the literature (Pooley, 2009). Therefore distance travelled has been defined as 'daily distance travelled'.

Daily distance travelled is used to determine levels of mobility. Measuring distance travelled, as opposed to time travelled, is felt to give a better indication of physical mobility levels. Although an individual may have spent a long time travelling, this may be as a result of congestion in urban areas and thus present an inaccurate picture of mobility. Distance travelled is also indicative of travel horizons. However, although indicating physical mobility, it could be considered quite a crude measure as this measure cannot account for physical aspects of environment which can influence journeys taken particularly for older people such as terrain, places to rest, availability of particular transport modes and personal safety and security issues encountered along the route. However, from a macro scale perspective and movement it is considered appropriate.

In some of the analysis, trips made for commuting, business, work or education purposes are excluded. This is in order to reduce bias when comparing mobility between age groups as some groups are more likely to be engaged in employment than others. However, when considering the influence of the concessionary scheme on mobility, commuting trips have not been excluded. As the concessionary pass is available to those aged 60 and over, many are not likely to retire until 65 and the pass may be used for commuting, therefore it is important consider all trips made whilst having the benefit.

In accordance with the preceding discussion mobility is defined in this thesis as follows: trip frequency; daily distance travelled; mode share and socioeconomic factors such as driving licence holdership and household car access. It is hypothesised that the car is becoming increasingly important in the mobility of older people. Therefore it is important to consider how factors related to car use, such as driving licence and access to a car, are influencing the changing mobility of older people.

3.4.3. Cohort Analysis and Cohort Groups

A cohort can be defined as the aggregate of individuals who experienced the same event within the same time interval (Ryder, 1965). This is usually based on time of birth but numerous types of cohorts can be identified including marriage, divorce, retirement and education cohorts (Rentz and Reynolds, 1981). The ageing of the Boomer cohort is beginning to contribute to the change in proportion of older people in Britain and it has been recognised that they will be a different older population in terms of their preferences and expectations which will influence mobility (ECMT, 2000, Metz, 2003, Newbold et al., 2005, Mercado et al., 2007, Coughlin, 2009, Warnes, 2009).

Older people have different mobility patterns compared to the younger population (Noble, 2000). Existing studies have identified that the mobility of older people is changing due to increasing use of the car (Rosenbloom, 2001, Rosenbloom and Ståhl, 2002, O'Fallon and Sullivan, 2009, Le Vine and Jones, 2012). Mobility characteristics of the Boomer cohort compared to current and former cohorts of older people are different as the Boomer cohort grew up with developments in infrastructure and technology linked to the car (Coughlin, 2009).

Successive cohorts differ as they age in different historical, cultural, technological, and socioeconomic circumstances, or are different ages when shared historical periods occur (Ryder, 1965, Rafferty and King-Hele, 2010). Consequently the behaviour of different cohort groups varies. These variations can reflect different social attitudes; varying aptitudes and skills; and the effects of historical events (Productivity Commission, 2005). Given these differing cohort characteristics, it is necessary to take cohort effects into consideration when examining the changing mobility of older people over time.

Cohort analysis is a strategy for examining data and is a method, or rather group of methods designed to separate out age, period and cohort effects (Rentz and Reynolds, 1981, Glenn, 2005). This thesis is interested in these effects for explaining changes in behaviour as it is hypothesised that cohorts have different characteristics and expectations in terms of personal daily mobility and as such will exhibit different travel behaviour, especially as they age. Age, period and cohort effects are defined as follows (Palmore, 1978, Glenn, 2005, Yang, 2007):

- Age effects are those displays in travel behaviour exhibited by different age groups, with people changing behaviour due to the ageing process. For example, changes in behaviour may be related to age-associated disabilities, or place in the life-course, such as retirement and no longer constrained by working hours to undertake other activities.

- Period effects represent changes in behaviour over time associated with all age groups at the same moment in time, for example an increase in fuel prices or improved public transport vehicles.
- Cohort effects are those which are associated with changes in behaviour across groups of individuals that are exposed to a similar set of factors over a particular period of time.

The main difficulty in conducting cohort analysis is that there is a well-known identification problem which is created by the exact linear dependency that exists between age, period and cohort effects ($\text{Period} = \text{Age} + \text{Cohort}$) (Mason et al., 1973, Palmore, 1978, Robertson et al., 1999, Yang et al., 2004, Glenn, 2005). This presents a major methodological challenge that has been widely recognised in demography, epidemiology and statistics and various attempts have been made to address this issue through the development of new methods in order to disentangle these effects (Mason et al., 1973, Rentz and Reynolds, 1981, O'Brien, 2000, Yang et al., 2004, Yang and Land, 2008). However, it has been argued that cohort analysis will always be the subject of criticism as measures used are: "not state of the art" (Glenn, 2005, p.53). Due to this complexity and the aim to develop generalisable and illustrative explanations for the older population, descriptive statistics and multiple linear regression models have been used to infer which effects are having the greatest impact in changing mobility of older people.

Dale and Davies (1994) argue that through examining multiple cohorts over time, it is possible to distinguish between age and cohort effects. By constructing pseudo cohorts, repeated cross-sectional data can help to distinguish cohort and age effects by comparing age groups from pseudo cohorts for different years (Rafferty and King-Hele, 2010). Pseudo cohort data represents cohort groups on the basis of age groups from repeated cross-sectional data (McIntosh, 2005, Uren, 2006, Rafferty and King-Hele, 2010). As the National Travel Survey (NTS) uses random sampling of the British population in consecutive years, representative pseudo cohorts of the population can be constructed from this dataset.

Using this technique, cohorts are tracked over time and changes in mobility can be compared within and between cohorts (Newbold et al., 2005, Rafferty and King-Hele, 2010). Although it is not possible to consider individual behaviour, aggregate cohort behaviour can be observed to make inferences about the future mobility of the older population. Defining the cohorts in this way enables large sample sizes to be analysed, however, they are not perfectly comparable as they are just based solely on birth year. There is heterogeneity between individuals that can impact on travel behaviour such as income, car access, household structure and health being just a few.

As the overarching objective of the thesis is to apply a longitudinal demographic perspective to exploring mobility, for new insights into the changing mobility of the older population,

change at the aggregate level is important to be able to make generalisations. There are arguments regarding over generalising in terms of travel behaviour but factors that are known to influence mobility patterns can be controlled for in the regression models.

As the criterion for being an older person is based exclusively on age, that is being the age of 60 years or over, in line with this it would be appropriate to define the cohort groups by birth year. It should also be noted that the oldest people in the dataset are aged 99. Table 3.2 outlines the cohort groupings used in the analysis.

Table 3.2: Birth cohort group definitions

Cohort Label	Birth Year	Cohort Name	Sample Size
Cohort 0	(b.1976 – 1985)	Generation Y	17,574
Cohort 1	(b.1966 – 1975)	Generation X	25,139
Cohort 2	(b.1956 – 1965)	1960s Boomers	27,180
Cohort 3	(b.1946 – 1955)	Post-War Boomers	24,778
Cohort 4	(b.1936 – 1945)	World War II	20,668
Cohort 5	(b.1926 – 1935)	Great Depression	15,980
Cohort 6	(b.1916 – 1925)	Parents of the Boomers	8,345
Cohort 7	(b.1906 – 1915)	Grandparents of the Boomers	1,671

According to Frey (2010) cohort groups are typically based on 10 year time periods. This neat classification of cohorts into 10 year groups allows for clear alignment and accurate comparisons with age groups also based on 10 year groups in the data sources that have been used. In the existing literature there is no consensus on the classification of cohort groups and there are also various names associated with them. However, in line with defining 10 year groups according to Frey (2010) cohort names and definitions have been aligned as closely as possible to this. Micklewright (1994) also argues that birth cohorts smaller than 10 years may pose a problem in terms of fluctuations in sampling variation.

The Boomer cohort are widely considered to be those born during the post-World War II baby boom between 1946 and 1964 (Macunovich, 2002, Lehto et al., 2008, Dahmen and Cozma, 2009, Jang and Ham, 2009, Frey, 2010). In this thesis the Boomer cohort has been classed as two groups reflecting the first and second waves, given that this was a large birth cohort born after World War II which spanned across two decades. McDougall (1998) and Einolf (2009) define the first wave born from 1946-1955.

There are other names associated with different cohort groups. In Table 3.2, Cohorts 4 and 5 (b.1926-1945) are also known as the 'silent generation' (Pennington-Gray and Lane, 2002,

Beinhocker et al., 2008, Einolf, 2009) as they lived through the Great Depression and World War II. They are also the parents of the Boomer cohort (Strauss and Howe, 1991 in Lehto et al., 2008).

According to McIntosh-Elkins et al. (2007) Generation X were born from 1963-1977, although they recognise that the exact boundaries of this generation are not well-defined. They grew up with technology and their values seemed to stem from a life of uncertainty. Economic values were shaped by recessions. Generation Y were born from 1978-1986 and are the most technologically advanced yet, having always had access to various forms of technology including mobile phones and internet connection. They are also known as the Early Millennials and Echo Boomers as they are the children of the Boomer cohort (Foot and Stoffman, 2000). Due to current high unemployment levels amongst younger people, some members of this cohort group are part of what has been termed the 'lost generation' (Eurofound, 2012).

It should also be noted that given the time span of the available data two additional cohorts were defined but have been excluded from the analysis. There were some older people belonging a cohort born prior to 1906 e.g. someone born in 1905 would be aged 90 in 1995. There are also some people belonging to a subsequent cohort born after 1985 e.g. someone born in 1986 would be aged 22 in 2008. However, due to the small sample sizes of these cohorts, it is considered appropriate to exclude these cohorts from the thesis.

Descriptive analysis is used to track the mobility of age and cohort groups over time. The age groups will consist of different cohort members at different points in time. As cohorts are associated with different socioeconomic characteristics, some of which influence mobility, these can be compared to gain an understanding of how the cohorts are behaving in relation to one another.

Multiple linear regression models will also be used for this analysis to provide some indication of age, period and cohort effects in conjunction with the descriptive analysis. Ordinary Least Squares (OLS) and Weight Least Squares (WLS) are the most common statistical methods used to estimate the coefficients of the Age Period Cohort Characteristics (APCC) model. APCC models can accommodate controls for 'contemporaneous' variables and additional cohort characteristic variables (O'Brien, 2000). Variables to indicate each of the effects will be controlled for in the multiple linear regression models analysis. Survey year will be controlled for to estimate period effects. Cohort group is controlled for as well as age group. Other factors that influence mobility are controlled for which includes: area type, socioeconomic group, full driving licence holdership, household car access and single household structure. Given that there are gender differences in transport, the descriptive analysis and regression models have been disaggregated by gender.

3.4.4. Policy Effects and Control Groups

In order to examine policy influences on older people's travel behaviour a different approach will be required. One particular method that will be employed is the 'difference-in-differences' approach. This method has been used to study numerous policy questions as it is a classic method for analysing the effect of a 'treatment' and hence very good for exploring policy interventions by 'testing' two different groups, whilst controlling for the interaction effect of the policy (Imbens and Wooldridge, 2007). This thesis will consider the influence that free concessionary bus travel has on the mobility of older people.

For a simple set up the outcomes are observed for two groups for two time periods. The 'intervention' group is exposed to a treatment in the second period but not in the first. The 'control' group is not exposed to treatment during either period (Imbens and Wooldridge, 2007). While this is used by economists, very few geographers have used this approach.

If the analysis were to just consider the difference in older people's mobility between the second time period and the first time period the difference may be caused by other factors that have occurred during this time span, as well as the policy influence. For example, the introduction of improved vehicles that are more comfortable or an increase in fuel prices, which may mean that more people might be likely to use the bus regardless of the policy. There may be other 'trend' effects involved.

Also, if the analysis were just to focus on the second time period and focus on the difference in mobility behaviour between the intervention group and the control group, the difference may not just be due to the policy but to a 'composition' effect. The different make-up of these groups may affect the outcome.

The 'difference-in-differences' approach isolates the policy effect from the 'composition' and 'trend' effects as explained above. The difference in behaviour is examined between two time periods time as well as between the control and intervention groups, which will reveal the impact of the policy.

The 'difference-in-differences' model also assumes that trends influence the control group and intervention group similarly. However, the different composition of groups may affect the outcome therefore appropriate control and intervention groups need to be defined for use in this approach. Control groups can be defined in a variety of ways, for example based on income group. The difficulty in establishing a control group specifically for this research arises due to the universal nature of the concessionary travel pass. As all those aged 60 and over are eligible to claim, it may not be suitable to distinguish between groups of older people on socio-demographic characteristics.

In assessing the influence of concessionary travel on the mobility of older people, ideally 50% of older people would be given a concessionary travel pass and 50% would not. The groups would also be equal in terms of socioeconomic make-up. Their mobility behaviour could be compared over time, before and after the introduction of the policy to assess the influence of the policy influence.

This is not possible and so the control group that is developed should have similar characteristics to the intervention group in order to look at policy influences on behaviour. Within this assessment the absence of this ideal control group against which to assess the impact of the policy leads to problems in assessing how it will affect older people. In this analysis the effect of the concessionary policy (the 'treatment') is being observed on mobility of older people (the 'intervention group' exposed to the 'treatment').

Comparing over 60 year olds with those aged less than 60 years can be problematic, as younger people exhibit different mobility patterns and therefore not similar to older people. They may also have broadly different socioeconomic characteristics due to a greater chance of being employed for example. Those who are under 60 but have taken early retirement are likely to have higher levels of wealth and therefore may not be broadly comparable to the older population. The sample size of this group is also likely to be small.

A control group based on whether an older person holds a concessionary pass or not is considered to be most appropriate. Although there may be reasons why an older person has not claimed for a pass, such as: being unaware of the policy; they do not want one; have a higher income so feel it is unnecessary; unable to use bus services due to physical disability or lack of availability of services. Comparing groups constructed of older people, rather than including younger people, are more likely to lead to results that provide a better indication of the influence of the policy, as well as an idea about mobility behaviour should the concession be unavailable. The two time periods that will be considered are before and after the removal of the peak hour and local boundary restrictions. This major policy change was introduced on the 1st April 2006 and so the 2nd April 2006 has been used as the date by which the dataset has been split.

3.4.5. Summary of Definitions and Scope

A view has been taken to define older people as being aged 60 years and over for the purposes of this study. Mobility has been defined as travel behaviour that can be measured using trip frequency and distance travelled as measurements. Other travel variables that will be measured include mode share; driving licence holdership and household car access.

It is necessary to consider cohort effects when investigating changing travel behaviour of the older population to infer how the mobility of older people will change in the future given the current trends of mobility. Cohort groups based on 10 year time spans have been developed.

A 'difference-in-differences' approach is considered appropriate to consider the influence of the concession policy on older people's mobility. This requires the construction of a control group that is as similar as possible to the intervention group, which in this thesis are those aged 60 years and over who hold a concessionary travel pass. The control group therefore are those who are also aged over 60 but do not have a concessionary pass.

In order to address the research questions, a quantitative approach has been adopted to explore trends and adopt a cohort analysis approach to examine the effects driving the change in older people's behaviour at the aggregate level. This outline of the research approach is developed further in the following section.

3.5. Availability of Data Sources

This section will review the data requirements for answering the research questions utilising secondary datasets. The discussion will consider the available datasets which are appropriate for this study as well as the limitations of using them. All three research questions seek to examine change at the aggregate population level and require data that is representative of the travel behaviour of the population over time.

3.5.1. Data Requirements

Data should include information about all travel undertaken over a period of time, which is usually collected in the form of a travel diary. All trip purposes need to be taken into consideration, not just commuting trips as older people are more likely to be retired therefore less likely to engage in commuting. As there are other socioeconomic characteristics, aside from age and cohort group that can influence travel choices, data on individual and household characteristics is also required.

In order to obtain an overview of the mobility trends of the older population, data needs to be representative of the British population. Repeated cross-sectional data is representative of the population for each year. Whilst it could be argued that panel or longitudinal data may provide better prospects to track individual level change to identify how and when travel behaviour changes, assessing aggregate level change can be addressed with repeated cross-sectional data (Yee and Niemeier, 1996).

Repeated cross-sectional datasets can be used to create pseudo cohort groups to evaluate behaviour over time to examine cohort effects. Pseudo cohorts are artificially created data sets constructed from repeated cross-sections (Micklewright, 1994, McIntosh, 2005, Uren, 2006, Rafferty and King-Hele, 2010). In this thesis the post-WWII Boomer cohort are classed as those born between 1946 and 1955. In 2008 they are aged between 53 and 62 years. Respondents of these ages are identified in the repeated cross-sectional datasets in the relevant years and then extracted to form pseudo cohorts. Although the individuals surveyed will differ between time points, they are broadly representative of the entire cohort group (McIntosh, 2005, Newbold et al., 2005).

Defining the cohorts in this way enables large sample sizes to be analysed, however, they are not perfectly comparable as they are based solely on birth year. However, it is considered an effective technique to provide representative samples of the cohort population to analyse mobility at the aggregate level. Data also needs to contain comparable units on a large scale. Following on from this discussion, the next section turns to examine the available data sources used to meet the needs of the research.

3.5.2. Description and Processing of Secondary Repeated Cross-Sectional Datasets

This section describes the available two secondary datasets that are the most appropriate for the analysis. The National Travel Survey (NTS) will be used to address Research Questions 1 and 2 and the Scottish Household Survey (SHS) will be used to answer Research Question 3.

3.5.3. National Travel Survey (NTS)

To explore mobility trends, the most useful dataset is the National Travel Survey (NTS). This is a national government survey which collects information on travel undertaken by British households. This section outlines the features that make it suitable for use in this thesis. It also considers the caveats and limitations of using this dataset and what measures have been taken to minimise these.

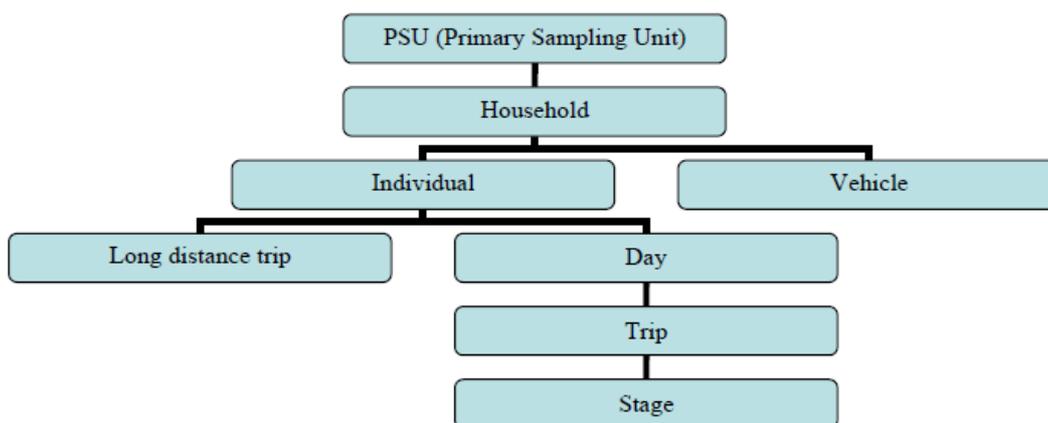
The NTS is a UK government conducted repeated cross-sectional household survey. It collects information on travel patterns and has been running continuously since 1988, though it was first conducted in 1965-1966. It is the primary source of data on personal travel patterns in Britain and collects information on how, why, when and where people travel along with other household and individual attributes that could affect travel such as car availability and driving licence holdership (Anderson et al., 2009). It is designed to provide regular, up-to-date data on personal travel and used to monitor changes in travel behaviour over time (ESDS, 2013).

Data is collected via a face-to-face interview and a self-completed travel diary for one week. Each year approximately 20,000 individuals, in 8,000 households take part in the survey. The NTS is based on a random sample of approximately 15,000 private households, drawn from the Postcode Address File (PAF®) (Anderson et al., 2009). According to the Royal Mail (2013) it is the most up-to-date and complete address database in the UK and contains over 28 million addresses. Its main advantages are its completeness and lack of bias.

The NTS is carried out primarily for the purposes of government and used to develop transport policies. Given that personal travel information is collected it is possible to relate policies to people and to predict their impact. Alongside detailed information on different types of travel: origin and destination of journey, distance, purpose and mode, the NTS also provides personal and socioeconomic information to allow distinctions to be made between different groups of people in terms of their travel behaviour (ESDS, 2013).

Given that the NTS is a repeated cross-sectional survey in design as well as being developed in order to monitor long-term trends it is suitable for examining the travel patterns of older people over time. The individual age variable was requested from the DfT to construct the defined cohort groups as outlined in Table 3.2. The year from which the individual age was available was 1995; therefore it was not possible to consider data prior to this year. At the time of processing the dataset, two folders were available; one for the years 1995-2001 and a separate folder for 2002-2008. To explore mobility trends using all available data, data from each folder was combined into a single dataset on which to perform the analysis. Figure 3.1 outlines the different levels of the NTS dataset.

Figure 3.1: Levels in the NTS database



Source: ESDS (2012)

The levels used to construct the single dataset included the PSU, Household, Individual, Vehicle, Day, Trip and an additional single age variable obtained from the DfT. As the focus of

the study was on local, everyday journeys which are felt to be more pertinent to the older population, long distance trip data was not included.

Within the NTS, a trip is defined as a one way course of travel which has a single main purpose. A trip consists of one or more stages. A new stage is defined when there is a change in the form of transport being used or change of vehicle with a separate ticket. In order to draw meaning from the results, and as trips cover the main trip and purpose made, it was felt that only including data at trip level was satisfactory.

A unique ID number was created for each respondent based on the key identifier variables provided. Using this ID number the data was restructured so that there was a case for each person which contained travel data as well as individual and household information. The research is interested in the mobility of older people, it is necessary to arrange all variables by person. The data for all available years was then merged to create a single dataset from which to run the analysis.

Over time there have been some changes to the NTS. The main change was the increase in sample size in 2002. There was also a redesign of the travel diary in 2007. The fall in trip rates in 2007 was almost entirely due to a fall in short trips as a result of this redesign (Anderson et al., 2009). Care was also taken to only include variables in the single dataset that were present across all available years. Where the categorisation of variables or questions had changed, the variable categories were harmonised across years. The names of variables were also harmonised where necessary.

NTS user guidance (ESDS, 2012) suggests that analysis is carried out with 'fully co-operating' households, therefore only cases that belonged to these households were included in the single dataset. For a household to be classed as 'fully co-operating' the placement interview had to be fully completed and travel diaries had to be collected for all household members (Anderson et al., 2009).

In addition as the analysis focuses on older people and is interested in other adult cohort groups, only adults aged 16 and over were included. It should also be noted that the oldest people in the dataset are aged 99. There is no person over this age in the survey. This is important to note as the definition of Cohort 7 (Grandparents of the Boomers b.1906-1915) in Table 3.2 means that there could be people older than this in the survey but it is important to note that there are none.

In accordance with NTS user guidance weighting was also applied where appropriate. To account for short walks weights were applied to gross up for trips and distance travelled. Trips of less than one mile in distance are recorded only on the seventh day of the travel week, and

these trips must be weighted by a factor of seven when analysed. Analysis of travel data is based on the diary sample, which consists of all 'fully co-operating' households. The NTS weighting methodology produces a weight that needs to be applied for all analysis of trip data to adjust for non-response and a drop-off in recording observed during the seven day travel week (Anderson et al., 2009). This weight is provided in the NTS dataset and is also adjusted so that characteristics of the weighted achieved sample matches population estimates to ensure that the results are representative of the population.

Additional travel behaviour variables were also constructed for the analysis. As travel information is collected over the course of one week, new travel variables were based upon this time scale for the analysis. These include the following: total trip distance travelled per week grossed up for short walks (km); number of trips per week by all modes as well as by each mode; percentage mode share; total number of trips by trip purpose; percentage trip purpose and binary variables for driving licence holding and household car access.

3.5.3.1. Caveats to Using the NTS Dataset

As the main source of data on travel information, behaviour and patterns in the UK the NTS is a well utilised survey for studies on travel behaviour of older people (Noble, 2000, Mackett, 2001, Metz, 2010, 2012).

However, there are some caveats to note when using the NTS for analysis of the travel behaviour of older people. There are types of address that are classed as ineligible for the sampling of the survey. A communal establishment or institution, defined as: an address at which four or more unrelated people sleep while they may or may not eat communally, the establishment must be run or managed by the owner or a person (or persons) employed for this purpose (Anderson et al., 2009). This means that older people living at retirement homes or sheltered housing accommodation are not included in the survey. According to Pannell and Blood (2012) around 5% of the older population live in specialist housing with support. There are just over 550,000 dwellings in nearly 18,000 schemes with some on-site scheme manager/warden presence across the UK. A significant number of very old tenants (aged 85 and over) reside in these dwellings. Of residents in 'sheltered housing with a warden', 25.6% belonged to this age group in 2010-11. Older people who reside in these establishments may potentially have greater physical mobility difficulties and therefore potentially lower levels of transport mobility. This may produce bias in the results as these older adults may be slightly underrepresented in the survey. However, there tends to be emphasis on enabling older people to stay in their own households for as long as possible in line with the 'ageing in place' concept (Sixsmith and Sixsmith, 2008), therefore it may be more important to analyse the travel trends of older people living in private households.

Income is an important factor in the examination of travel behaviour as this influences travel choices (Goodwin, 1990, Pooley et al., 2005b, Headicar, 2009). However, this variable is not available in the NTS dataset therefore socioeconomic group is used as an alternative variable in the analysis to give an indication of the income level an individual may have.

The sample size of the survey was increased in 2002. As such the NTS user guide advises combining years for period 1995-2001 for analysis. However, as change over time is an integral aspect of the thesis it is felt that combining years will dilute this aspect and changes that occur between years may be missed.

Due to the relatively small sample sizes of British regions in the NTS, it is not possible to undertake spatial comparisons over time. The total sample size of older people in Scotland was 3,940 respondents, which accounted for 9.2% of the sample of older people in the NTS. Therefore the NTS is not suitable to consider the impact of concessionary travel schemes for older people's mobility in Scotland.

As previously noted there are variations in the concessionary schemes between England, Scotland and Wales (Shaw et al., 2009, Butcher, 2011). Due to the change in the English concessionary scheme in 2008 that brought the concessionary scheme into line with the schemes in Scotland and Wales, there is not enough recent data available to conduct an adequate assessment of the concessionary scheme in an English context.

The regional sample sizes in the NTS are too small to examine mobility changes over time in relation to the policy influences in Scotland and Wales. To be able to conduct a critical assessment of the scheme a different dataset is required. The Scottish Household Survey (SHS) will be more suitable for this analysis at a national level for Scotland.

3.5.4. Scottish Household Survey (SHS)

To be able to address Research Question 3, the Scottish Household Survey (SHS) contains a larger sample of older respondents in Scotland. The final sample size of older people in the SHS totalled over 26,000, compared to just fewer than 4,000 cases of older people in Scotland in the NTS.

The SHS is a repeated cross-sectional survey of the composition and characteristics of Scottish households, including the attitudes and behaviour of adults, and to a lesser extent, of children within these households. The Scottish Executive (now the Scottish Government) commissioned the survey in 1998 to provide household and individual information previously unavailable in Scotland. It had also been developed to allow early detection of national trends

and to assist the Scottish Government and other bodies to plan services and policies for Scotland (Hope and Burnett, 2010).

The analysis in this thesis uses data from 1999 to 2008 since this was the latest available data at the time of processing. As the concessionary scheme was extended in Scotland in 2006, there is available data to be able to consider the impact of this change. Given that it was developed to identify trends it is suitable to assess the change in mobility over time. Since its inception in 1999, around 30,000 households per year have been interviewed on a variety of socioeconomic topics. It is unique as it includes a travel diary element, allowing travel patterns to be linked to household characteristics.

The survey is conducted in two parts. The Highest Income Householder (HIH) or their partner completes the first part of the interview. Once the composition of the household has been established, one of the adults in the household is randomly selected to complete the second part which contains the travel diary. The former is intended to generate data representative of Scottish households and the latter data representative of the Scottish adult population resident in private households (Hope and Burnett, 2010). The sample size of the survey is 31,000 interviews spread evenly over two years. Addresses are drawn from the Postcode Address File (PAF).

The travel diary is based on all travel undertaken on the day prior to the interview. The respondent is asked to recall all trips made on the previous day, including modes used, start and end times, origin and destination and the purpose of the trips made. It includes all personal travel, so domestic, social and recreational trips and journeys made during the course of employment are recorded as well as journeys made to accompany someone else.

In processing the datasets for analysis, data for a two year time period is contained within a folder. Similar to the NTS, there are several levels of data also within each folder: the main household and journey level datasets for all available years were used to create a single dataset for the analysis. The key component of this survey is that of the travel diary, completed by a random adult from the household. Each person in the household is assigned a unique ID number. Only information associated with the ID number of the random adult was selected so that personal and socioeconomic characteristics from the household dataset were merged with the travel diary information. The data was restructured so that a single case contained all information about the respondent who completed the travel diary. Data for all available years was merged to create a single dataset. The data in this survey is largely consistent over time, however, only variables that appeared across all years were included in the data or harmonised where necessary.

Weighting was also applied where appropriate in accordance with the SHS travel diary user guide (ESDS, 2010). The travel diary weight contained within the dataset corrects for differences in selection probabilities between local authorities, between adults in different sizes of household and between days on which people are available to be interviewed.

Additional travel variables were computed from the existing variables for the analysis. These included the following: total trip distance travelled per day (km) for all modes and by each mode; total number of trips per day by all modes as well as by each mode; percentage mode share; total number of trips by trip purpose as well as percentage trip purpose; and binary variables for car access; before and after the introduction of policy; whether respondent was an older person; driving licence holding and whether respondent held a concessionary pass.

3.5.4.1. Caveats to Using the SHS Dataset

There are some limitations to using the dataset. Firstly, only households are included within the survey. Similarly to the NTS, some specific accommodation types are excluded from the survey as they are not listed on the Small User file of the PAF as this is primarily a survey of private households. These include: nurses' homes; student halls of residence; other communal residences such as hostels for the homeless and older people's homes; mobile homes and sites for travelling people. Households in these types of accommodation are included in the survey if they are listed on the Small User file of the PAF. In analysing the travel behaviour of older people this presents a problem as older people living in sheltered accommodation and retirement and care homes may be underrepresented in the SHS.

Although the travel diary element of the survey is of great use in linking socioeconomic characteristics with travel behaviour, travel data is only collected for one day. Interviewees are asked to recall travel from the previous day. If respondents are unable to remember or have forgotten about journeys made, this may lead to underreporting of journeys and produce inaccuracies in the results. Also, travel undertaken on the previous day may not be representative of the usual transport mode used or activities undertaken.

The Travel Diary format also changed slightly from 2007 onwards, which means that some time series data may not be strictly comparable (Hope and Burnett, 2010). Prior to 2007, short journeys (considered to be less than ¼ mile or 5 minutes on foot), were excluded. Since 2007 these trips have been included in the data. The analysis calculated journey distance 1999-2006 by inputting a figure of 0.125 for short journeys, where distance was imputed as 0.00. This was to enable calculations of total distances for use in the analytical models.

In the SHS, distance travelled is calculated 'as the crow flies', based upon the grid coordinates of the 'centres' of the postcodes of the origin and destination of that stage of the

journey. Deducting distance travelled using this method, estimated distances may not be precisely recorded as the 'straight-line' distance is calculated and not the distance of the actual journey path taken. Some journeys may also start or finish some distance away from the centre of the recorded area.

3.6. Conclusion and Summary

This chapter has provided definitions of the terms to be used in the thesis, along with a description and justification of the quantitative approach and cohort analysis adopted to address the research questions. Older people are defined in this study as those aged 60 years and over, in line with the eligibility age to receive some benefits in Britain that are commonly associated with 'older age', such as the concessionary pass. 10 year birth cohorts have been defined to make meaningful comparisons between cohorts and age groups. Mobility is classed as the local, everyday movements which are measured by trip frequencies and distances travelled, considered a tangible view of analysing mobility patterns.

The appropriateness of available datasets has been considered, with the NTS and SHS selected for the analysis. Both of these datasets are large scale government conducted repeated cross-sectional datasets.

As the thesis is concerned with mobility trends of the older population at the aggregate level, these datasets are suitable for use as they aim to provide representative samples of the population through random sampling. It is recognised that there are dangers in generalising, as mobility is complex as individual behaviour varies due to socioeconomic characteristics and attitudes. However, statistical inference can be utilised to test this and make inferences about the mobility of the older population to further understand the main drivers of change. Given that the concessionary policy specifically targets older people and is administered at the national level, it is considered appropriate to also examine the influence of the policy on behaviour at the aggregate level

Cohort analysis has not been adopted widely in mobility studies. Ryder (1965) argued that cohort membership could be as important in determining behaviour as other social structural features such as socioeconomic status. Therefore this approach has the potential to offer greater insights into the changing mobility of older people as society ages. An ageing population will consist of a greater proportion of older people in society belonging to different cohorts.

The following three chapters address each of the research questions in turn, that have been developed to meet the wider objective of this thesis. Chapter Four presents the mobility trends of older people in relation to trip frequency, distance travelled, percentage mode share

and trip purpose using NTS data from 1995-2008. Chapter Five uses cohort analysis to determine the influence of age, period and cohort effects on the changing mobility of older people using descriptive analysis and a multiple linear regression model. Chapter Six considers the influence of the concessionary scheme on the mobility of older people in Scotland using descriptive analysis and 'difference-in-differences' regression models.

4. Mobility Trends of Older People in Britain from 1995-2008

4.1. Introduction

The Boomer cohort have begun to age and contribute to the proportion of older people in society and are considered to have different characteristics to current and former cohorts of older people (Spain, 1997, Coughlin, 2009, Dannefer and Shura, 2009, Warnes, 2009). Due to population ageing in Britain it is necessary to explore how mobility is changing over time. The focus of the chapter is to explore the daily mobility trends of older people using National Travel Survey (NTS) data from 1995-2008.

Whilst the older population of Britain may travel less compared to the younger population, it is hypothesised that as the first wave of the Boomer cohort (b.1946-1955) reaches older age they will have greater expectations about mobility. Therefore they will be more mobile in older age compared to current cohorts of older people and contribute to increasing mobility of the older population given high rates of driving licence holdership among the Boomer cohort, especially amongst women.

The discussion in Chapter Two identified that the mobility of older people differs from the younger population due to lifestyle changes such as retirement, driving cessation and age-related disability (Tacken, 1998, Noble, 2000, Metz, 2003). Much attention has focused on the barriers and problems that older people can face in accessing goods, services and amenities as a result of poor and inappropriate transport that does not suit their needs (Hine and Mitchell, 2003, Lucas, 2004, Titheridge et al., 2009, Shergold and Parkhurst, 2012). As the Boomers have been associated with higher expectations about mobility, it is thought that previous assumptions, arguments and debates regarding the mobility of older people may no longer be appropriate in the future. Travel behaviour is not solely affected by age and is differentiated by many other factors that contribute to how people make their travel choices. Household income levels and residential area type also have a major influence upon how people travel. There are also gender differences in travel behaviour which has been documented in the literature (Pooley et al., 2005b, Rosenbloom, 2006).

Activity patterns have developed largely around the private car over the last 50 years (Lucas and Jones, 2009), therefore it is important to consider the trends in car use amongst the older population. Travel by this mode is influenced by rates of driving licence holdership, car access and indeed multiple car household ownership (Pooley et al., 2005b, Lucas and Jones, 2009). Given that rates of driving licence holdership are increasing amongst older people (Rosenbloom and Ståhl, 2002, DfT, 2010a), it is likely that there will be an increasing proportion of older drivers on British roads. Car users tend to travel further distances, which will have an impact on the overall trends of mobility of older people should people continue to

drive into later life. As a result of this increased car use there are likely to be a range of adverse environmental implications and unequal experiences of ageing relating to issues of social exclusion. Mobility is considered to be an extremely important prerequisite for quality of life, particularly for older people (Metz, 2000, Banister and Bowling, 2004, Spinney et al., 2009) in which the private car has an important role (Gilhooly et al., 2002, Davey, 2007).

This chapter begins by providing a brief outline of the data and methods used to explore the dataset. The mobility trends and patterns of the British population are outlined in order to contextualise the travel behaviour of older people before presenting the analysis. Trends in trip frequency (the number of trips per week); distance travelled per week (focusing on daily mobility), percentage mode share and trip purpose in Britain will be presented from 1995-2008 to assess whether mobility has been increasing amongst older people and if this is explained through increasing use of the private car. These trends have also been disaggregated by gender to determine whether gender differences in travel behaviour are converging amongst older people. Having explored how the mobility trends of older people have changed over time, the analysis will be tested relative to the claims in the literature.

4.2. Data and Methods

NTS data from 1995-2008 was used to analyse the mobility trends of older people. Trip frequency was calculated by the number of journeys undertaken in the week. Distance travelled was established by combining all distance travelled per journey made using the main travel diary dataset and has been termed 'daily distance travelled'. Changes in percentage mode share over time have been calculated to explore changes in transport modes amongst older people. Increased car use amongst the older population questions the effectiveness of concessionary travel schemes. Examining changes in trip purpose is important to understand why older people are travelling.

Journeys made for work-related purposes (including education) have been included and excluded from the analysis in this chapter. It is thought that including working-related trips could introduce bias into the results, with some older people working, but with the majority likely to have retired. However, it is necessary to compare the analysis to observe whether work-related trips significantly affect the mobility patterns and trends of older people.

To analyse these trends, descriptive analysis is provided in the form of line graphs. 3-year moving averages have been plotted to smooth trend lines, and to indicate significant statistical differences 95% confidence intervals have been plotted. Where statistical differences between years are not clear from the graphs, particularly for intermediate years, *t*-tests are used to compare specific years.

4.3. Mobility Trends of the British Population

This section presents an overview of the mobility trends and patterns of the British population. These are presented to contextualise the mobility trends of older people, which are presented in the following section. The trends from 1995-97 up to 2008 are outlined as this was the latest available data available at the time of analysis.

According to the DfT (2009), NTS data shows that trip rates have fallen from an average of 1,086 trips per person per year in 1995-97 to a low of 972 in 2007, but this increased slightly to 992 trips in 2008. This translates into an average of 21 trips per week in 1995-97 to 19 trips in 2008. The decline in trip rates can be accounted for by a fall in walking trips, which fell by 15% up to 2006 and by a further 11% between 2006 and 2008.

Average distance travelled per person per year has remained relatively stable over the last 10 years at around 7,100 miles but declined slightly in 2008 to 6,923 miles (DfT, 2009). This converts into an average distance travelled of around 220km per week over the past decade, declining to 214km in 2008. On average, women make more trips than men, but men travel further per year. In 2008, overall, women made 5% more trips than men in 2008. However, men travelled 20% further than women, averaging nearly 7,600 miles a year (which approximately equates to 235km per week) compared with 6,300 miles (approximately 195km per week) respectively.

Figures 4.1a-b shows that in 2008 car travel was the dominant form of travel, accounting for almost two thirds of all trips made and four fifths of all distance travelled, and has remained fairly steady since 1995-97 (DfT, 2009).

Figure 4.1a-b: Average number of trips and distance travelled by mode in 2008

Figure 4.1a: Average number of trips by mode

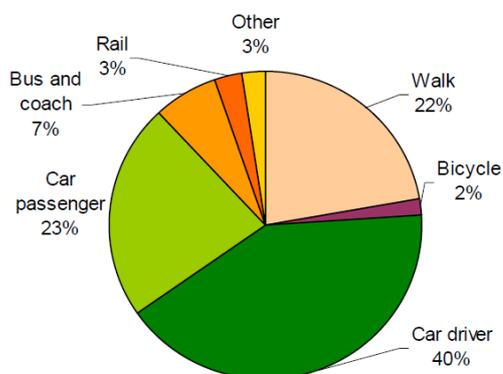
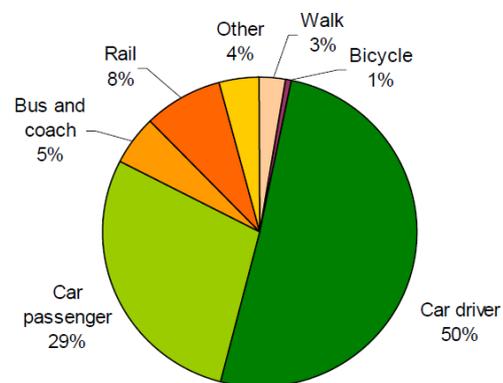


Figure 4.1b: Average distance travelled by mode



Source: DfT (2009)

Since 1996, the average distance travelled as a car driver has fallen by around 10% among men but has increased by over 20% among women. In 2008, adult men made more trips as car drivers than as passengers in all age groups. This was also true for women aged 21-69, but women aged 17-20 or over 70 were more likely to be passengers than drivers. Overall women made 23% of trips by walking, compared to 21% for men. This proportion was higher for women than men in all age groups from 21 upwards. Women of all ages also used buses more than trains (DfT, 2009).

The majority of the decline in trip rates since 1995-97 can be accounted for by a fall in shopping, visiting friends at private homes and commuting. The average number of shopping trips per person fell by 8% between 1995-97 and 2006, which is associated with a switch from more frequent, short shopping trips on foot to longer, less frequent car trips. The subsequent decline in shopping trips in 2007 and 2008 was associated with the introduction of a revised NTS travel diary in 2007 (DfT, 2009).

Amongst men, commuting trips accounted for 19% of trips made in 2008, whilst amongst women commuting trips accounted for 13%. On average, women made 23% more shopping trips each per year than men (218 trips per person per year compared with 177 for men). Females also made more personal business trips (110 compared with 96) and trips to visit their friends at home (119 compared with 99). However, women and men a similar number of trips to see their friends elsewhere (45 compared with 49) (DfT, 2009).

Car travel is important for the majority of the population with differences in travel behaviour between men and women, although the difference in distance travelled is narrowing due to changes in car use. It is also thought that increasing importance of the private car will also contribute to explaining changes in older people's mobility. Older people were more likely to be car passengers, however, with a reducing rate of driving licence holding amongst younger adults identified earlier, this may affect the mobility of older people in the future if there are fewer drivers to offer lifts to older people. Women still continue to make more walking and bus trips than men, broadly suggesting that women will be less affected by issues relating to driving cessation when they are older. Trips undertaken for shopping amongst older people may also differ from that of the general population if they are less likely to drive, therefore having to make greater shopping trips by visiting shops closer to residences.

4.4. Results and Findings

4.4.1. Number of Trips

The first section of results examines changes in trip frequency over time amongst the older population. Trip frequency has been calculated as the total number of trips made per week. A

comparison is made between trips that include and exclude those made for commuting, business, and other work and education purposes. The reason for including commuting and other work-related trips is that many people aged 60-64 are still likely to be employed as the retirement age in Britain is currently 65 years.

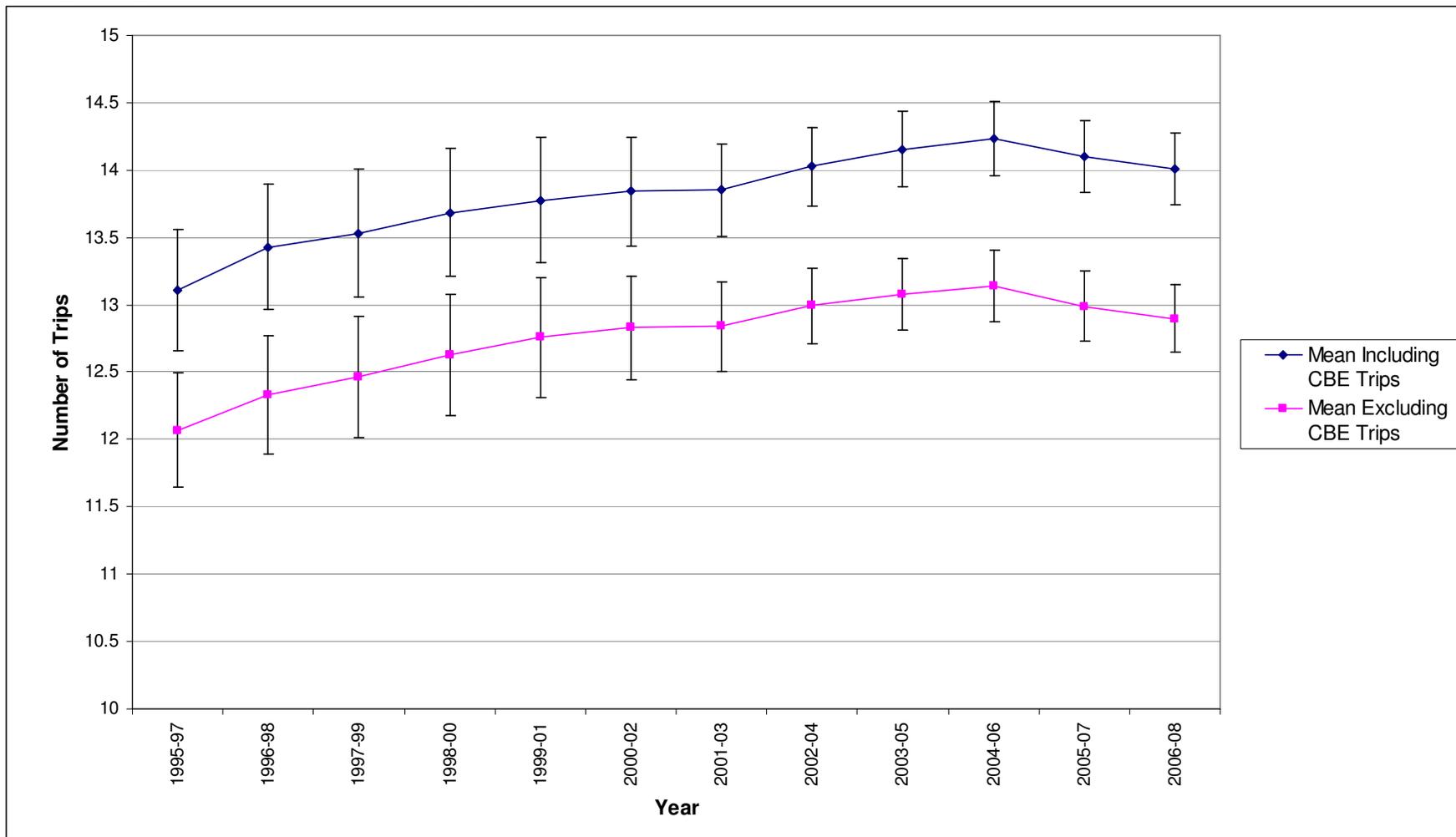
Figure 4.2 plots the mean number of daily trips per week among older people (all those over 60 years of age), including and excluding commuting and other work-related and education trips. Along each line representing the mean, confidence intervals have been plotted at the 95% level to test the statistical significance of these results.

The mean number of trips per week made by the older population increased significantly over the time span 1995-2008. An increase in the mean was observed from 13.11 to 14.01 trips per week when including trips made for commuting, business and education. The difference between the means for 1995-97 and 2006-08 are statistically significant as the confidence intervals do not overlap.

When trips made for commuting and other work-related purposes were excluded a similar trend line was observed although trip frequency was lower. However, an increase in the mean number of trips per week was observed from 12.07 to 12.90 trips from 1995-2008, which is also statistically significant.

A reduction in the mean number of trips was observed between 2004-06 and 2006-08 when work-related and education trips were included and excluded from the analysis. However, this observation is not significant as the confidence intervals between these years clearly overlap. These results suggest that older people have become more mobile from 1995-2008 in terms of the number of trips they are making per week.

Figure 4.2: **Mean** number of trips per week including and excluding commuting, business and education trips amongst older people from 1995-2008 (3-year moving averages with 95% confidence intervals)



Given that the confidence intervals do overlap for years 1996-98 and 2006-08, Tables 4.1 and 4.2 present the results of post-hoc Tukey's HSD tests to identify where the mean differences are statistically significant to highlight changes in trip making over time for specific years amongst the older population.

Table 4.1 presents the results from a Tukey's HSD post-hoc analysis test comparing the mean trip frequency, including trips made for commuting, business and education, in 1995 to the mean trip frequency in all other years. Trip frequency significantly increased in 1999 and subsequent years at the 0.05 level of significance. Other comparisons for years 1996-1998 were not significant.

Table 4.1: Comparison of mean number of trips per week **including** commuting, business and education trips amongst older people using Tukey's HSD post-hoc test

(I) Year	(J) Year	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
1995	1996	-.813	.323	.396	-1.90	.27
	1997	-.840	.326	.356	-1.93	.25
	1998	-.960	.331	.178	-2.07	.15
	1999	-1.126*	.330	.042	-2.23	-.02
	2000	-1.302*	.319	.004	-2.37	-.23
	2001	-1.233*	.317	.008	-2.29	-.17
	2002	-1.320*	.272	.000	-2.23	-.41
	2003	-1.336*	.267	.000	-2.23	-.44
	2004	-1.755*	.268	.000	-2.65	-.86
	2005	-1.704*	.265	.000	-2.59	-.81
	2006	-1.564*	.266	.000	-2.45	-.67
	2007	-1.358*	.265	.000	-2.25	-.47
	2008	-1.427*	.266	.000	-2.32	-.54

*. The mean difference is significant at the 0.05 level.

Table 4.2 displays the results from a Tukey's HSD post-hoc analysis test comparing the means for trip frequency excluding trips made for commuting and work-related trips. There has also been a significant increase in trip frequency between 1995 and in 1999 as well as subsequent years at the 0.05 level of significance. Other comparisons for 1995 between years 1996-1998 were also not statistically significant.

Table 4.2: Comparison of mean number of trips per week **excluding** commuting, business and education trips amongst older people using Tukey's HSD post-hoc test

(I) Year	(J) Year	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
1995	1996	-.71140	.30963	.557	-1.7498	.3270
	1997	-.69921	.31250	.602	-1.7473	.3489
	1998	-.78647	.31718	.422	-1.8502	.2773
	1999	-1.10176*	.31641	.033	-2.1629	-.0406
	2000	-1.19794*	.30565	.007	-2.2230	-.1728
	2001	-1.16760*	.30346	.009	-2.1853	-.1498
	2002	-1.32414*	.26054	.000	-2.1979	-.4503
	2003	-1.22202*	.25620	.000	-2.0813	-.3628
	2004	-1.63112*	.25652	.000	-2.4914	-.7708
	2005	-1.58056*	.25446	.000	-2.4340	-.7271
	2006	-1.41615*	.25468	.000	-2.2703	-.5620
	2007	-1.16547*	.25391	.000	-2.0170	-.3139
	2008	-1.31277*	.25446	.000	-2.1662	-.4594

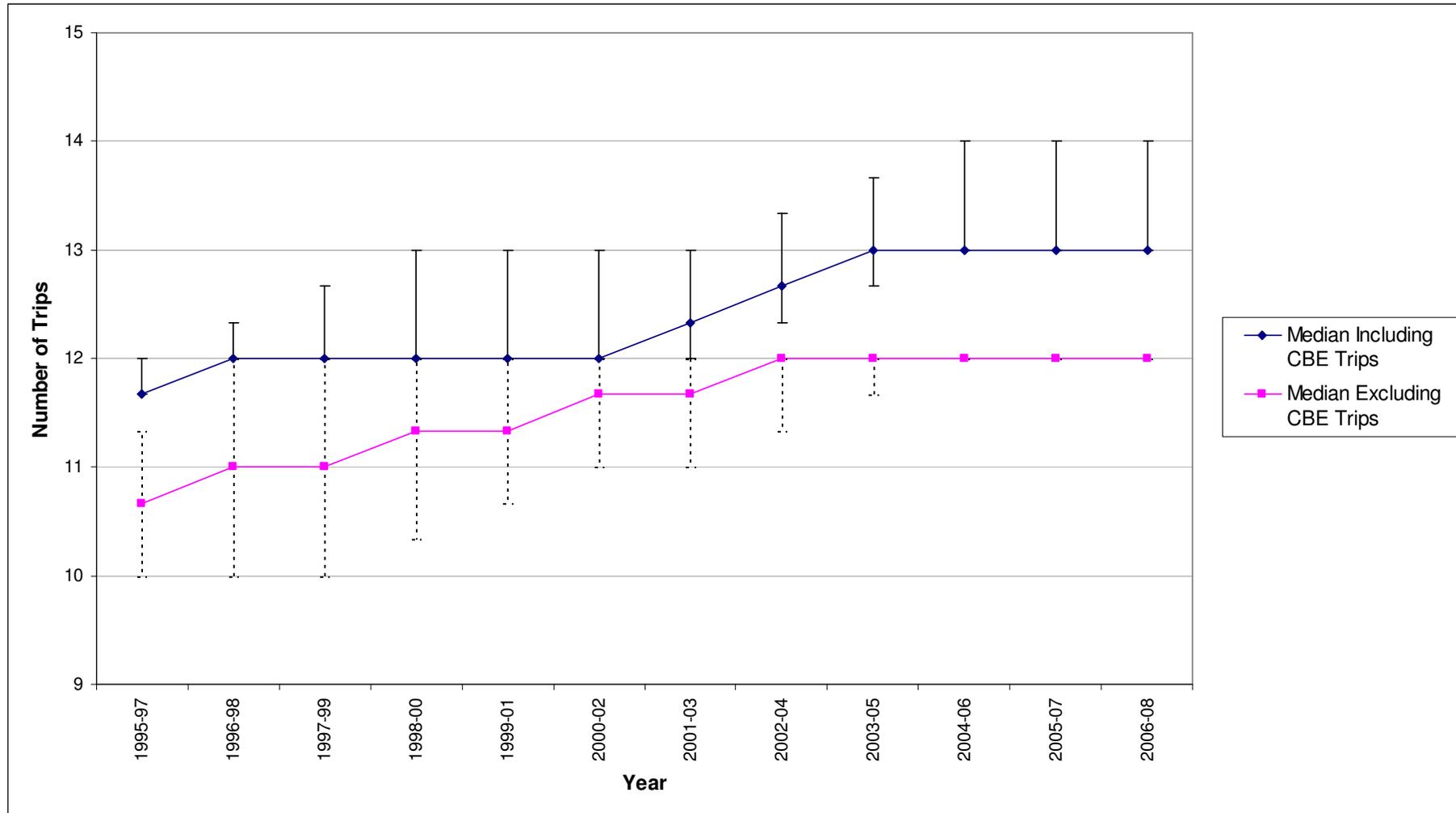
*. The mean difference is significant at the 0.05 level.

Using the median trip frequency as a measure of mobility may increase the accuracy of using this measure as an indicator of the changing mobility of the older population. It is considered a more robust measure than the mean value as it reduces bias from extreme outliers. Older people with extremely high mobility can affect the mean value. Figure 4.3 replicates the analysis presented in Figure 4.2 but plots the median trip frequency values.

Figure 4.3 plots the median number of trips per week made by the older population both including and excluding trips made for commuting, business and education purposes. For each median line, 95% confidence intervals have been plotted. Some of the confidence intervals between the two measures meet in some years.

To clearly identify which confidence interval belongs to each measure, the solid lines relate to the trips *including* commuting, business or education. The dashed confidence interval plots relate to the median trips *excluding* commuting and other work-related trips. As the median values represent whole trips, the confidence intervals are also based on whole trips. This is reflected in some of the confidence intervals and has resulted in some years appearing not to have any confidence intervals appearing on either side of the median. It is also important to note that as 3-year moving averages are used, this is also reflected in some of the median points and the confidence intervals as they do not total a whole trip.

Figure 4.3: **Median** number of trips per week including and excluding commuting, business and education trips amongst older people from 1995-2008 (3-year moving averages with 95% confidence intervals)



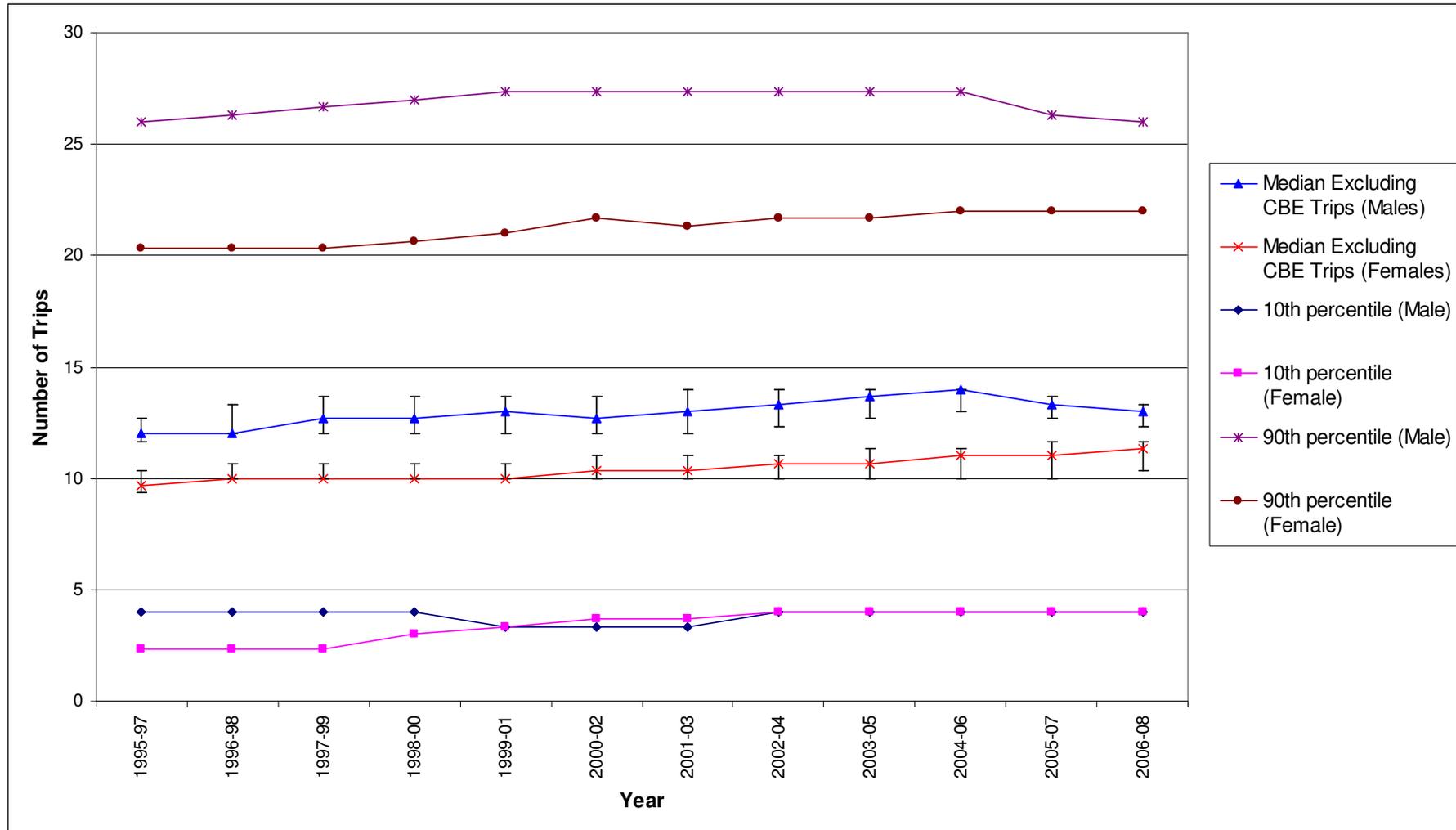
The median number of trips is lower than that of the mean presented in Figure 4.2. Median number of trips per week, including commuting and work-related trips, increase significantly from 11.67 trips per week in 1995-97 to 13 trips per week in 2006-08 as the confidence intervals between these points do not overlap. The median number of trips made per week, excluding commuting purposes, also increased significantly from 10.67 trips per week in 1995-97 to 12 trips per week in 2006-08.

These results suggest that the trip frequency and therefore the mobility of older people has increased over the time span 1995-2008. This increase is not solely attributed to older people remaining in employment for longer as trip frequency significantly increases when work-related trips are excluded from the analysis. This increase may reflect the changing activity patterns of older people, suggesting that personal business and leisure pursuits are increasing, perhaps as disposable income amongst older people, particularly the Boomer cohort, has risen over this time span.

In order to establish whether the increase in trips can be attributed to those with extremely high mobility or those with increasing low mobility Figure 4.4 plots the 10th and 90th percentiles in addition to the median as well as disaggregating by gender, given the prevalent gender differences in travel patterns. This analysis excludes trips made for commuting and work-related trips as a similar trend pattern of increased trip frequency was observed in Figures 4.2 and 4.3 when these trip purposes were included and excluded from the analysis.

Figure 4.4 presents number of trips per week by the older population by gender by 3-year moving averages. In addition to plotting the median with confidence intervals at the 95% level, the 90th percentile gives an indication of the mobility and changes of those with the highest mobility, whilst the 10th percentile signifies those with the lowest mobility.

Figure 4.4: **Median, 10th and 90th percentile** number of trips per week **excluding** commuting, business and education trips by **gender** from 1995-2008 (3-year moving averages with 95% confidence intervals)



Between 1995-97 and 1999-01, a difference in trip frequency was observed between older men and women amongst the 10th percentile, those with the lowest mobility. Amongst older men in the 10th percentile 4 trips per week were made in 1995-97, whilst for older women it was 2.33 trips per week. By 1999-01 this appears to have converged as the 10th percentile for both older men and women was 3.33 trips per week. Between the years 2000-02 to 2001-03 the 10th percentile of older women were making 3.67 trips per week, compared to 3.33 trips per week for men. Since 2002-04, amongst the 10th percentile, the number of trips per week for both older men and women is 4 trips per week. This suggests trip frequency has converged between older men and women with lower mobility patterns.

Median trip frequency has been plotted separately for older men and women. Across the time span 1995-2008 there are significant gender differences, with men making a higher number of median trips per week than women. In observing Figure 4.4 alone it is not possible to clearly ascertain trip frequency change over time. Therefore statistical significance testing was undertaken between median values for older men and women for specific years using the Mann-Whitney-Wilcoxon Test in SPSS.

Initially the median values from 1995 and 2008 were compared to identify any significant change between these years. Median trips per week made by older women in 1995 were 9 trips, significantly increasing to 12 trips ($Z = -6.711$, $p = 0.000$). Median trips per week by older men significantly increased from 12 trips in 1995 to 13 trips in 2008 ($Z = -3.034$, $p = 0.002$).

Other testing has been carried out as it is difficult to visually obtain the significant difference between the 3-year moving averages for 2001-03, 2004-06 and 2006-08 from Figure 4.4. As 3-year moving averages were plotted, the central year has been selected for testing. As 2008 is the most recent year for which data is available, this year has been chosen for comparison with others rather than 2007.

Figure 4.4 indicates that there was an increase in median trips made by older women from 2001-03 to 2006-08. Further investigation is warranted to identify if this represents a significant increase, which cannot be identified from the confidence intervals alone. The median numbers of trips per week were 11 trips in both 2002 and 2005, therefore there was no increase. Median trips per week did increase from 11 trips in 2005 to 12 trips in 2008, however, this was not a significant increase ($Z = -1.751$, $p = 0.080$). However, a significant increase was observed from 11 trips in 2002 to 12 trips in 2008 ($Z = -2.139$, $p = 0.032$).

The median number of trips per week made by older men increased significantly from 12 trips in 1995, to 13 trips in 2002 ($Z = -2.582$, $p = 0.010$). Another significant increase was observed from 13 trips in 2002 to 14 trips in 2005. However, a significant decrease in trip frequency was

observed from 14 trips in 1995 to 13 trips in 2008. There appears to have been a faster increase in trip frequency for older women with a significant increase from a median of 9 trips in 1995 to 11 trips in 2002 ($Z = -4.958$, $p = 0.000$). From 2002 to 2008 a significant increase in median trips was also observed. The 90th percentile of older people repeats a similar pattern seen among the median measure of trip frequency. The trip making amongst the 90th percentile of older men has remained relatively constant, though it increased from 1995-97 to 2004-06 before decreasing again. Older females in the same percentile have seen an increase over the time period from 1995-2008.

4.4.1.1. Summary of Number of Trips

Figures 4.2 and 4.3 observed that there have been significant increases in the mean and median trip frequency amongst older people from 1995-2008, demonstrating that older people have become more mobile in terms of trip frequency. Figure 4.4 observed that older males make a greater number of trips than older women across all time periods, but that trip making amongst older women has been rising at a faster rate than older men, with significant increases in trip frequency observed between 1995 and 2002 as well as 2002 and 2008.

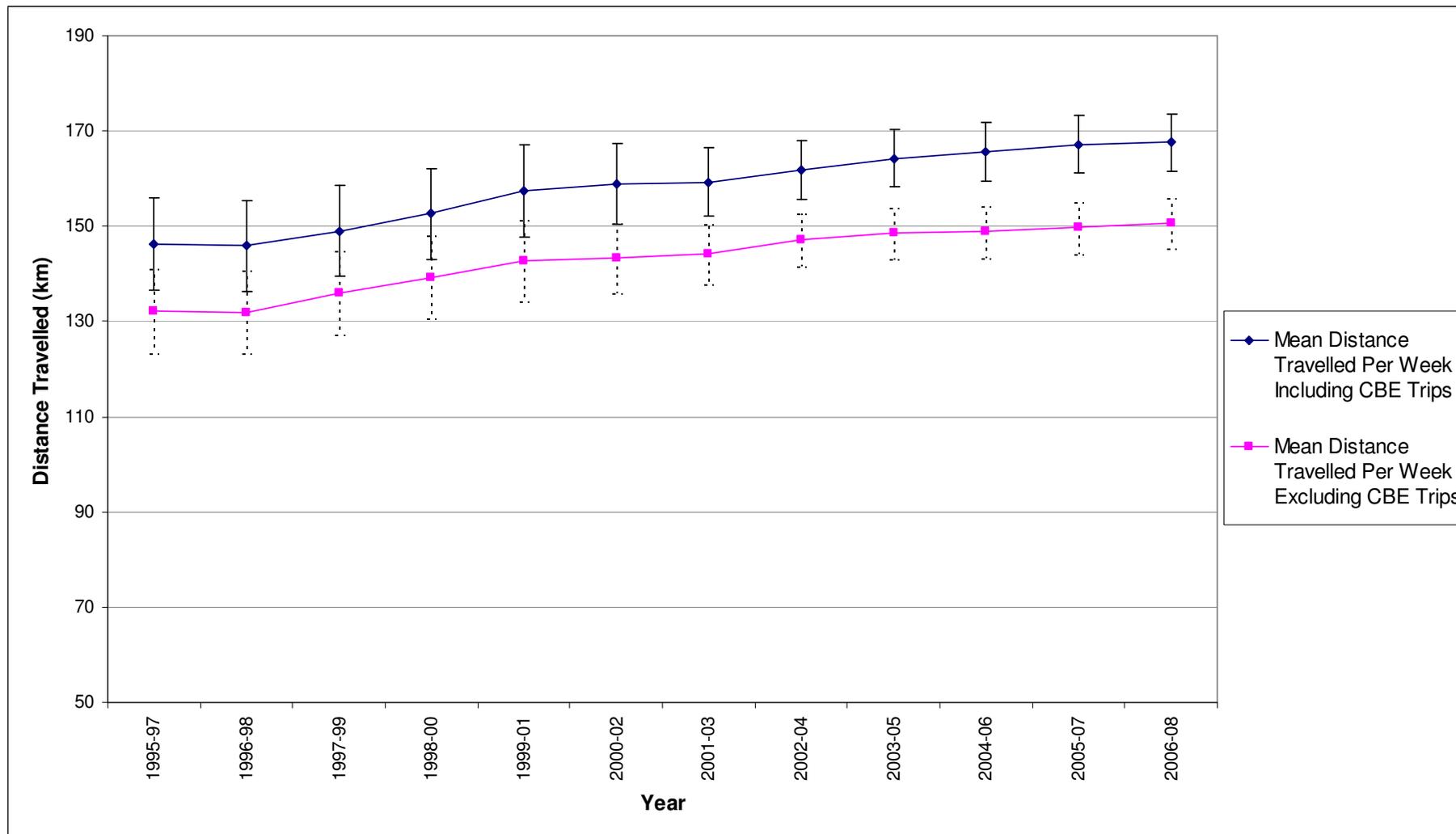
Whilst median trip frequency amongst older men increased between 1995 and 2008, a drop in trip frequency was observed between 2005 and 2008. Therefore it can be deduced that older women are contributing to observed increases in trip frequency, and therefore the mobility of older people, more than older men. Given the increase trip frequency observed by older women over time, the gender gap in terms of trip frequency converged between 1995 and 2008.

4.4.2. Distance Travelled

Having examined the trends of the number of trips made per week, this section will explore trends in distance travelled per week using mean and median values. The analysis will also present these values including and excluding commuting, business, and other work and education trip purposes. The analysis of distance travelled will also be disaggregated by gender. This analysis is presented in Figures 4.5-4.7.

Figure 4.5 plots the mean distance travelled per week for older people (including and excluding commuting, business, education trips) as well as 95% confidence intervals to determine the significance of the results. Given that the confidence intervals overlap for years 1995-97 to 2000-02, the solid confidence intervals relate to distance travelled including commuting, business and work trips whilst the dashed confidence intervals refer to the median excluding commuting, business and education trips.

Figure 4.5: **Mean** distance travelled per week (km) including and excluding commuting, business and education trips amongst older people from 1995-2008 (3-year moving averages with 95% confidence intervals)



Mean distance travelled amongst the older population increased significantly from 146.28km per week in 1995-97 to 167.65km per week in 2006-08 when all trip purposes are included. This represents a total increase of 21.37km. When commuting, education and business trip purposes were excluded from the analysis, distance travelled also increased significantly from 132.21km per week in 1995-97 to 150.59km per week in 2006-08, an increase of 18.38km.

Mean distance travelled including trips made for commuting, compared to mean distance travelled excluding commuting is not significantly different from 1995-97 to 2000-02, given that the confidence intervals overlap for each year. However, significant differences are observed from 2001-03, which could indicate that distance travelled for commuting and work-related purposes have increased over time among older people.

Given that 3-year moving averages are used to plot the mean measure of distance travelled, post-hoc Tukey's HSD tests have been used to identify differences between specific years to further explore when changes in distance travelled occurred. Tables 4.3 and 4.4 compare the means between 1995 and all other years to identify significant increases in distance travelled amongst older people.

Table 4.3 presents the results from a Tukey's HSD post-hoc analysis test comparing the mean distance travelled (including trips made for commuting, business and education purposes). Distance travelled significantly increased in 2004 and subsequent years at the 0.05 level of significance. Other comparisons for years 1996-2003 were not significant.

Table 4.3: Comparison of mean distance travelled per week (km) **including** commuting, business and education trips amongst older people using Tukey's HSD post-hoc test

(I) Year	(J) Year	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
1995	1996	-2.52949	7.05689	1.000	-26.1972	21.1382
	1997	-4.02551	7.12231	1.000	-27.9126	19.8616
	1998	1.08534	7.22904	1.000	-23.1597	25.3304
	1999	-11.77536	7.21139	.938	-35.9612	12.4105
	2000	-14.90060	6.96631	.674	-38.2645	8.4633
	2001	-13.20826	6.91630	.822	-36.4044	9.9879
	2002	-16.24849	5.93805	.258	-36.1638	3.6668
	2003	-16.19121	5.83917	.238	-35.7749	3.3924
	2004	-20.53957*	5.84650	.030	-40.1478	-.9313
	2005	-23.92945*	5.79948	.003	-43.3800	-4.4789
	2006	-20.21240*	5.80455	.033	-39.6799	-.7449
	2007	-25.26720*	5.78695	.001	-44.6757	-5.8587
2008	-25.18187*	5.79949	.001	-44.6325	-5.7313	

*. The mean difference is significant at the 0.05 level.

The post-hoc Tukey's HSD tests in Table 4.4 present the same findings to Table 4.3. Examining difference in means in distance travelled (excluding trips made for commuting, business and education) illustrates that distance travelled increased significantly in 2004 at the 0.05 level of significance. As also found in Table 4.3, all other comparisons for years 1996-2003 were not significant.

Table 4.4: Comparison of mean distance travelled per week (km) **excluding** commuting, business and education trips amongst older people using Tukey's HSD post-hoc test

(I) Year	(J) Year	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
1995	1996	-1.54405	6.30689	1.000	-22.6964	19.6083
	1997	-2.83891	6.36536	1.000	-24.1873	18.5095
	1998	.58300	6.46075	1.000	-21.0853	22.2513
	1999	-13.42764	6.44498	.713	-35.0431	8.1878
	2000	-12.88630	6.22594	.722	-33.7671	7.9945
	2001	-9.61982	6.18124	.957	-30.3507	11.1111
	2002	-15.38599	5.30696	.178	-33.1847	2.4127
	2003	-14.94716	5.21859	.193	-32.4495	2.5552
	2004	-18.91750*	5.22515	.021	-36.4418	-1.3932
	2005	-19.44332*	5.18312	.013	-36.8267	-2.0600
	2006	-15.79820	5.18765	.123	-33.1967	1.6003
	2007	-21.56775*	5.17192	.002	-38.9135	-4.2220
2008	-22.13599*	5.18313	.002	-39.5194	-4.7526	

*. The mean difference is significant at the 0.05 level.

Figure 4.6 plots the median distance travelled to reduce bias that the mean value can introduce through the inclusion of extreme observations. Analysis includes and excludes commuting and work-related trips. 3-year moving averages have been plotted along with 95% confidence intervals.

Figure 4.6: **Median** distance travelled per week (km) including and excluding commuting, business and education trips amongst older people from 1995-2008 (3-year moving averages with 95% confidence intervals)

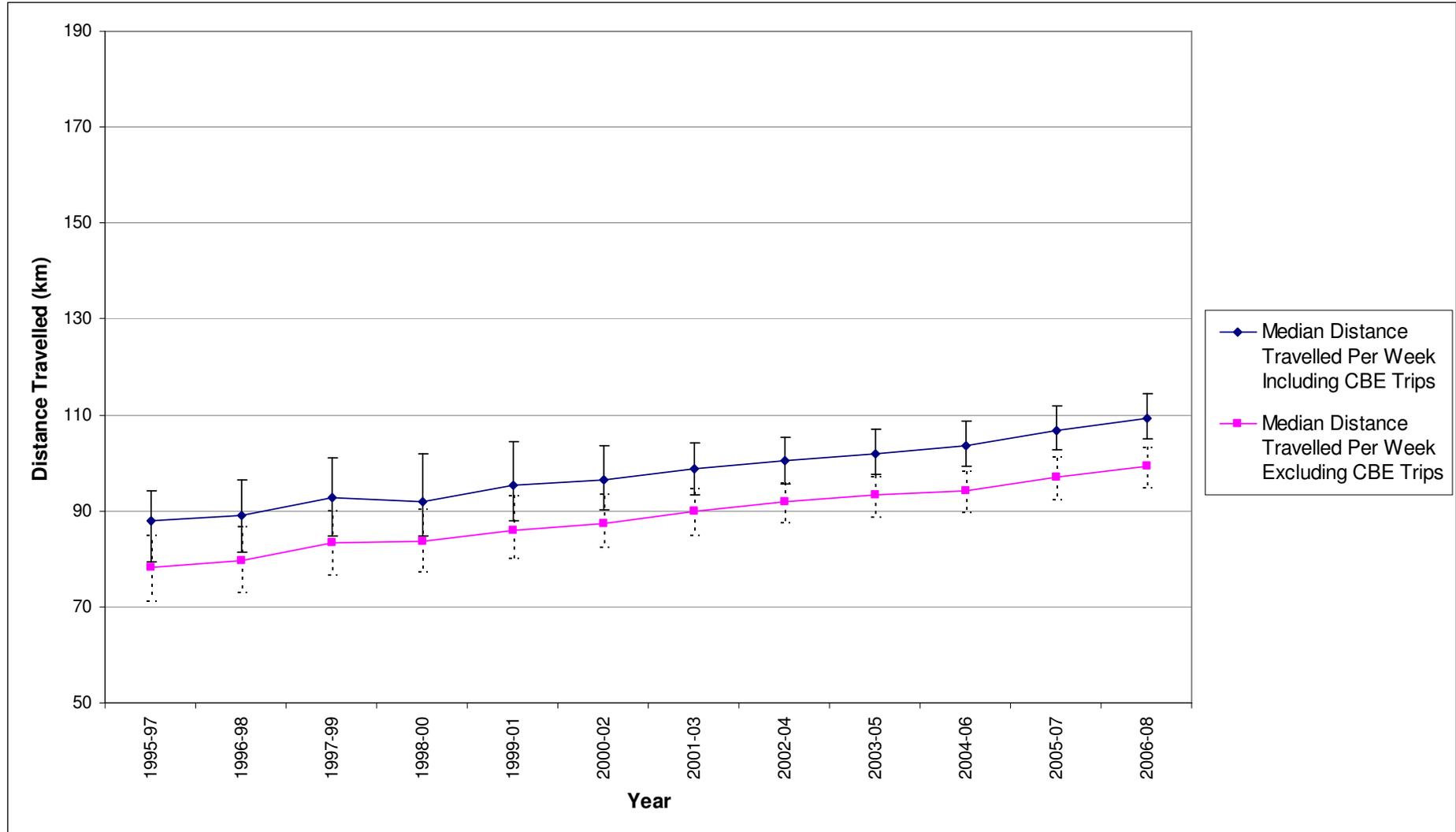


Figure 4.6 uses the same scale on the Y axis (distance travelled km) as Figure 4.5. When comparing the two figures, median distance travelled is lower. This measure is less sensitive to extreme outliers and therefore reduces bias in the results. The confidence intervals for the median measure including commuting, business and education are represented by the solid line, whilst for the median measure excluding commuting, the confidence intervals are represented by the dashed line to highlight where they overlap.

Significant differences in the median distance travelled are observed from 2003-05 between the inclusion and exclusion of commuting and work-related trips. This follows a similar pattern to that in Figure 4.5, suggesting that distance travelled for commuting and work-related purposes have been increasing over time among older people.

The median distance travelled when including work related trips has significantly increased by a total of 26.24km, from 83.20km in 1995-97 to 109.44km in 2008 as the confidence intervals for these years do not overlap. Although the median distance travelled when excluding working trips is lower, it has still increased significantly from 75.32km in 1995-97 to 99.46km in 2006-08, a total increase of 24.14km.

Whilst significant differences in median distance travelled are observed between 1995-97 and 2006-08, further statistical testing is required to identify differences between specific years. Comparing the median distance travelled between 1995-97 and 2001-03 is difficult to decipher visually from Figure 4.6 alone. The same is also true when attempting to compare 2001-03 with 2006-08 as well as 2002-04 with 2006-08 to ascertain significant differences. As 3-year moving averages have been plotted in Figure 4.6, the central year has been selected for comparison, with the exception of 1995 and 2008 as these are the earliest and most recent year available. The medians for these years were compared using the Mann-Whitney-Wilcoxon Test in SPSS.

Median distance travelled (including commuting purposes) significantly increased from 83.20km in 1995 to 112.65km in 2008 ($Z = -7.972$, $p = 0.000$). When commuting and work-related trips are excluded from the analysis the median distance travelled also significantly increased from 75.32km in 1995, to 103.00km in 2008 ($Z = -7.873$, $p = 0.000$).

Significant increases in median distance travelled (including work-related trip purposes) were also observed from 83.20km in 1995 to 99.86km in 2002 ($Z = -4.266$, $p = 0.000$). When work-related trips were excluded, median distance travelled significantly increased from 75.32km to 91.73km over the same time span ($Z = -4.465$, $p = 0.000$).

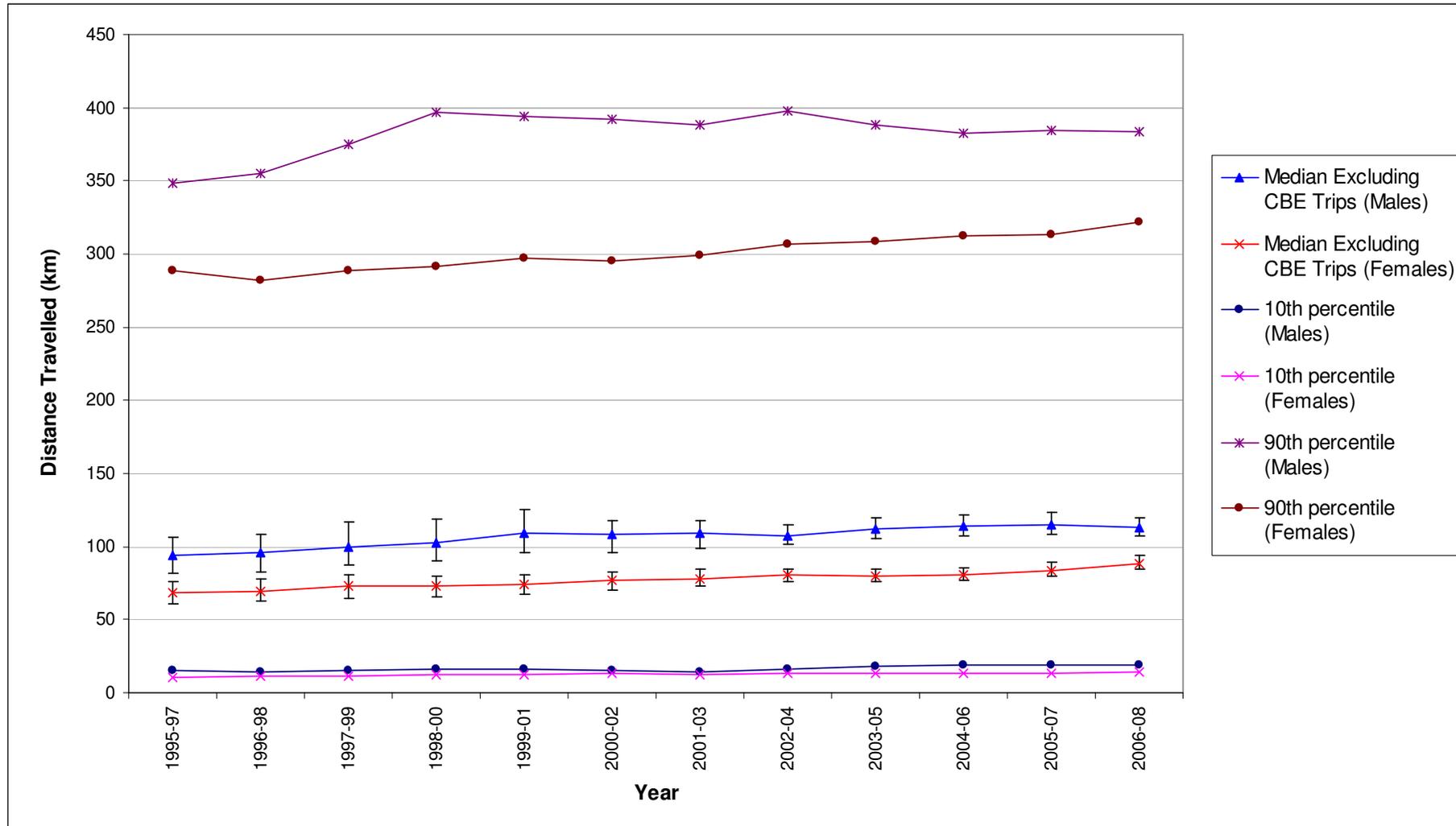
From the confidence intervals in Figure 4.6 alone it is difficult to establish if there have been significant increases between 2002 and 2008 as well as 2003 and 2008. Firstly examining

change from 2002 to 2008, there was a significant increase in median distance travelled (including commuting) from 99.86km per week to 112.65km per week ($Z = -4.685$, $p = 0.000$). Excluding work-related trips there was a significant increase from 91.73km to 103.00km over the same time span ($Z = -4.289$, $p = 0.000$).

Focusing on the differences between 2003 and 2008, median distance travelled (including commuting) increased from 99.78km to 112.65km ($Z = -4.130$, $p = 0.000$). When commuting was excluded median distance travelled also significantly increased from 91.37km to 103.00km ($Z = -3.861$, $p = 0.000$).

To examine gender differences in distance travelled among older people, Figure 4.7 presents the median distance travelled disaggregated by gender. The 10th and 90th percentiles have also been plotted to determine whether the increase in distance travelled can be attributed to those with high or low mobility to see how this has changed over time. The following analysis excludes distance travelled for commuting and other work-related trips.

Figure 4.7: **Median, 10th and 90th percentile** distance travelled per week (km) **excluding** commuting, business and education trips by **gender** from 1995-2008 (3-year moving averages with 95% confidence intervals)



Gender differences are observed in Figure 4.7 as median distance travelled among older men is significantly higher compared to older females across all years. The differences for each gender between years are less clear and therefore require further statistical testing. Between 1995 and 2008 median distance travelled increased significantly for both older men and women.

Median distance travelled increased significantly for older men from 86.91km in 1995 to 111.30km in 2008 ($Z = -4.676$, $p = 0.000$). For women distance travelled significantly increased from 64.37km in 1995 to 94.95km in 2008 ($Z = -6.413$, $p = 0.000$).

Between 2001 and 2005 significant increases in distance travelled were observed for older women from 72.42km to 80.47km ($Z = -1.967$, $p = 0.049$). Whilst the median distance travelled also increased amongst older men from 114.42km to 119.09km, this was not significant ($Z = -1.513$, $p = 0.130$).

Considering the difference in mobility between 2005 and 2008, there was a significant increase in distance travelled for women from 80.47km and 94.95km ($Z = -3.902$, $p = 0.000$). A decrease in distance travelled was observed for older men, from 119.09km to 111.30km although this was not significant ($Z = -.933$, $p = 0.351$).

Over a longer time span from 2001 to 2008 a decrease was observed for older men from 114.42km to 111.30km, however, this was again not significant ($Z = -0.870$, $p = 0.384$). However, a significant increase was observed amongst older women from 72.42km to 94.95km ($W = 1483046$, $Z = -4.879$, $p = 0.000$).

Among the 10th percentile of older men distance travelled has increased from 14.75km to 19.31km. Older men in the 10th percentile still travel further than women with an increased observed from 10.89km in 1995-97 to 14.65km in 2006-08. The 90th percentile also demonstrated that older men with high levels of mobility travel further than older women across all years. Interestingly for women in this percentile, distance travelled has increased from 288.24km in 1995-97 to 322.30km in 2006-08. For men, distance travelled has also increased over the same time span from 348.89km to 383.51km but there have been more fluctuations over this time period.

4.4.2.1. Summary of Distance Travelled

Distance travelled has increased significantly over the 1995-2008 time period for the older population when work-related trips are included and excluded from the analysis. Older men have continued to travel further than older women at all points. Although there has been a significant increase in mobility from 1995-2008, the most significant increases in distance

travelled in recent years have occurred amongst older women. Therefore the increase in distance travelled amongst the aggregate older population appears to result from significant increases in distance travelled by older women. In addition, among the 90th percentile of older women distance travelled has also risen sharply over time. Whilst gender differences can still be observed in travel behaviour among older people, these appear to be converging with women's distance travelled rising significantly from 1995-2008, with distance travelled by older males remaining relatively constant.

The following section explores the changes in mode share from 1995-2008. Separate figures have been produced for older men and women to highlight any gender differences in transport mode use, to observe any convergence in mobility behaviour.

4.4.3. Mode Share

Figures 4.8 and 4.9 present the change in percentage mode share for men and women respectively. Mean percentages, as opposed to median have been used in order to gauge how mode share is changing over time, as it was not possible to calculate the median. Due to the structure of the dataset commuting, business, and education trip purposes have been included in the analysis as mode share was calculated from all trips made in the week.

Figure 4.8 shows that the private car has remained as the main mode of transport for older men from 1995-2008, in particular as the car-driver, which increased from 53.05% in 1995-97 to 59.81% in 2006-08. The increase in car-driver trips appears to be offset by a reduction in the proportion of walking trips by a total reduction of 4.85% from 15.82% in 1995-97 to 10.97% in 2006-08. Bus trips have also decreased over time by 2.23% from 12.34% in 1995-97 to 9.26% in 2004-06, but increased to 10.11% in 2006-08, which may reflect changes to the concessionary travel scheme. Car passenger trips, trips by other private modes, rail trips and other public modes have not changed over the same time.

Figure 4.9 presents a drastically different picture of how older women travel compared to older men, most notably the difference in proportion of trips made as the car passenger and driver. Travel as a car passenger is much more prevalent among older women, across all years. Older women have increased percentage mode share as the driver by 7.59% from 15.55% in 1995-97 to 23.14% in 2006-08. As the rate of driving licence holding has increased among older women as illustrated in Figure 2.1, this may be reflected by increased percentage mode share as the car-driver. The proportion of walking trips has also decreased between 1995 and 2008 from 14.12% to 10.75%, a total reduction of 3.37%. Bus trips have also declined by 4.22 % from 21.04% to 16.82% from 1995-2008. As with men, travel by other private modes, rail and other public modes have not changed from 1995-2008, although women make greater use of public transport modes.

Figure 4.8: Percentage transport mode share amongst older **men**, including all trip purposes, from 1995-2008 (3-year moving averages)

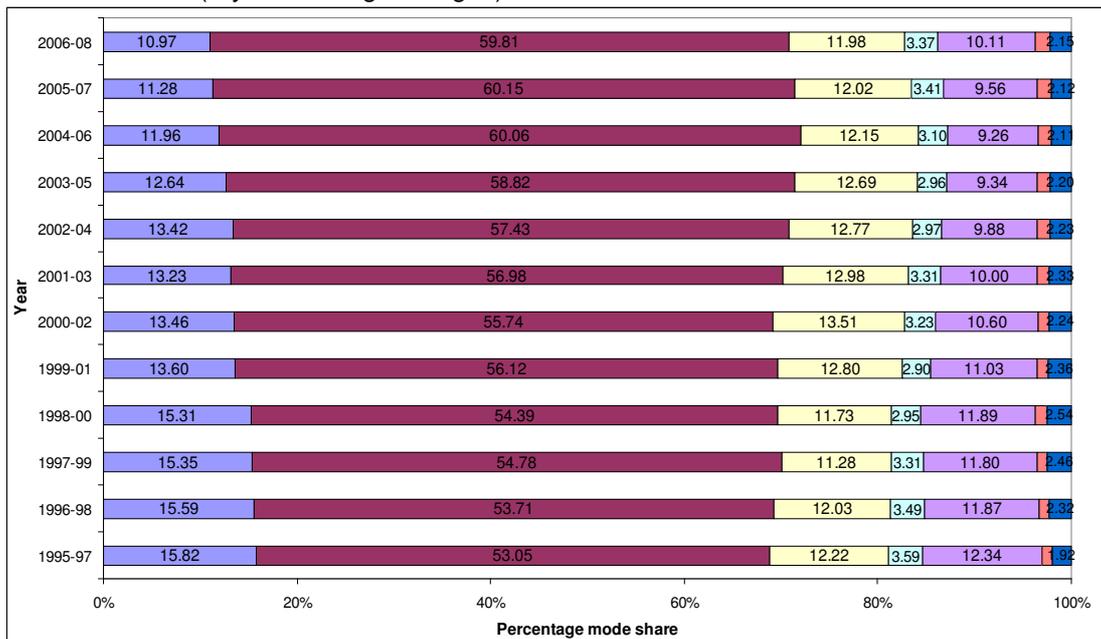
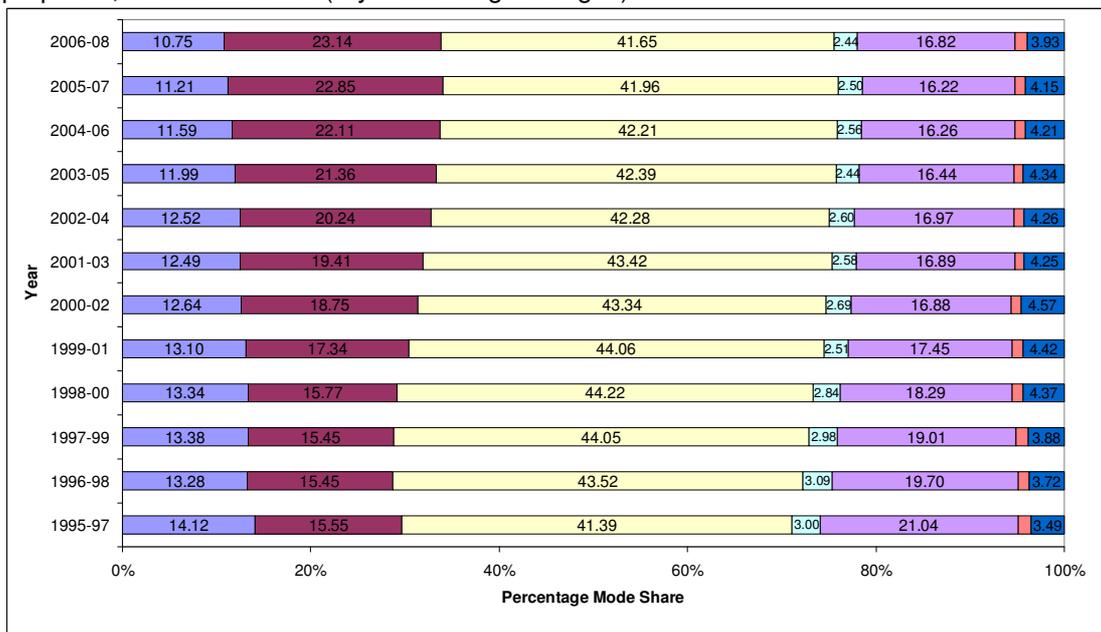


Figure 4.9: Percentage transport mode share amongst older **women**, including all trip purposes, from 1995-2008 (3-year moving averages)



- Walking Trips
- Car Driver trips
- Car Passenger Trips
- Other Private Mode incl. Motorcycle and Bicycle Trips
- All Bus Trips incl London Bus, Stage Bus and Non Local Bus
- All Rail Trips including Underground and Surface Rail
- Other Public Mode incl Taxi Trips

Further investigation is required into the proportional change in mode use relating to walking, bus and car driver amongst older men and women. Figures 4.10 and 4.11 plot the mean number of daily trips per week among older men and women, respectively, focusing on trips made as the car driver, car passenger, by bus and by walking from 1995-2008. As with percentage mode share, Figures 4.10 and 4.11 also include trips made for commuting and other work-related trips. For each mode 3-year moving averages have been plotted along with 95% confidence intervals.

Figure 4.10 shows that the mean number of trips made as a car-driver by older men increased from 9.88 trips in 1995-97, peaking at 11.25 trips 2004-06. However, since then the mean number of car-driver trips has declined to 10.77 trips in 2006-08. Trips made as a car passenger among older men have not changed significantly over the same time period.

The mean number of walking trips made by older men has declined from 2.05 trips in 1995-97 to 1.61 trips in 2006-08; however, it is not clear from Figure 4.10 alone whether this is significant.

Mean bus trips made by older men declined from 1.32 trips in 1995-97 to 1.04 in 2002-04; however, has since increased to 1.21 trips in 2006-08. This increase in mean bus trips may be due to changes made to the national concessionary travel scheme as the generosity of the concession was increased. Again, it is not clear whether these changes are significant from Figure 4.10 alone.

As 3-year moving averages have been used to plot mean trips by different modes, post-hoc Tukey's HSD tests have been used to identify differences between specific years to explore changes in mode share further. As it is not clear whether there has been significant changes in car-driver, walking and bus trips amongst older men, Tables 4.5-4.7 present the results of Tukey's HSD tests comparing the means for each of these modes to identify where the mean differences are statistically significant.

Figure 4.10: **Mean** number of trips per week by transport mode amongst older **men**, including all trip purposes, from 1995-2008 (3-year moving averages)

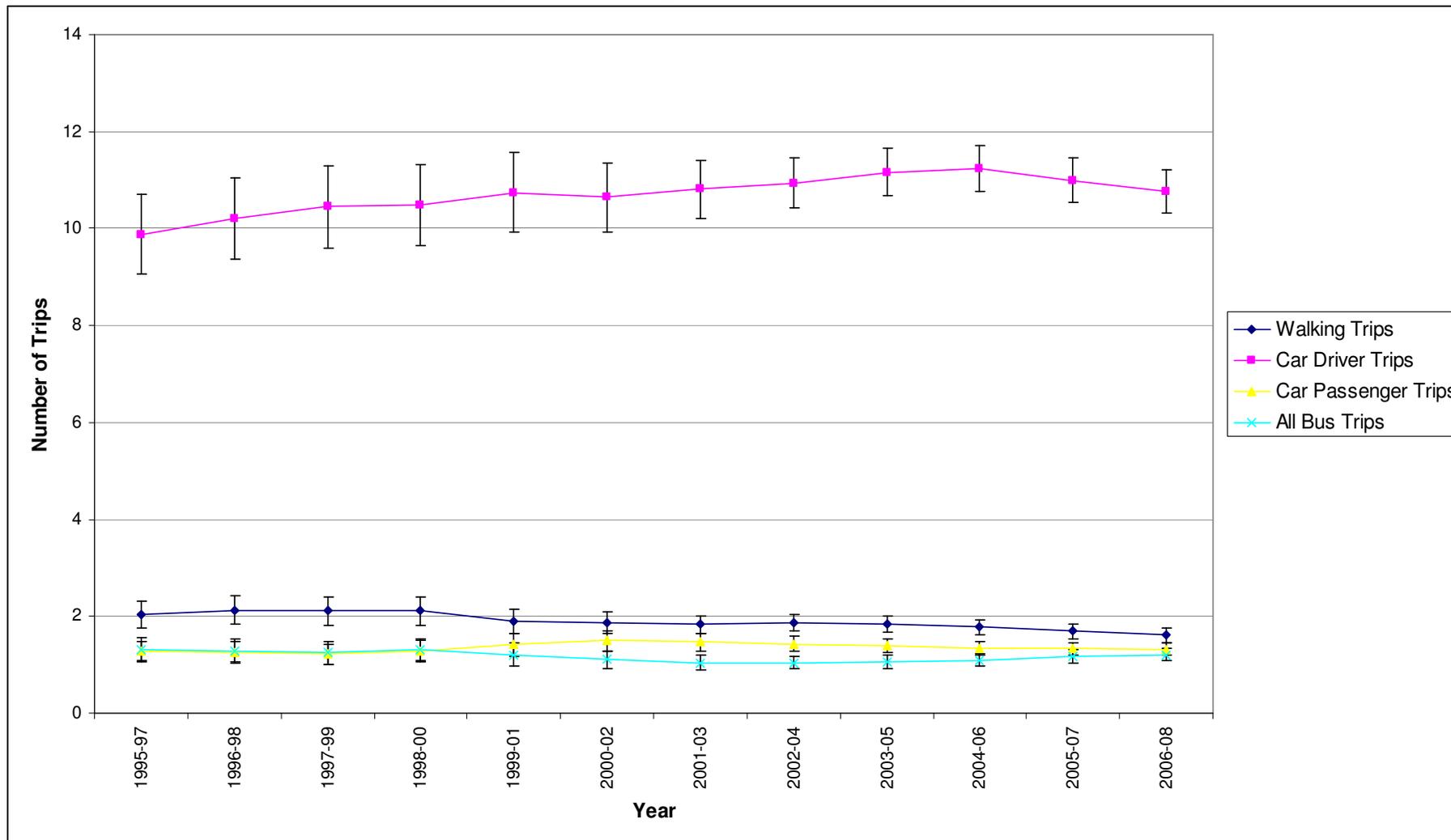


Table 4.5 displays the results from a Tukey's HSD post-hoc analysis test comparing the mean car-driver trip frequency in 1995 to all other years. Car-driver trips increased significantly for the years 2003-06, however they have since declined from 2005-07.

Table 4.5: Comparison of mean number of **car driver** trips per week including commuting, business and education trips amongst older **men** using Tukey's HSD post-hoc test

(I) Year	(J) Year	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
1995	1996	-1.023	.572	.882	-2.94	.90
	1997	-1.169	.578	.754	-3.11	.77
	1998	-.965	.585	.933	-2.93	1.00
	1999	-1.753	.583	.135	-3.71	.20
	2000	-1.296	.563	.553	-3.18	.59
	2001	-1.739	.559	.102	-3.61	.14
	2002	-1.444	.481	.136	-3.06	.17
	2003	-1.798*	.472	.010	-3.38	-.21
	2004	-2.116*	.473	.001	-3.70	-.53
	2005	-2.129*	.469	.000	-3.70	-.56
	2006	-2.035*	.469	.001	-3.61	-.46
	2007	-1.367	.469	.170	-2.94	.20
2008	-1.440	.468	.114	-3.01	.13	

*. The mean difference is significant at the 0.05 level.

Table 4.6 presents the results from a Tukey's HSD post-hoc analysis test for walking trips. These trips have been declined since 1995; however, this was not significant until 2007-08.

Table 4.6: Comparison of mean number of **walking** trips per week including commuting, business and education trips amongst older **men** using Tukey's HSD post-hoc test

(I) Year	(J) Year	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
1995	1996	.146	.191	1.000	-.49	.79
	1997	.232	.193	.996	-.42	.88
	1998	-.247	.195	.993	-.90	.41
	1999	.189	.195	1.000	-.46	.84
	2000	.234	.188	.994	-.40	.86
	2001	.416	.187	.608	-.21	1.04
	2002	.281	.160	.897	-.26	.82
	2003	.325	.158	.726	-.20	.85
	2004	.305	.158	.807	-.22	.83
	2005	.375	.157	.485	-.15	.90
	2006	.501	.156	.080	-.02	1.03
	2007	.547*	.156	.031	.02	1.07
2008	.636*	.156	.004	.11	1.16	

*. The mean difference is significant at the 0.05 level.

Table 4.7 displays the results from a Tukey's post-hoc analysis test comparing the means for trip frequency by bus. Since 1995, trip frequency by bus has also not significantly changed.

Table 4.7: Comparison of mean number of **bus** trips per week including commuting, business and education trips amongst older **men** using Tukey's HSD post-hoc test

(I) Year	(J) Year	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
1995	1996	-.00378	.16122	1.000	-.5445	.5370
	1997	.32048	.16276	.787	-.2254	.8664
	1998	.09792	.16488	1.000	-.4551	.6510
	1999	.12969	.16417	1.000	-.4210	.6803
	2000	.15235	.15851	1.000	-.3793	.6840
	2001	.36753	.15739	.528	-.1604	.8954
	2002	.43234	.13536	.081	-.0217	.8864
	2003	.37045	.13298	.232	-.0756	.8165
	2004	.34932	.13309	.324	-.0971	.7957
	2005	.36033	.13212	.263	-.0828	.8035
	2006	.27595	.13205	.709	-.1670	.7189
	2007	.15903	.13196	.996	-.2836	.6017
	2008	.21333	.13195	.942	-.2293	.6559

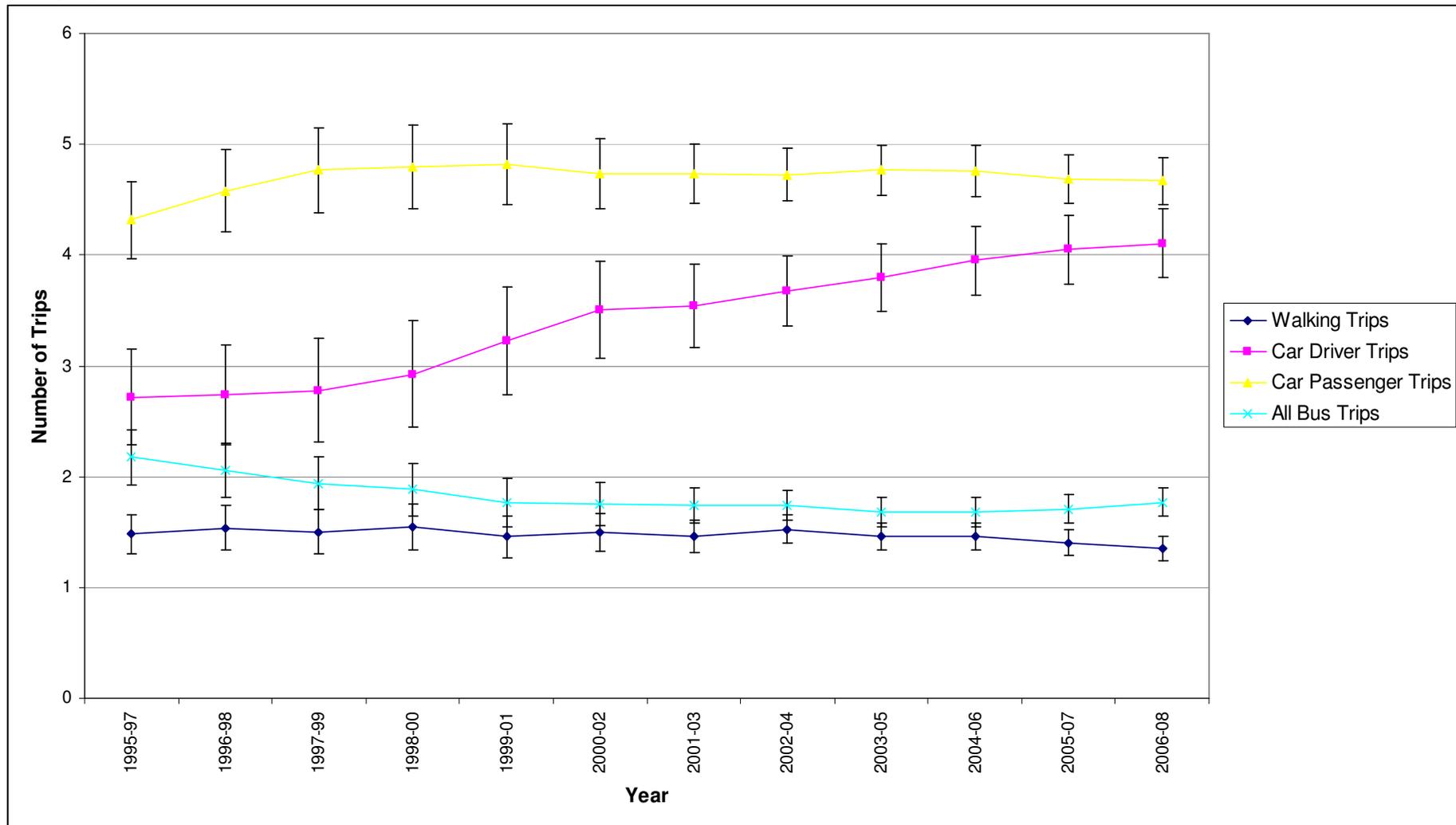
*. The mean difference is significant at the 0.05 level.

Figure 4.11 shows that older women travel differently compared to older men. Trips made as the car passenger are extremely important for women as they have increased from 4.31 trips per week in 1995-97 to 4.77 trips in 2003-05 although they have declined slightly to 4.67 trips in 2006-08. Trip frequency by this mode is significantly higher than the other trip modes presented but has not changed significantly from 1995-2008.

Car-driver trips by older women have increased significantly from 2.72 trips in 1995-97 to 4.10 trips in 2006-08, as the confidence intervals clearly do not overlap between these time periods. This demonstrates that the private car is becoming more important as a mode of transport for women, especially as a car-driver.

Mean walking trips amongst older women declined from 1.48 trips in 1995-97 to 1.35 trips in 2006-08 although this is not significant. Mean bus trips amongst older women also declined from 2.18 trips in 1995-97 to 1.68 trips in 2004-06; however, this has increased to 1.77 in 2006-08. From Figure 4.11 alone it is not sure whether this change is significant.

Figure 4.11: **Mean** number of trips per week by transport mode share amongst older **women**, including all trip purposes, from 1995-2008 (3-year moving averages)



To accurately ascertain whether mean bus trips have decreased significantly over time amongst older women Table 4.8 presents the results from a Tukey's HSD post-hoc analysis test comparing the mean trip frequency by bus amongst older women. The decline in mean bus trips has been significant since 1999 onwards.

Table 4.8: Comparison of mean number of **bus** trips per week including commuting, business and education trips amongst older **women** using Tukey's HSD post-hoc test

(I) Year	(J) Year	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
1995	1996	.19772	.15626	.993	-.3264	.7218
	1997	.40385	.15768	.366	-.1250	.9327
	1998	.36350	.16028	.579	-.1741	.9011
	1999	.54751*	.16013	.041	.0104	1.0846
	2000	.57360*	.15476	.015	.0545	1.0927
	2001	.70215*	.15363	.000	.1869	1.2174
	2002	.60247*	.13172	.000	.1607	1.0443
	2003	.61261*	.12963	.000	.1778	1.0474
	2004	.69122*	.12984	.000	.2557	1.1267
	2005	.78745*	.12871	.000	.3557	1.2192
	2006	.61575*	.12898	.000	.1832	1.0483
	2007	.61093*	.12833	.000	.1805	1.0413
	2008	.60850*	.12885	.000	.1763	1.0407

*. The mean difference is significant at the 0.05 level.

4.4.3.1. Summary of Mode Share

To summarise, the private car, whether used as a driver or a passenger, is extremely important for the mobility of older people and appears to be the preferred mode of transport. Travel by this mode is becoming increasingly important over time with observed increases in the proportion of trips made as the car-driver for both men and women. Whilst the mean number of car driver trips has not significantly increased for men, it has increased significantly for women. With older women increasing the proportion of travelling as the car-driver over time, in line with the increase in driving licence holdership, this suggests that transport mode use amongst older men and women are converging, also contributing to the increases in mobility observed amongst older women. The absolute mean number of car-driver trips made by women also increased significantly by 1.38 trips. Observed reductions in the proportion and mean number of walking and bus use by both older men and women could be a result of this increase in car use.

With increasing use of the private car amongst older people, combined with reductions in walking and bus use there are a number of implications to consider in terms of future mobility. Access and use of the private car in travel is known to be important in sustaining quality of life

amongst older people (Gilhooly et al., 2002, Banister and Bowling, 2004, Davey, 2007). With increasing reliance on the private car there are potentially negative impacts on quality of life if they are unable to sustain car use. Due to age-related illnesses it is likely that driving cessation will eventually occur.

Walking trips and those induced from bus use (i.e. walking to the bus stop) are important for older people's health. Physical activity is important in older adults as it reduces the risk of loss of mobility and muscle strength, falls, and fractures, as well as promoting social and mental well-being (Department of Health, 2004). There are benefits that are not being gained from physical activity amongst the older population if transport by these modes is reducing over time.

The following section considers changes in journey purposes over time to explore what activities older people are participating in which results in travel. Separate figures have been produced by gender given the mobility differences that have been observed. It will also assist in establishing whether these differences can be partly attributed to the activities they are partaking in.

4.4.4. Trip Purpose

Figures 4.12 and 4.13 present the percentage journey purpose for older men and women respectively from 1995-2008. Mean percentages, as opposed to median, have been used in order to gauge how journey purposes are changing over time. Within this analysis trip purposes for commuting, business, and other work and education have been included

Figure 4.12: Percentage journey purpose share amongst older **men** from 1995-2008

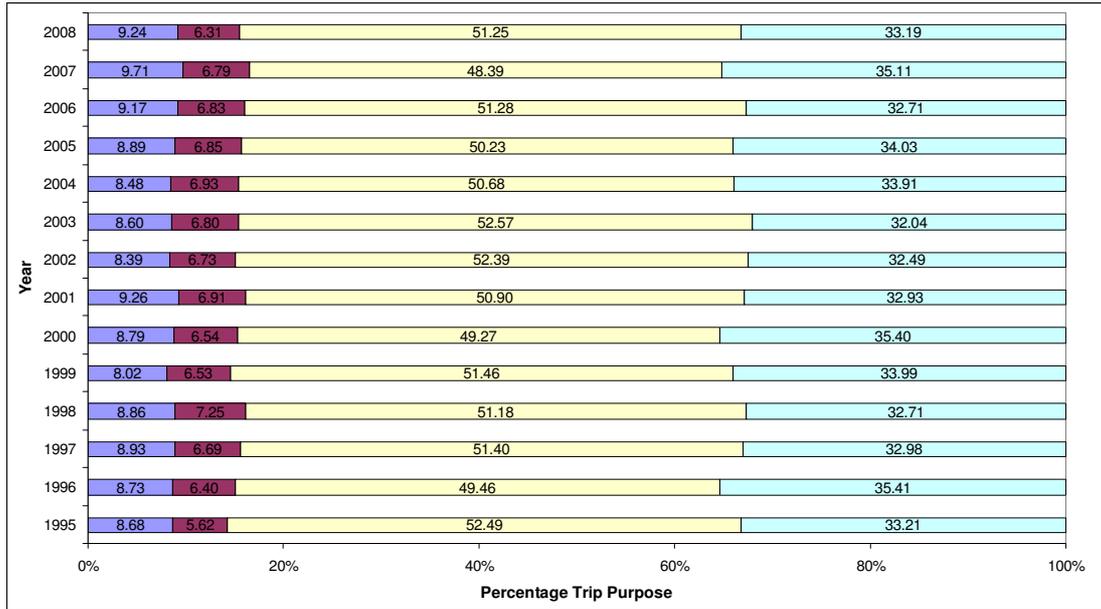
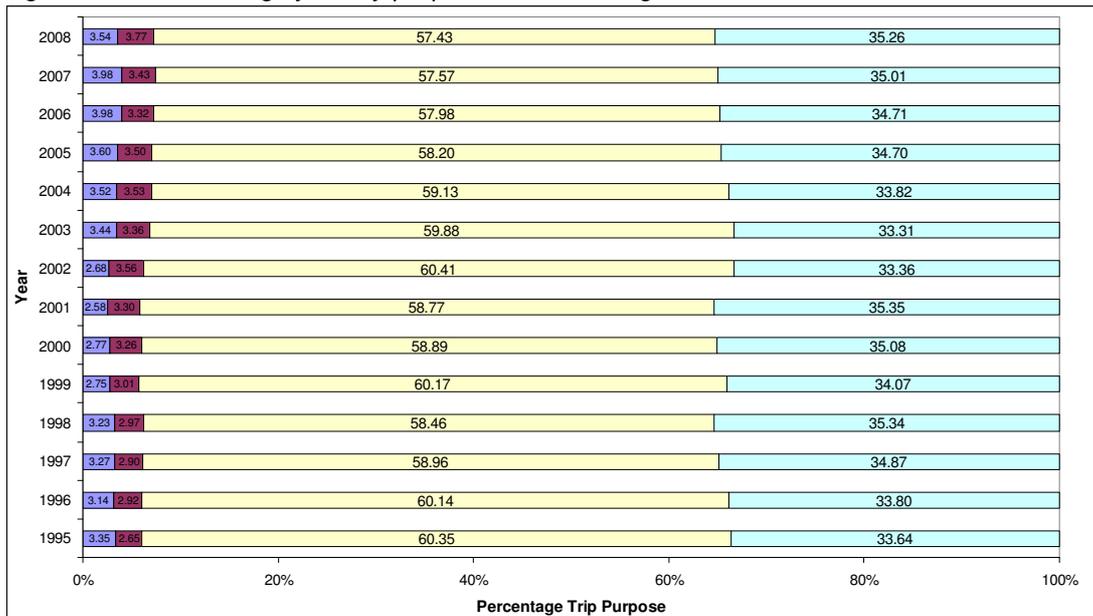


Figure 4.13: Percentage journey purpose share amongst older **women** from 1995-2008



- % Work Business Commuting Education Trips per week
- % Escort Trips per week
- % Shopping and Personal Business Trips per week
- % Social and Entertainment Trips per week

As observed from Figures 4.12 and 4.13, the overwhelming majority of journey purposes for older men and women are shopping or personal business trips (an average of 50.92% and 59.02% respectively), followed by social and entertainment trips which include: visiting friends, public activities, sports, holidays and day trips (an average of 33.58% and 34.45% respectively).

The analysis contains people aged 60-64 and is therefore likely to contain older people who are still engaged in employment. Older men make a greater proportion of trips for commuting and work-related purposes, compared to older women (an average of 8.84% and 3.27% respectively). The age at which women can retire is currently increasing to 65 years to bring it in line with the retirement age for men. As women could retire at an earlier age of 60 during the 1995-2008 time span, this could partly explain why they are less engaged in trip making for the purposes of employment.

Escort trips are those where a person provides travel assistance to another. This includes escorting children to education or another adult for another trip purpose. Older men make a greater proportion of these trips (an average of 6.66%) compared to older women (an average of 3.25%). This could be a reflection of the observations made in the mode choice by older men and women in Figures 4.8 and 4.9. Older men tend to make more trips as the driver, whilst older women make more trips as the passenger, which could be attributed to some of these escort trips.

4.4.4.1. Summary of Trip Purpose

The majority of trips made by older people are for shopping and personal business purposes, followed by entertainment and social engagement trips. At present, older men and women are engaged in roughly the same proportion of activities. Older males are more likely to be engaged in employment than females, explained by the previously higher retirement age for men than women. The changing role of women in the labour market along with the increase in the retirement age from 60 to 65 years is perhaps still yet to be reflected in the proportion of older women making these types of trips. It is envisaged that these trips will increase over time and that there will be gender convergence over time as women continue to be in employment in older age.

4.5. Discussion

Mobility is an important prerequisite for older people's quality of life (Mollenkopf et al., 1997, Metz, 2000, Banister and Bowling, 2004, Ziegler and Schwanen, 2011) and the changing mobility patterns of older people in the context of an ageing population have not been considered as highly as other issues such as housing and healthcare. The mobility of the

population overall is higher than that of older people in terms of trips made and distance travelled. The majority of trips are also made by private car. Having explored how the mobility trends of older people have changed over time, this section will relate the analysis to claims in the literature.

4.5.1. Increasing Mobility Amongst Older People

The mean number of trips made per week (including and excluding commuting and work-related trips) increased between 1995 and 2008. Significant increase was observed from 1995 to 1999 and onwards to 2008. As the number of trips is increasing when commuting is excluded from the analysis, other activities are taking place that are leading to increases in mobility, such as trips for personal business, shopping and leisure activities.

Older men make a greater median number of trips per week than women from 1995-2008. However; older women have seen greater significant increases in the number of trips made. Among the 10th percentile the number of trips older women make per week has increased in line with the number that older men make. Whilst the 90th percentile of older men make a greater number of trips than women, the number of trips of the 90th percentile of older women rose sharply from 1995-2008.

There have been significant increases in the mean distance travelled among older people from 1995 and 2004 and onwards to 2008. This increase has been observed when commuting and work-related trips are both included and excluded from the analysis. However, as observed in Figure 4.5 there is a significant difference between distances travelled including and excluding commuting trip purposes from years 2002-04 onwards. This suggests that distance travelled for work-related trips has increased more recently and this is contributing to the increased mobility of older people.

Focusing on the median distance travelled presented in Figure 4.6 produces a similar pattern. Testing specific years reveals that (both including and excluding work-related trips) there were significant increases in the median distance between 1995 and 2002 and again between 2002 and 2008. Figure 4.6 also shows there is a significant difference between distances travelled including and excluding commuting and business-related trip purposes from 2003-05 onwards.

Significant differences in distance travelled were observed in Figure 4.7 between older men and women, with older men travelling further between 1995 and 2008, however, significant increases in distance travelled were more prevalent amongst older women. A steady increase was observed among the 90th percentile of women, and although older men among the 90th

percentile travelled further, their distance travelled has been observed to fluctuate over the same time span.

Noble (2000) found that older people were travelling further in 1996/98 compared to 1985/86 in terms of distance travelled. The findings of this study are that there is a continuation of this increase in distance travelled over time as significant increases have been observed for older men and women from 1995-2008. As the Boomer cohort have begun to age within this time span, it can be deduced that the mobility of older people will increase further as older people are healthier than previous cohorts and have higher expectations about their mobility.

The findings observe that mobility has increased over time when including trips made for commuting and work-related trips. The increase in the retirement age amongst women during the time period 1995 to 2008 could explain some of the increases in mobility. As the retirement age is set to increase further, mobility is also likely to increase as a result of continued employment. The increasing importance of the private car also points to higher mobility levels, particularly as older women continue to hold onto their driving licences into older age. The implications of increased car use are discussed further in the following section.

4.5.2. Increasing Importance of the Private Car

Travel by the private car has become increasingly important over time, with the combination of deregulation of bus services during the 1980s and falling relative costs of motoring. As older people have remained healthier into older age it is unsurprising that the private car dominates as the main mode of travel for older people. Figures 4.8 and 4.9 showed that percentage mode share was highest among use of the private car for both men and women demonstrating its importance for the mobility of older people. Older men tend to travel as the car-driver which has been increasing over the time period 1995-2008. Older women are more likely to be a car passenger, although the proportion of mode share by car-driver has increased over the same time span.

The rise in use of the private car has led to decreases in the proportion of walking and bus trips, despite the national policy of providing free bus passes to those aged over 60 that operates in England, Scotland and Wales. Older women tend to make a greater proportion of trips by this mode compared to men. Women are perhaps more likely to be used to using this mode of transport, having used it when they were younger, as a private car would have been more likely to be made available to their male partner to be able to commute from home to work (Pooley et al., 2005b). Men have continued to use the car into older age, and there is some evidence that the car provides feelings of safety amongst men (Pooley et al., 2005a). Feelings of safety are important amongst older people (Davey, 2007, Risser et al., 2010, Mollenkopf et al., 2011) and there is some evidence that suggests older people can

sometimes feel vulnerable using buses (Lucas 2004). This could also explain continued car use over other modes of transport.

A combination of increased private car use, decreased bus use and reduction in walking trips presents a number of challenges and policy implications for the future. These decreases in walking and taking the bus could be a result of this increase in car use, suggesting that there will be major policy implications for the future of older people's mobility if people are unable to sustain car use into much older life. It also raises questions about the continued financing and financial sustainability of the free bus travel scheme in operation in Britain as bus use appears to be decreasing in favour of the private car. The total costs of the scheme have been increasing, yet the bus is becoming less important in older people's mobility.

In Scotland, bus operators are reimbursed for carrying concessionary passengers. These payments to bus operators are calculated by applying a fixed Reimbursement Rate to the adult cash single fare that would have been charged for each concessionary journey. Although the Reimbursement Rate in Scotland has been revised downwards from 73.6% in 2006-07 to 67% bus fares have increased above the rate of inflation. In addition Last (2013) argues that the adult cash single fare which is used to determine concessionary reimbursement has risen substantially more than other measures of the fare charged by operators to non-concessionary fare-paying passengers. It is argued that this is due to the current national reimbursement arrangements, with a fixed rate which is the same for all operators; this is likely to have created incentives for bus operators to increase the adult cash single fare more than they would otherwise have done.

Bus operators are reimbursed similarly in England, although the reimbursement rate is lower, currently between 50-65% according to the TAS Partnership (Butcher 2011). However, fares have risen much higher than the rate of inflation. Between March 2007 and March 2013 average bus fares paid by passengers in England increased 37%, with similar rises in London and the rest of England over this period as a whole. This compares with a 22% increase in the all items retail prices index (RPI), which means that bus fares have increased in real terms over this period (DfT, 2013).

As bus fares have risen, bus patronage amongst older people has declined since 1995 and although mean trips have increased very slightly between 2006-08, this is not significant. As a result, it would appear that bus operators are being reimbursed a higher amount due to an increase in fare prices causing the costs of the scheme to increase, whilst mobility by bus is decreasing in importance amongst older people.

However, due to age-related disease and physiology, many older people have to give up driving, which can lead to isolation, loneliness and depression if people are unable to maintain

social networks and contact through travel by the private car and undertaking trips for pleasure (Burkhardt et al., 1996, Marottoli et al., 1997, Ragland et al., 2005, Davey, 2007, Li et al., 2012). It also raises questions of the future physical mobility of older people. Walking as physical exercise can improve health and well-being amongst older people (Department of Health, 2004), however, reductions in walking and bus trips could potentially lead to higher incidence of physical disability amongst older people.

4.5.3. Convergence of Gender Differences in Mobility

Gender differences in travel behaviour have been identified in the literature (Sarmiento, 2000, Pooley et al., 2005b, Rosenbloom, 2006, Hanson, 2010) which are also evident from the findings; however, these appear to be converging over time, in line with other studies that have also found that gender differences are narrowing at the aggregate level (Noble, 2005, Rosenbloom, 2006, Frändberg and Vilhelmson, 2011, McQuaid and Chen, 2012). Older women are more likely to be a car passenger but are increasing the proportion of trips made as a car-driver. Given that older men make a greater proportion of trips as a car-driver, the findings suggest that older women may be dependent on older male partners, or receive lifts from relatives and friends.

These gender differences in mobility that originated in previous years have continued into later life amongst the cohorts of older people observed in this time span. Whilst older men make a greater number of trips and travel further than older women at each year for which data is available, evidence from the findings suggest that these differences are converging. Distance travelled has significantly increased amongst older women over time. Amongst the 10th percentile of women the number of trips they make per week have increased to the same number as men. Median distance travelled has also significantly increased amongst women. Women belonging to the 90th percentile have observed larger increases in distance travelled compared to men belonging to the same percentile as distance travelled has fluctuated. The increase in older women's mobility suggests that the gap in mobility between older men and women will narrow further in the future. The increase in the retirement age for women and increase in car use may be contributing to this convergence.

Figure 4.9 shows that older women have been increasing the proportion of trips made as a car-driver; this is in line with the increase in the proportion of older women holding a driving licence as observed in Figure 2.1. Faster transport modes are associated with travelling longer distances, therefore it could be deduced that increased car use amongst older women is contributing to the observed increases in distance travelled. Older women belonging to the Boomer cohort have similar driving licence holding as men and therefore may have more similarities in terms of travel characteristics to their male counterparts than older women belonging to the former cohorts did.

Whilst journey purposes have not changed much over the time span from 1995-2008, as the retirement age of women is rising in line with men's, distance travelled by women could further increase if they remain in employment for longer. The changing roles of women were observed with the Boomer cohort with women entering higher education and subsequently professional jobs (Spain, 1997, Pooley et al., 2005b, Rosenbloom and Herbel, 2009). As such, it is envisaged that as trips for commuting and business-related purposes will increase, therefore distance travelled will also rise and result in further convergence between these gender differences in the future.

4.6. Conclusion: The Changing Mobility of Older People

This chapter has presented an analysis of the mobility trends of older people in Britain at the aggregate level. From this evidence, it can be concluded that the mobility of older people in Britain increased from 1995-2008 in terms of the number of trips and distance travelled per week. The proportion of trips made by the car has increased in terms of car-driver and passenger, which have contributed to a decline in the proportion of walking and bus trips. This increase in car use can be attributed to the increase in mobility observed, particularly among older women, as car use is associated with longer distances.

This increasing mobility amongst older people questions the concept of what it means to be 'older'. Previous studies have found that mobility declines amongst older people, with clear distinctions between younger and older people (Tacken, 1998, Noble, 2000, Li et al., 2012). The finding of increasing mobility amongst older people suggests that the previous conceptualisation of older people as having lower mobility may no longer be appropriate, particularly as car use is increasing amongst the older population. This produces a different notion of how older people should be considered in the future in that they are not as mobility deficient as perhaps once thought. As older people begin to delay retirement in line with increases in the retirement age, they are also likely to continue to make trips for commuting into older age which will also contribute to the increase in mobility at the aggregate level and further challenging the perception and assumptions of older people having 'low mobility'.

As the Boomer cohort ages they are beginning to contribute to the 'younger' older population (i.e. those aged 60-69) and are more likely to make greater use of cars and therefore have greater mobility compared to other cohorts of older people. Certain characteristics have been associated with the Boomer cohort that are thought will lead to these higher levels of mobility. They tend to have higher wealth as they grew up during an era of economic growth; are more likely to have a driving licence as they grew up with developments in technology and infrastructure associated with the car; and due to healthier living and improvements in medical care the Boomers are also healthier compared to other older cohorts leading to a suggestion that they will be more active and more mobile in later life.

Issues of social exclusion may not be as prevalent among the Boomer cohort as they age as they are likely to have greater access to a car, which has been recognised to be an important aspect in preventing social exclusion and improving quality of life (Gilhooly et al., 2002, Banister and Bowling, 2004, Davey, 2007, Hensher, 2007). However, as an increasing proportion of older people use the car for mobility, there may be delayed or exacerbated issues of social exclusion when they are no longer able to drive if there are no suitable alternative transport modes. The quality of life for the 'young elderly' may be improved compared to former cohorts when they were of this age, if they are able to drive until they are older. However, the transition into 'older elderly' age may result in lowered quality of life if they are unable to travel due to driving cessation.

As gender convergence in mobility has been observed in this chapter, further investigation is required into the characteristics of the Boomer cohort in relation to other cohort groups and how this is contributing to changes in mobility amongst the older population. The following chapter uses cohort analysis to understand how the mobility behaviour of cohorts has changed over time and explore to what extent age, period and cohort effects can be used to develop further insight into the changing mobility of older people and to develop ideas about future implications and ideas about how the mobility of older people will change in the future.

5. Using Age Period and Cohort Effects to Explain The Changing Mobility of Older People

5.1. Introduction

The previous chapter analysed how mobility trends of older people have changed in Britain from 1995-2008. This chapter turns to examine the mobility patterns of age groups and birth cohorts over the same time span. Of particular interest is the Boomer cohort as they have started to contribute to the proportion of older people in Britain, classed in this study as those aged 60 and over. Given that this cohort is large in terms of the number of members, they will make up a large proportion of older people in society. It has also been recognised that they have different views and expectations about mobility compared to other cohorts of older people. It is important to consider the mobility of this cohort and subsequent cohorts as this has future implications for policy, infrastructure and transport systems.

There are two main aims of this chapter. The first is to present the mobility trends of all age groups and birth cohorts over time, with a particular focus on the Boomer cohorts given that they will soon reach the age of retirement. The purpose of this analysis is to differentiate between the mobility of older people over time in relation to the membership of the different cohort groups. Secondly, the chapter will seek to explain how ageing affects mobility, how the cohorts differ in terms of their mobility and what trends are influencing these levels of mobility. Using cohort analysis to tease out age, period and cohort effects will be used to explain the change observed in the mobility trends of older people in terms of distance travelled.

Firstly, the chapter will provide a brief overview of the data and methods used that are considered most appropriate to indicate how age, period and cohort effects can be used to explain changes in travel behaviour. It will then present the findings along with a discussion and then conclude.

5.2. Data and Methods

NTS data from 1995-2008 was used to undertake the analysis in this chapter. It is the most useful dataset for this study as it allows for exploration of travel patterns whilst capturing individual and household attributes. As the NTS is a repeated cross-sectional survey in design as well as being developed in order to monitor long-term trends it is suitable for looking at the travel behaviour of older people over time.

To assess changes in mobility total distance travelled per week (km) is used as a measure of mobility. Distance travelled is felt to give a better indication of the level of mobility someone

has, compared to time spent travelling. Although an individual may have spent a long time travelling, this could be affected by congestion levels and thus give an inaccurate picture of their mobility. Distance travelled may also be indicative of travel horizons. The analysis also only focuses on daily mobility and is concerned with everyday journeys and mobility rather than longer distance travel. This measure of mobility does not distinguish between mode, trip frequency or journey purpose for this analysis. Distance travelled could be considered a crude measure as it gives no indication of terrain or weather during the distance travelled.

Pseudo cohorts have been created from the NTS, which are defined in Table 3.2. Descriptive analysis is used to compare how the mobility of age groups and birth cohorts change over time. Age groups will consist of different cohort members at different points in time. This comparison will enable identification of the separate age, period and cohort effects that influence changes in mobility over time. Multiple linear regression models will be used for this analysis. Given that there are gender differences in transport, the descriptive analysis and regression models have been disaggregated by gender to see if there are age-cohort effects.

5.3. Results and Findings

The first section presents results from the descriptive analysis which considers the change in mobility trends in relation to distance travelled per week among the different age groups and cohort groups from 1995-2008. The second section will present the results of the multiple linear regression model used to identify the influence of age, period and cohort effects.

5.3.1. Descriptive Results by Age Group

Firstly, considering the mobility of age groups, Figure 5.1 plots the mean distance travelled by each age group for the years 1995-97, 2001-03 and 2006-08. These time points have been chosen to make comparisons over time clearer to identify the changes that have occurred over time and between age groups. 95% confidence intervals have also been plotted to indicate statistical significant differences between age groups and between years. 3-year moving averages have been calculated to smooth the trend lines. Figure 5.1 also includes distance travelled for trips made for commuting, business other work and education purposes.

Figure 5.1: **Mean** distance travelled per week (km) **including** commuting, business and education trips by **age group** from 1995-2008 (3-year moving averages with 95% confidence intervals)

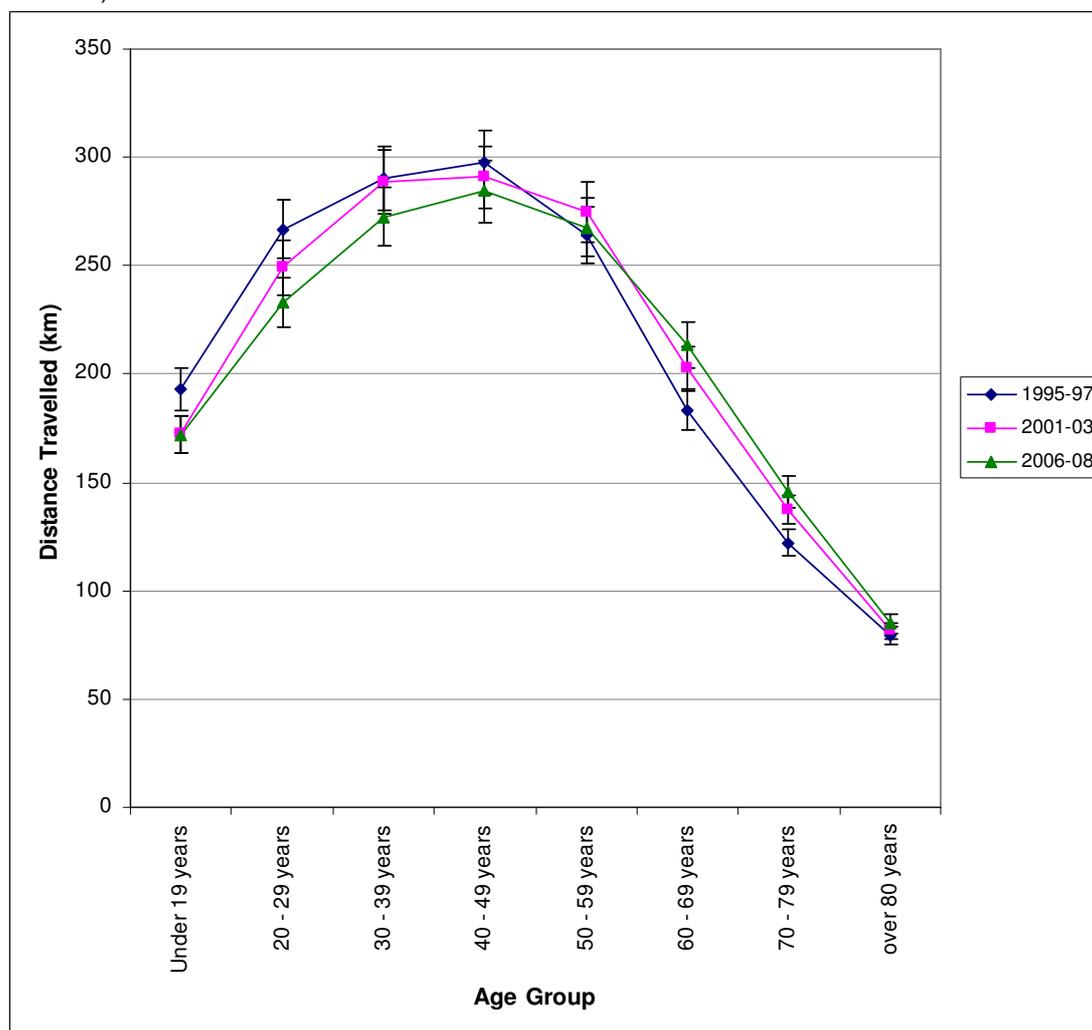


Figure 5.1 shows that there are significant differences in terms of daily mobility in terms of distance travelled between age groups. However, daily mobility has remained relatively consistent across the time period 1995-2008 for some age groups, whilst it has changed significantly for others.

As only adults aged 16 and over are included in the study, those aged 19 and under refer to adults aged 16-19 years. Those aged 19 and under have similar mobility levels to those aged 60-69. Those aged 20-29 have higher mobility but mobility peaks amongst those aged 40-49, which has been consistent during the time span 1995-2008. Those aged 30-39 and 50-59 also have mobility levels close to those of aged 40-49 years.

According to Figure 5.1, distance travelled drops sharply in older age, indicated by the difference between those aged 50-59 and 60-69, suggesting there are age effects present. There are also distinctive differences in distance travelled between the older age groups (aged 60 and over). These differences are statistically significant, confirmed by the gaps

between the 95% confidence intervals for each age group. The average mobility of older people aged 60-69 is higher compared to those aged 70-79 age by approximately 50km per week. Mobility declines again at the age of 80 years and over. In line with previous analysis on travel characteristics of older people by Noble (2000) using the NTS, those aged 80 and over have the lowest mobility of the population.

The curve shifts from left to right over time, indicating that distance travelled has changed differently amongst each of the age groups from 1995-2008. Reductions in the mobility of younger age groups are observed, whilst mobility has increased amongst older age groups.

Focusing on the change in mobility amongst older age groups, distance travelled increased significantly from 1995-2008. Mean distance travelled increased from 183.07km per week in 1995 to 213.3km per week in 2008 amongst those aged 60-69. Amongst those aged 70-79, distance travelled increased significantly from 122km per week in 1995 to 145.4km per week in 2008. Distance travelled has not changed significantly for those aged 80 and over or the age groups aged 30-59 years over the same time span. However, mean distance travelled has declined amongst the youngest age groups, those aged 29 and under.

Median distance travelled as a measure of mobility may be more accurate when considering the mobility of different age groups. It is a more robust measure compared to the mean as it reduces bias from extreme outliers such as those with very high levels of mobility which can affect the mean value. Figure 5.2 replicates the analysis presented in Figure 5.1 but uses median distance travelled to indicate mobility levels, as opposed to the mean.

Figure 5.2: **Median** distance travelled per week (km) **including** commuting, business and education trips by **age group** from 1995-2008 (3-year moving averages with 95% confidence intervals)

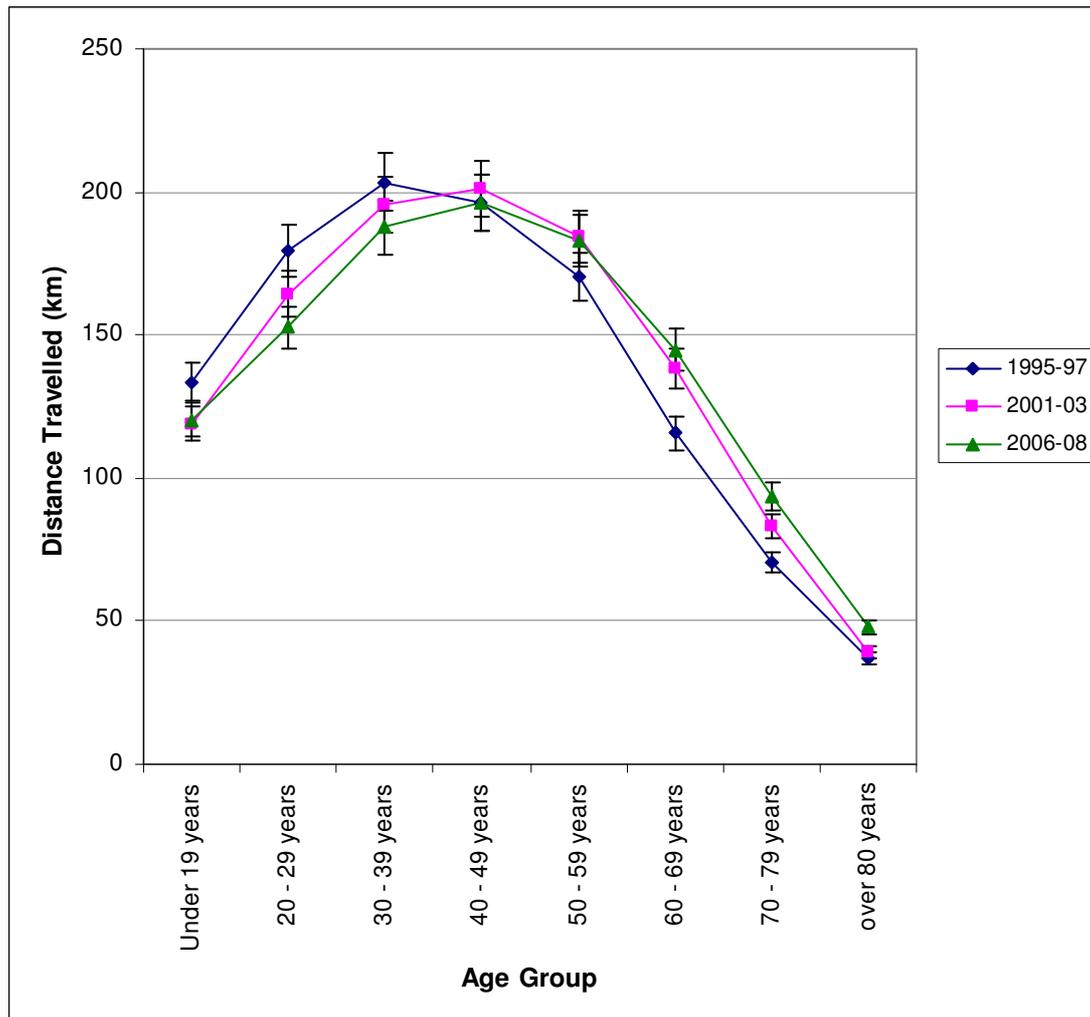


Figure 5.2 presents the median distance travelled for each age group for the years 1995-97, 2001-03 and 2006-08. To smooth trend lines, 3-year moving averages were calculated. To indicate statistical significant differences 95% confidence intervals have also been plotted.

Median distance travelled is lower compared to the mean values plotted in Figure 5.1. This is to be expected as there may be respondents making extremely long trips, which could skew the results. However, similar patterns of mobility changes over time amongst each age group can be observed in both Figures 5.1 and 5.2.

Although the median distance travelled is used in Figure 5.2, mobility still peaks amongst the 40-49 age group, compared to other age groups, and has remained constant from 1995-2008. However, in 1995-97 those aged 30-39 had the highest mobility of all age groups.

The curve in Figure 5.2 also follows the same shift over time as that in Figure 5.1. Declining mobility is observed amongst the younger age groups from 1995-2008, whilst there have been significant increases in mobility amongst the older age groups over the same time span.

Given that Figures 5.1 and 5.2 present similar mobility trends in terms of distance travelled from 1995-2008, the median measure will be used throughout the remainder of this chapter as it is considered a more accurate indicator of mobility due to the reduction of bias.

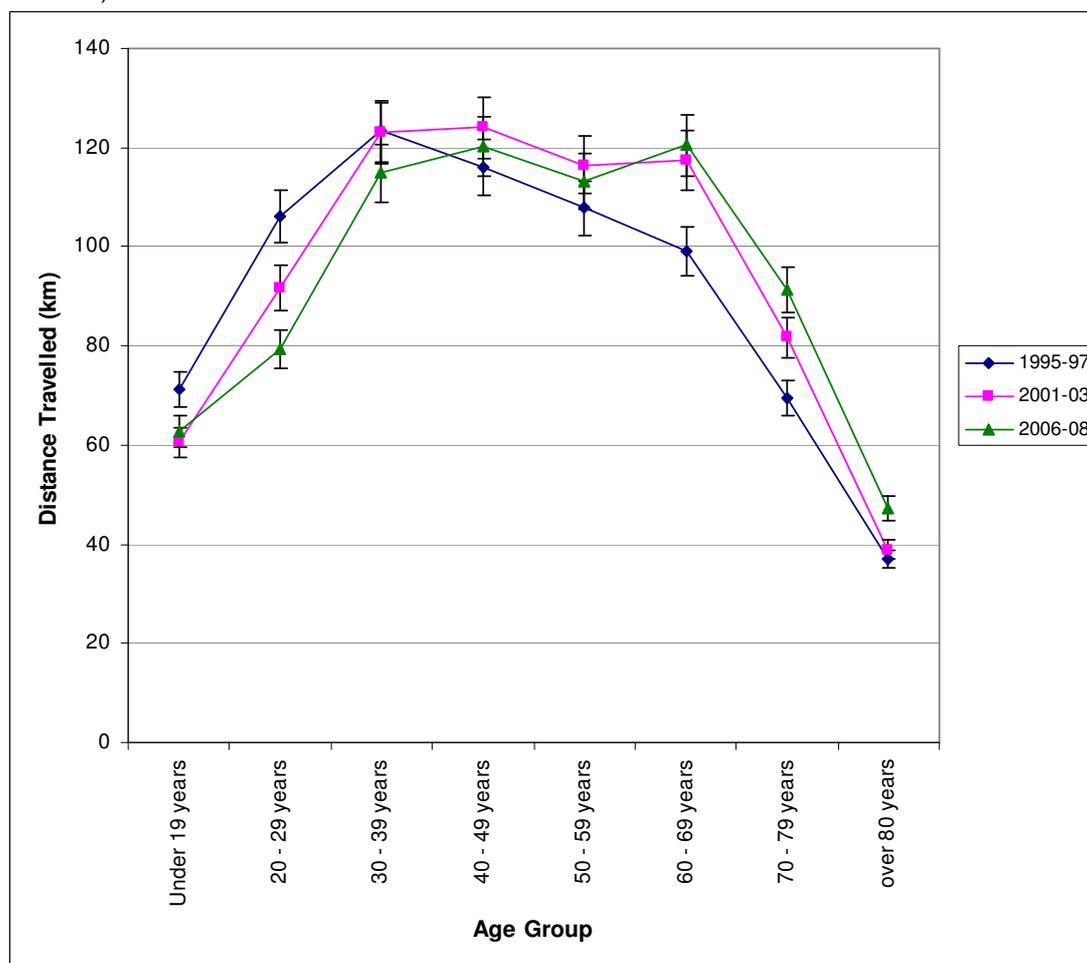
It is also important to note that the descriptive results outlined in Figures 5.1 and 5.2 include distance travelled for all trip purposes which includes those made for commuting and other work-related trips. Given that older people are likely to be retired, and perhaps members of the Boomer cohort are taking early retirement, for the following analysis these commuting and work-related trips have been excluded. Removing these trips allows for greater accuracy when comparing distance travelled between age groups, as well as by gender.

Different age groups may be undertaking different activities and gender differences have been observed in the existing literature related to employment roles of men and women. Men have been found to travel further due to places of employment being located further away from residential homes. Women tend to travel shorter distances although they have more complex mobility patterns and make a greater number of trips due to trip chaining behaviour given that they are likely to have a greater proportion of household responsibilities, in addition to employment, which tends to be located closer to the home (Sarmiento, 2000, Pooley et al., 2005b, Rosenbloom, 2006, Hanson, 2010).

Trips included in the analysis are those made for escorting others to education; shopping; other escort trips; other personal business; visiting friends at home; visiting friends elsewhere; entertainment or public activity; sport; holidays; day trips and others which include trips for just walking.

Figure 5.3 presents the median distance travelled excluding trips made for commuting, business and education purposes. 95% confidence intervals have been plotted along with 3-year moving averages.

Figure 5.3: **Median** distance travelled per week (km) **excluding** commuting, business and education trips by **age group** from 1995-2008 (3-year moving averages with 95% confidence intervals)



Similar mobility patterns are observed in Figure 5.3 that were found in Figures 5.1 and 5.2. However, median distance travelled for all age groups is lower compared to Figure 5.2, with the exception of those aged 70 and over. Presumably, as people belonging to these age groups are more likely to be retired they are not making commuting trips and so distance travelled is not affected by removing these types of trips from the analysis.

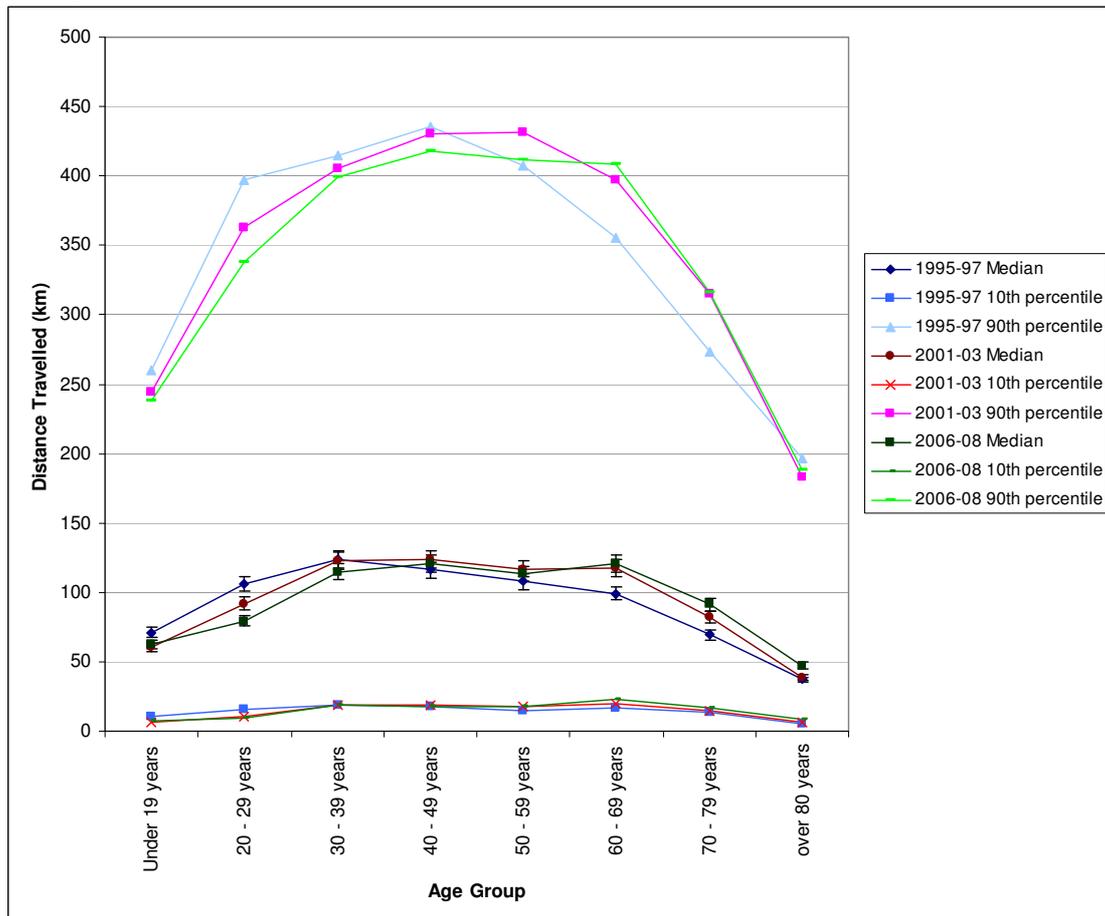
Distance travelled has increased from 1995-2008 amongst all three older age groups. However, there are significant differences between them. Those aged 80 and over have the lowest levels of mobility compared to all other age groups. Excluding commuting and work-related trips from the analysis reveals that those aged 60-69 have similar mobility levels to those aged 30-59 in 2001-03 and 2006-08. This suggests that this 'younger' older age group have similar mobility levels for social and personal business activities to those aged 30-59. This is not true for those of 70 years and over.

Median distance travelled increased significantly amongst those aged 60-69 from 99.2km per week in 1995-97 to 120.4km per week in 2006-08, as well as amongst those aged 70-79 from 69.4km to 91.2km travelled per week.

Interestingly, over time median distance travelled by those aged 70-79 has surpassed that of those aged 29 and under. Distance travelled by those aged 70-79 was statistically higher than that of both younger age groups in 2006-08.

Figure 5.4 presents the median distance travelled as well as the 10th and 90th percentiles for each age group. Trips made for commuting, business and education have been excluded from the analysis. 3-year moving averages have been derived and 95% confidence levels have been plotted.

Figure 5.4: **Median, 10th and 90th percentile** distance travelled per week (km) **excluding** commuting, business and education trips by **age group** from 1995-2008 (3-year moving averages with 95% confidence intervals)



Clear distinctions can be observed amongst the 90th percentile: those with the highest mobility levels. Amongst the older age groups, distance travelled increased from 1995-97 to 2001-03, except for those aged 80 and over.

Amongst the 90th percentile in 2001-03 and 2006-08 those aged 60-69 had similar mobility levels to those aged 30-59. Changes in mobility over time amongst the 90th percentile presents a similar pattern to changes in the median.

When examining the 10th percentile, it is difficult to clearly ascertain differences between and amongst the age groups. Distance travelled, or perhaps a more suited description, immobility, does not appear to change greatly over time. However, as reflected in the median, the 10th percentile aged 60-69 travel similar distances to those aged 30-59. The older age groups and the youngest age groups have lower levels of mobility in terms of distance travelled.

As the 90th and 10th percentiles reflect similar changes in mobility to that of the median by also having a similar trend line pattern, this suggests that changes in distance travelled cannot be attributed to or driven by very highly mobile people or those with low mobility.

5.3.1.1. Descriptive Results by Age Group and Gender

Gender differences in travel behaviour have been well documented. Women tend to make a greater number of trips but travel shorter distances, whilst men tend to travel further distances as a result of different employment patterns and level of household responsibilities (Sarmiento, 2000, Best and Lanzendorf, 2005, Pooley et al., 2005b, Rosenbloom, 2006). It has also been recognised that women tend to have different transport needs compared to men and tend to be at a greater risk of social exclusion as a result of poor transport (Hamilton and Jenkins, 2000, Hine and Mitchell, 2003, Lucas, 2004).

Rates of driving licence holdership also differ between men and women; however, these are converging as revealed in Chapter Two. Amongst older women in particular, dramatic increases in the rate of driving licence holdership have been observed (see Figure 2.1). However, a reducing rate of driving licence holding has been observed amongst those aged 17-20 and 21-29, although men and women belonging to these groups have similar levels of holdership. This suggests that gender differences in mobility may converge in the future, although there may be future implications for the mobility of current younger people as they age and do not obtain a driving licence in later life.

Given observed gender differences in mobility, the analysis has also been disaggregated by gender. As there is some evidence to suggest that the gender divide in transport is narrowing, in particular for the younger age groups, it will be interesting to see how this is borne out in the following analysis and the implications it will have in relation to the mobility of the older population in the future.

Continuing to use the median as the measure of mobility, Figure 5.5 presents the median distance travelled, excluding commuting and work-related trips, for men by age group. 95% confidence intervals have been plotted along with 3-year moving averages.

Figure 5.5: **Median** distance travelled per week (km) **excluding** commuting, business and education trips amongst **men** by **age group** from 1995-2008 (3-year moving averages with 95% confidence intervals)

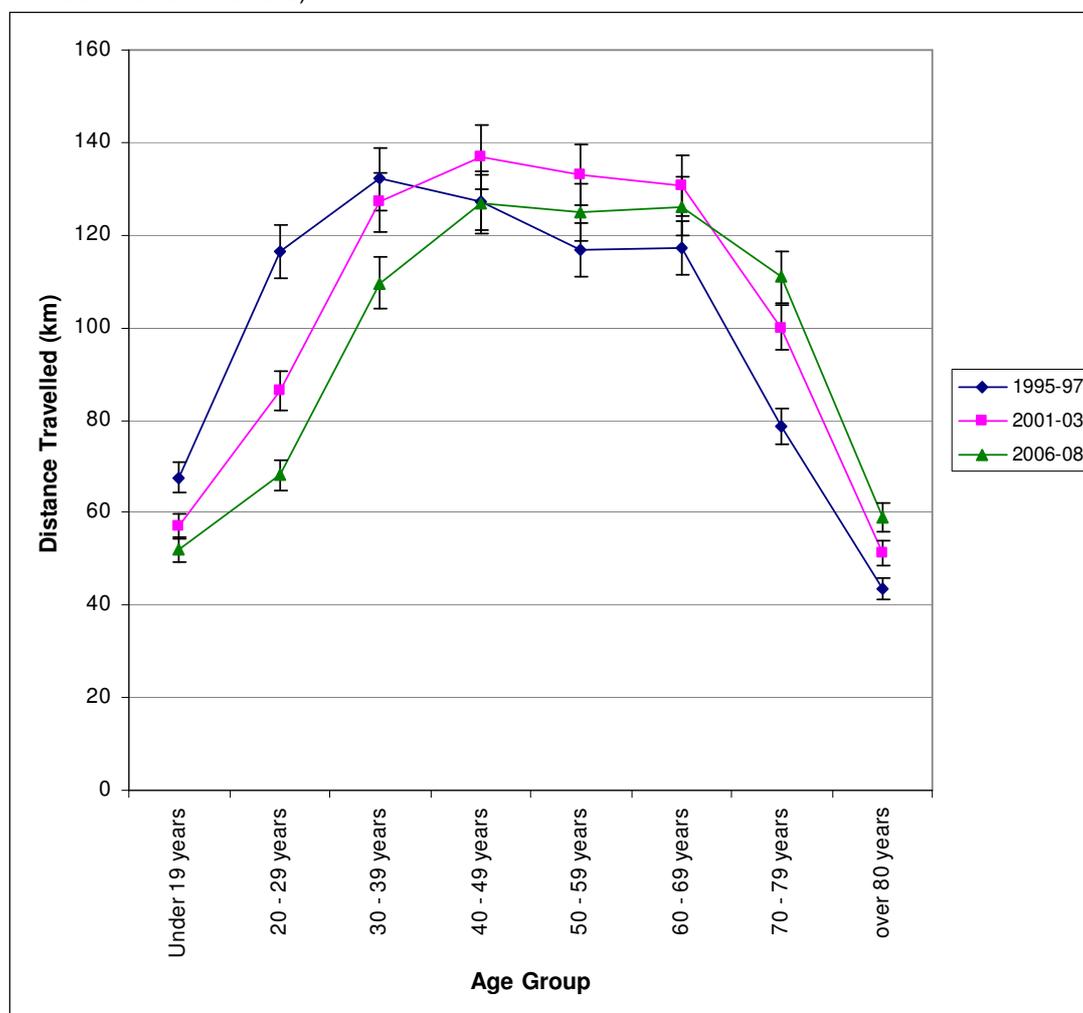


Figure 5.5 presents similar mobility patterns to those observed in Figures 5.1-5.3. There are clear significant differences between the mobility of men belonging to the older age groups (i.e. those 60 and over); the older the male age group, distance travelled is lower. However, there have been dramatic, significant increases in mobility over time amongst these particular age groups.

Distance travelled amongst those aged 70-79 increased from 78.8km per week in 1995-97 to 111km per week in 2006-08. Distance travelled also increased amongst those aged 80 and over from 43.6km per week to 59km per week. Distance travelled amongst those aged 60-69 also increased over the time span; however, distance travelled has declined amongst those aged 16-39.

Over time, distance travelled has converged between the male age groups. In 2006-08 those aged 60-69 had similar mobility levels to those aged 40-59. Distance travelled has peaked for men at age 40-49 since 2001-2008. In 1995-97 mobility peaked when men were aged 30-39.

Men aged 20-29 were previously considered to have the highest levels of mobility (Pooley et al., 2005b). However, according to Figure 5.6 distance travelled amongst men belonging to the youngest age groups has declined sharply over time. Amongst those aged 20-29 distance travelled fell from 116.5km per week in 1995-97 to 68.1km per week in 2006-08. In 1995-97, distance travelled by those aged 20-29, was similar to those aged 30-69; however, in 2006-08 distance travelled fell below that of older people aged 70-79. Men aged 19 and under have even lower levels of mobility: in 2006-08 distance travelled was lower than men aged 80 and over, a population group that has been considered to be very immobile in existing literature (Noble, 2000, Alsnih and Hensher, 2003).

Figure 5.6 turns to examine the travel behaviour in terms of distance travelled for the female age groups.

Figure 5.6: **Median** distance travelled per week (km) **excluding** commuting, business and education trips amongst **women** by **age group** from 1995-2008 (3-year moving averages with 95% confidence intervals)

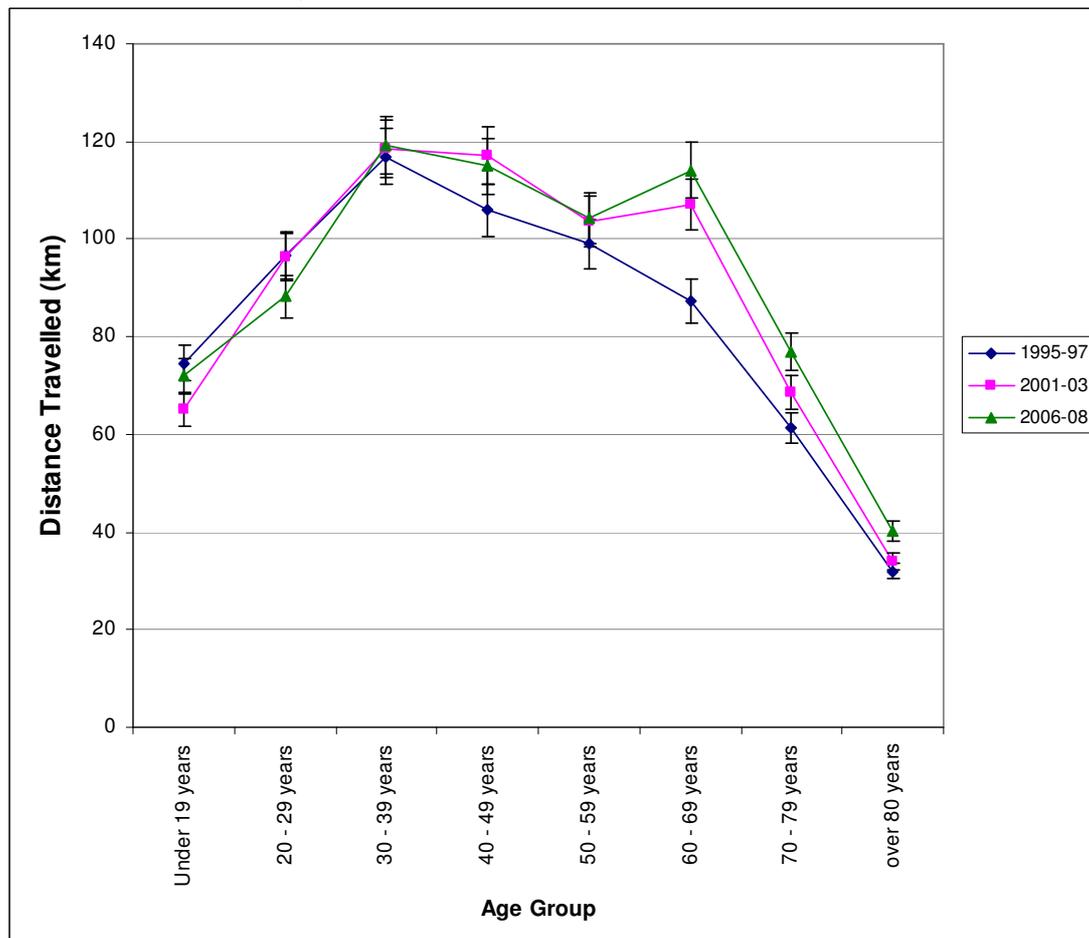


Figure 5.6 also presents a similar pattern of changes in mobility to those in Figures 5.1-5.3 and 5.5. Significant differences in distance travelled are observed between women of different ages. Women belonging to the older age groups have lower mobility compared to younger age groups, with the exception of those aged 60-69 during 2001-03 and 2006-08. For women, mobility peaks between the ages of 30-39, compared to 40-49 for men.

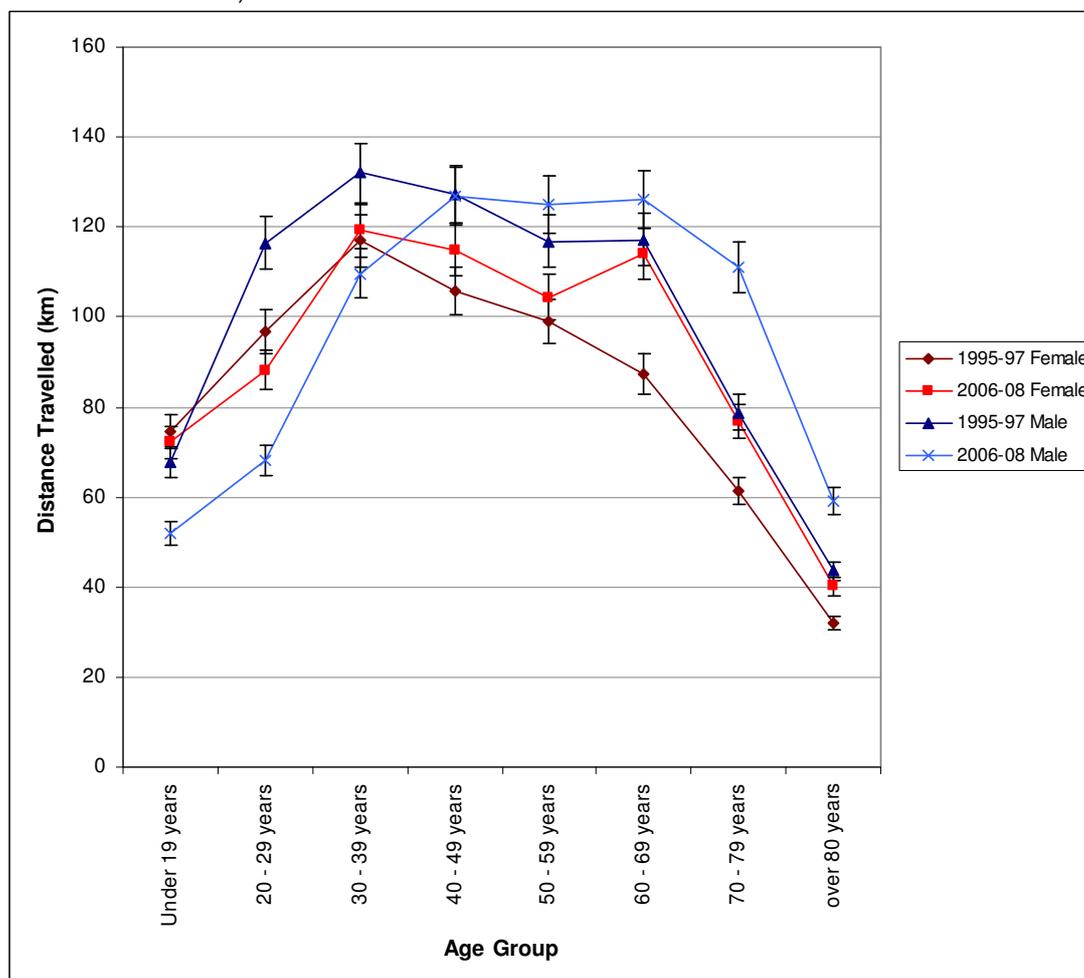
Distance travelled increased significantly from 1995-2008 amongst older women. Amongst women aged 60-69 distance travelled rose from 87.3km per week in 1995-97 to 114.1km per week in 2006-08. Amongst women aged 70-79 distance travelled increased significantly from 61.3km per week in 1995-97 to 76.7km per week in 2006-08. Women aged 80 and over had the lowest levels of mobility compared to all other age groups, however, distance travelled has increased significantly from 32km per week to 40.1km per week between 1995 and 2008.

Mobility levels amongst women of the younger age groups have remained constant over time. Women aged 19 and under had similar levels of mobility to women aged 70-79. Women aged 20-29 travelled less than women aged 60-69, except for the years 1995-97.

Figure 5.7 compares men and women across different age groups at two points in time: 1995-97 and 2006-08 to assess how gender differences in terms of distance travelled has changed between 1995 and 2008.

In Figure 5.7, clear differences in terms of distance travelled among older people are observed, as well as highlighting gender differences. Median distance travelled was greater amongst men of all age groups, compared to women, in 1995-97. This highlights the gender divide in mobility; however, over time this has changed amongst some age groups. In 2006-08, men belong to the older age groups aged 40 and above travelled further than women, but for the younger age groups, women travelled further than men.

Figure 5.7: **Median** distance travelled per week (km) **excluding** commuting, business and education trips by **gender** and **age group** from 1995-2008 (3-year moving averages with 95% confidence intervals)



This is an extremely interesting result given that it has been widely accepted that men usually travel further than women (Sarmiento, 2000, Pooley et al., 2005b, Rosenbloom, 2006, Crane, 2007). Distance travelled by women aged 16-29 has remained relatively constant from 1995-2008, but is higher than that of their male counterparts. This gap has widened as distance travelled has declined amongst men of this age over the same time span. Whilst men aged 20-29 had higher levels of mobility than women of the same age in 1995-97, distance travelled amongst men has fallen sharply over time and in 2006-08, women of this age had much higher levels of mobility compared to their male counterparts. This suggests the gender divide is converging and current cohorts of younger age groups may have similar mobility pattern in the future when of older age.

Amongst older age groups, a gender divide in mobility was observed, with men travelling further than women. However, distance travelled has increased amongst all older age groups from 1995-2008. Distance travelled has not changed significantly over time for women aged 30-49 or men aged 40-49, but has declined amongst for men aged 30-39. Mobility levels are highest, or peak, around these 'middle-age' groups.

5.3.1.2. Summary of Descriptive Results by Age Group

There is an interesting pattern observed between all age groups. Mobility is lower at a younger age, which rises and peaks in 'middle-age', before a reduction in mobility in older age. Significant differences in distance travelled are also clear between the older age groups. This demonstrates that there is an age effect as mobility declines in older age. This decline in mobility is not solely attributable to retirement as there are still clear distinctions in mobility between age groups when commuting and other work-related trips are excluded from the analysis.

Although the literature has distinguished between 'young' and 'older' older people based on mobility patterns (Noble, 2000, Alsnih and Hensher, 2003), there are significant differences between each of the older age groups. It may be more appropriate to further segment this group as follows. Those aged 60-69 may be considered as 'younger' older people, given that mobility has increased over time amongst this age group and is similar to those of the middle-aged groups (i.e. 30-59 years). It may be more appropriate to class those aged 70-79 as 'middle-aged' older people, given that their mobility is significantly less than those aged 60-69, yet is still significantly higher than those aged 80 and over. Given that mobility drops sharply amongst those aged 80 and over, they could be considered as 'older' older people, based on their mobility levels.

The findings suggest that gender differences in mobility are converging amongst the younger age groups, although these age groups have mobility levels similar to those of older age. Increased use of telecommunications technology amongst younger age groups could be changing the nature of trip-making (Lyons and Urry, 2005, Jain and Lyons, 2008), whereby some services that once necessitated a trip are now possible to access virtually, such as online banking (Kenyon et al., 2003, Lyons and Kenyon, 2003).

Gender differences are also evident in demographic trends in relation to family formation, partnership dissolution and re-partnering (Demey et al., 2011). Such trends could be leading to changes in activity patterns over time and therefore influencing mobility levels.

According to Demey et al. (2011) those entering 'mid-life' and the beginning of older age at the beginning of the 21st century are less likely to have ever married, while an increasing proportion have ever divorced and/or ever remarried. They are also more likely to have delayed having children, have fewer children and to remain childless. There have also been changes in living arrangements across all age groups since the mid-1980s. Gender differences in transport arose due to the complex trip-chains that women as employers and carers of children made, which led to the production of this gender divide (Turner and Niemeier, 1997, Sarmiento, 2000, Pooley et al., 2005b, Rosenbloom, 2006).

Demey et al. (2011) note that amongst younger people aged around 20-44 there has been a decrease in the proportion of those living with a partner and having dependent children, yet an increase in the proportion of those living with a partner and without children. Women of this age are also likely to have higher levels of education to former cohorts of women, which also leads to delays in having children. Higher levels of education are also changing the nature of jobs women have, which combined with delays in, or even foregoing, childbirth, the mobility of younger female cohorts may be similar to men in the future.

Demographic trends are also likely to be contributing to changing lifestyles amongst older people. With an increasing proportion of older people in society there will be greater variation of lifestyles amongst this population group. Due to this heterogeneity, greater refinement of segmenting older people is required to identify different mobility patterns. Segmentation based on mobility characteristics, as opposed to chronological age, may be more appropriate, particularly in relation to policy responses. Of course, groups cannot be completely generalised as there are other factors involved in mobility behaviour (such as income and health), however, changes in mobility over time could be attributed to changing demographic trends which impact differently on cohorts in terms of lifestyles, activity patterns and in turn, mobility levels.

Refinement is required to ascertain whether change in travel behaviour among the older population is due to 'ageing' occurring at a later stage compared to previous generations of older people. This may in part be due to a later physical ageing effect as a result of improvements in health (Christensen et al., 2009), as well as a gender effect due to changing demographic trends (Pierret, 2006, Demey et al., 2011). Historical forces may have had specific impacts on the cohorts included in this study that are contributing to longer run changes in mobility for those not in the workforce.

As distance travelled increased amongst all older cohorts from 1995-2008, the findings suggest that mobility transitions amongst older people are due to an interface of period and cohort effects. It should be remembered that the members of the age groups change over time due to the ageing of birth cohorts. Members from different cohort groups are moving in and out of the age groups over time. As a result, the social make-up of age groups is not constant over time due to the ageing of the cohort groups, which experience different social and historical contexts to each other (Ryder, 1965). To develop further insight into how mobility of older people is changing over time, it is important to consider how the mobility of cohort groups is changing over time as they age. The following section of descriptive analysis considers differences in mobility between and within cohorts over time.

5.3.2. Descriptive Results by Cohort Group

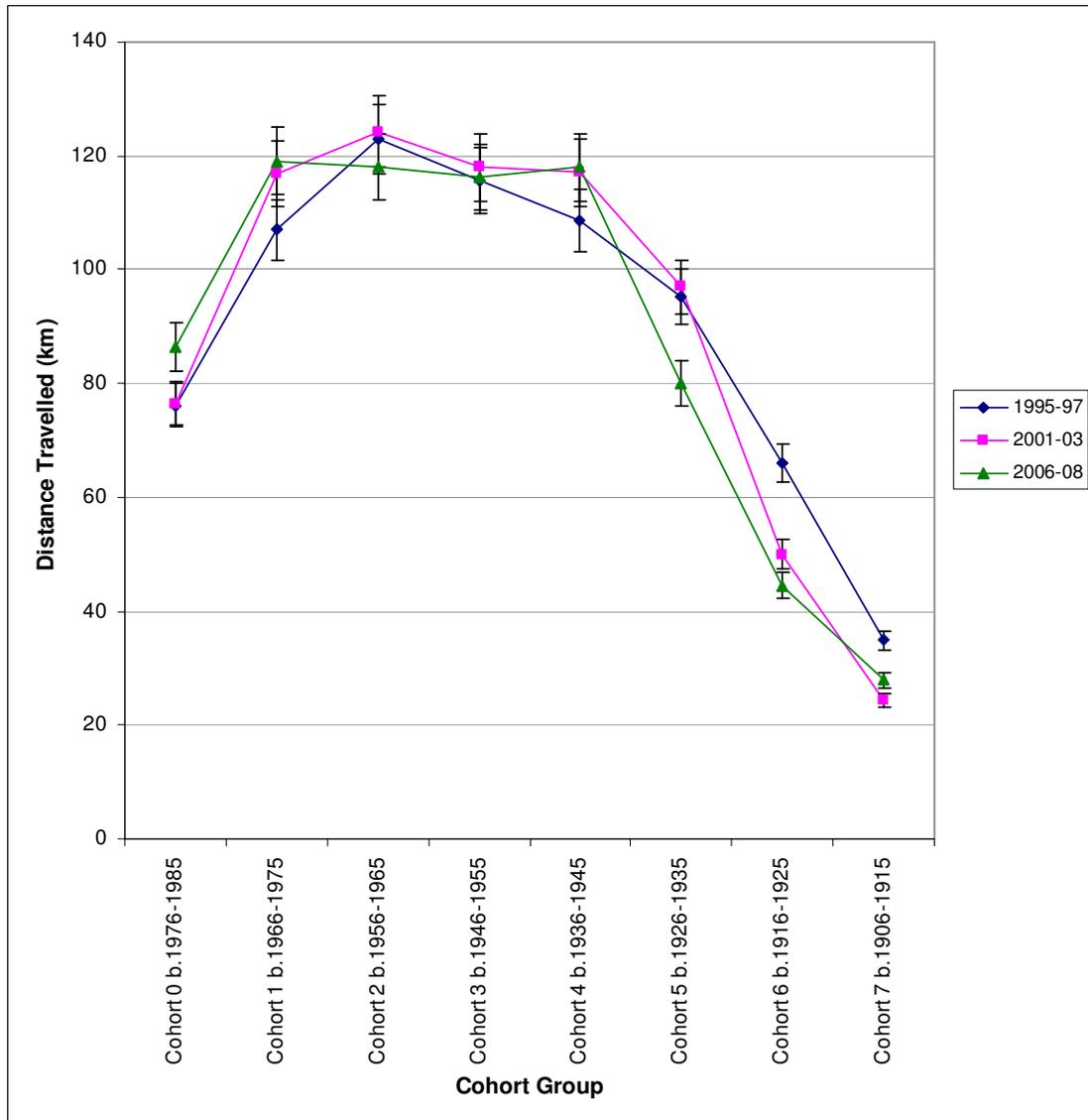
Pseudo birth cohorts have been created from the NTS, which enables cohort groups to be tracked over time. However, as the NTS is a repeated cross-sectional survey, different people are surveyed each year therefore the samples are composed of sets of individuals which differ from year to year (Micklewright, 1994). In order to give an indication of the interaction between cohort and age effects Table 5.1 outlines the age of the cohort groups at different years. The relative size of each cohort inevitably changes over time with older cohorts becoming smaller over time as members pass away.

Table 5.1: Age of cohort groups at different years

Cohort Group	1995	1997	2001	2003	2006	2008
0. Generation Y (b.1976-85)	10-19	12-21	16-25	18-27	21-30	23-32
1. Generation X (b.1966-75)	20-29	22-31	26-35	28-37	31-40	33-42
2. 1960s Boomers (b.1956-65)	30-39	32-41	36-45	38-47	41-50	43-52
3. Post-War Boomers (b. 1946-55)	40-49	42-51	46-55	48-57	51-60	53-62
4. World War II (b. 1936-45)	50-59	52-61	56-65	58-67	61-70	63-72
5. Great Depression (b. 1926-35)	60-69	62-71	66-75	68-77	71-80	73-82
6. Parents of Boomers (b.1916-25)	70-79	72-81	76-85	78-87	81-90	83-92
7. Grandparents of Boomers (b.1906-15)	80-89	82-91	86-95	88-97	91-100	91-102

Figure 5.8 presents the median distance travelled by birth cohort and the 3-year moving average for three time points, excluding distance travelled for commuting, business and education trips purposes along with 95% confidence intervals.

Figure 5.8: **Median** distance travelled per week (km) **excluding** commuting, business and education trips by **cohort** group from 1995-2008 (3-year moving averages with 95% confidence intervals)



When examining changes in mobility from a cohort perspective, a slightly different pattern emerges, compared to that of age groups. Unlike the youngest age groups, where distance travelled declined over time, significant increases in distance travelled were observed amongst the youngest cohorts, Generation Y (b.1976-1985) and Generation X (b.1966-1975) from 1995-2008. The reverse is true for the older birth cohorts.

A decline in mobility was observed over time for the three oldest cohorts in the analysis: the Great Depression cohort (b.1926-1935) and the cohorts who are the Parents and Grandparents of the Boomers (b.1916-1925 and b.1906-1915 respectively). However, the older age groups demonstrate increases in distance travelled over time.

There are changes over time which alters the differences in mobility between the cohort groups. In 1995-97 and 2001-03 the 1960s Boomer cohort (b.1956-1965) had the highest mobility levels of 123km and 124.3km distance travelled per week, respectively. However, in 2006-08 the mobility of the Generation X (b.1966-1975), 1960s Boomers (b.1956-1965), Post-War Boomers (b.1946-1955) and World War II (b.1936-1945) cohorts was very similar at just under 120km per week.

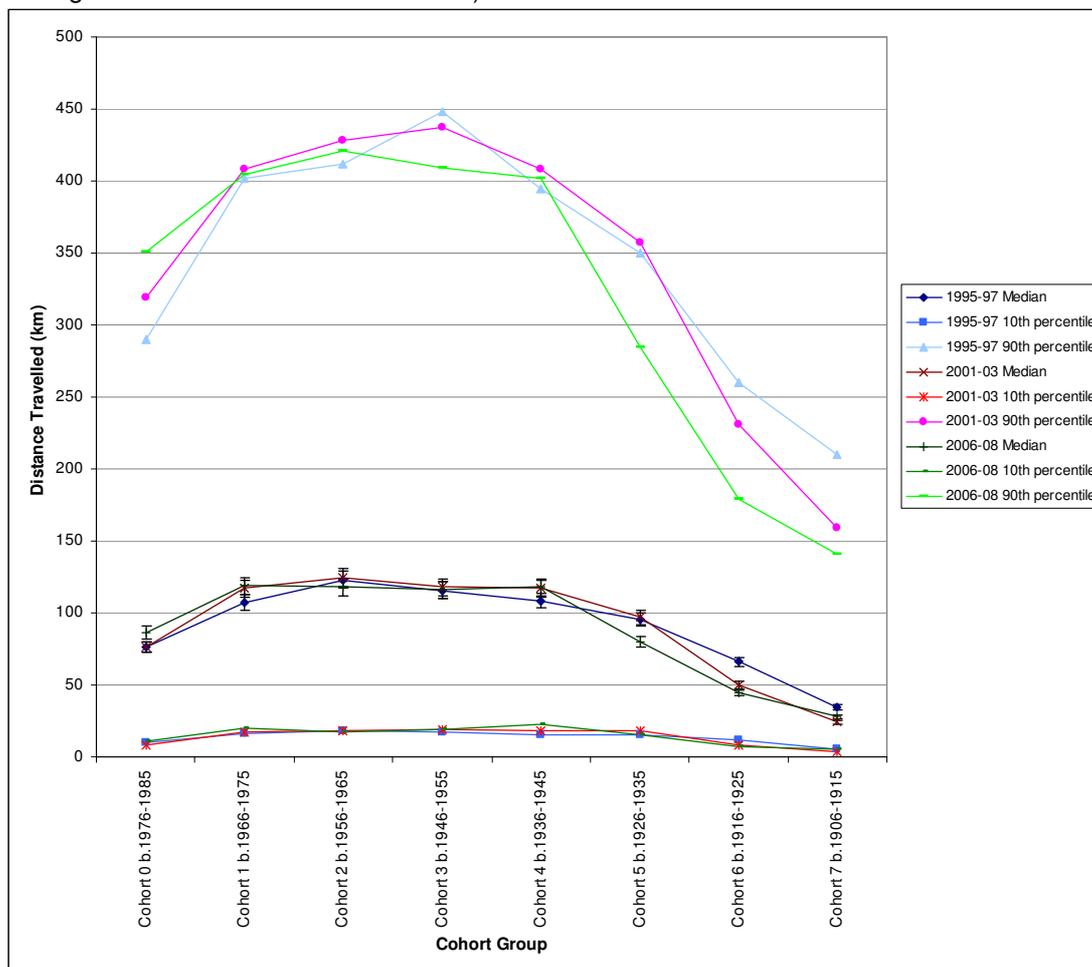
Distance travelled amongst the 1960s Boomers (b.1956-1965) and Post-War Boomers (b.1946-1955) cohorts have remained relatively constant over time from 1995-2008. The older cohort groups have the lowest mobility. The mobility of the Great Depression cohort (b.1926-1935) and the Parents and Grandparents of the Boomers (b.1916-1925 and b.1906-1915 respectively) has declined significantly over time from 1995-2008.

In particular, the Parents and Grandparents of the Boomers display significant reductions in distance travelled as they age over time. Amongst the Parents of the Boomers (b.1916-1925) distance travelled falls from 66km per week in 1995-97 to 50km in 2001-03. Members of this cohort age from 70-81 to 76-87 over this time span.

The previous analysis, which compared distance travelled between age groups, found that mobility levels fell sharply after the age of 80. Findings from Figure 5.8 suggest that age effects are present as the mobility of the older cohorts declines over time, as they also become older.

Figure 5.9 presents the median distance travelled as well as the 10th and 90th percentile distance travelled for each cohort group to ascertain if changes in mobility amongst the most mobile and immobile people are influencing mobility patterns at the aggregate level. 3-year moving averages have been derived and trips made for commuting, business and education have been excluded and 95% confidence levels have been plotted.

Figure 5.9: **Median, 10th and 90th percentile** distance travelled per week (km) **excluding** commuting, business and education trips by **cohort group** from 1995-2008 (3-year moving averages with 95% confidence intervals)



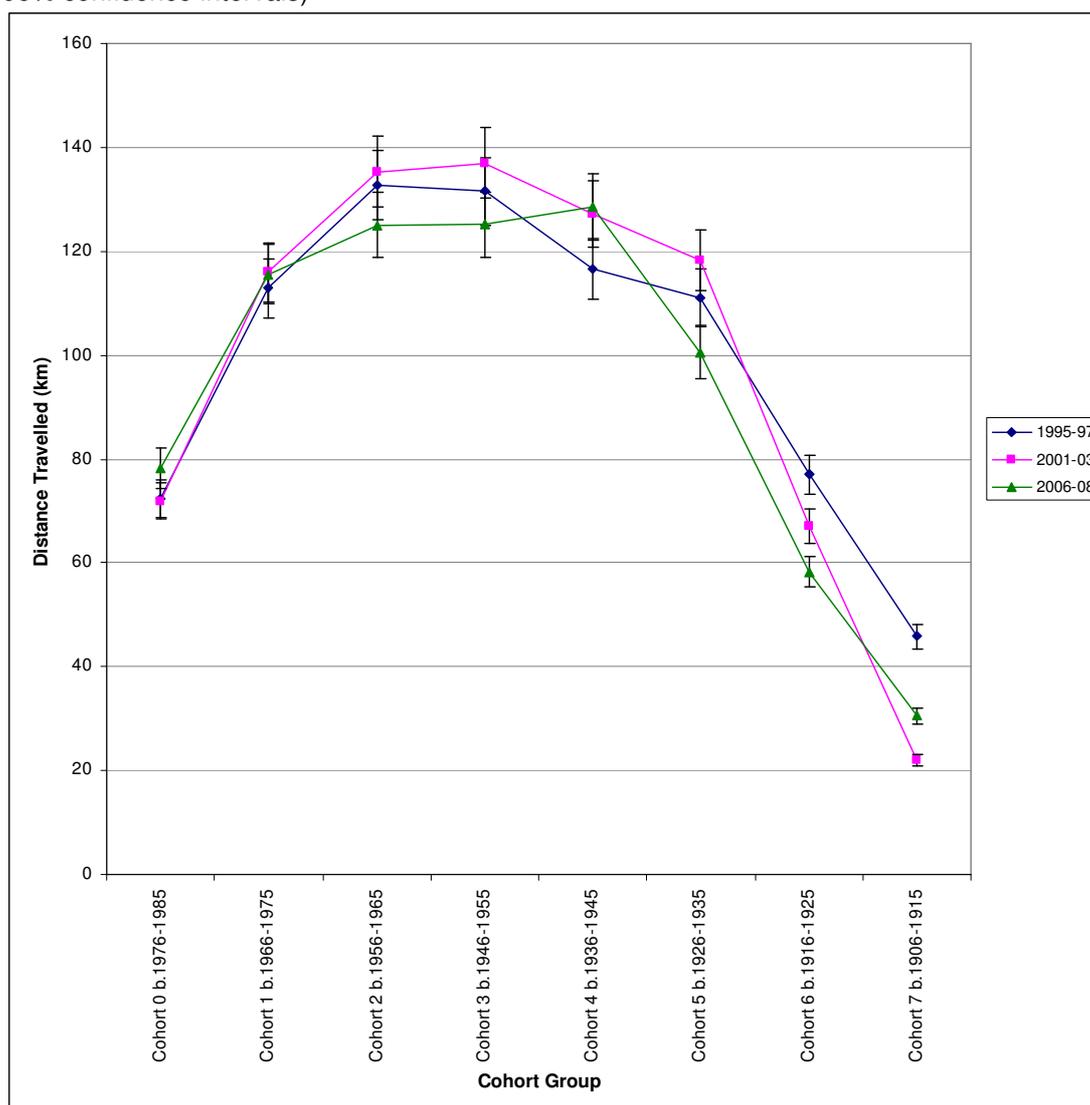
In Figure 5.9 increases in distance travelled over time are observed amongst younger cohorts, in contrast to the younger age groups in the previous section where declining mobility over time was observed. Declining mobility over time is observed for the older cohorts in Figure 5.9; however, the older age groups displayed increasing mobility over time.

Figure 5.9 shows that the 90th and 10th percentiles are similar to the median in relation to changes in mobility over time amongst the cohorts. This suggests that changes in distance travelled over time amongst the cohorts cannot be attributed to or driven by people with very high or low mobility.

5.3.2.1. Descriptive Results by Cohort Group and Gender

Given that gender differences in mobility exist as outlined previously, Figures 5.10 and 5.11 disaggregates the analysis by cohort group and gender. Median distance travelled, excluding commuting, business and education trips, has been plotted for males and females respectively. 3-year moving averages and 95% confidence intervals have also been plotted.

Figure 5.10: **Median** distance travelled per week (km) **excluding** commuting, business and education trips amongst **men** by **cohort group** from 1995-2008 (3-year moving averages with 95% confidence intervals)



The majority of male birth cohorts in the analysis have relatively constant mobility levels over time, with the exception of the two oldest cohorts in the analysis: the Parents and Grandparents of the Boomers (b.1916-1925 and b.1906-1915 respectively).

However, there are significant differences between some of the cohort groups. Generation Y (b.1976-1985) has the lowest mobility levels, compared to the cohorts born from 1926-1975. Rather, Generation Y (b.1976-1985) has similar mobility levels to the Parents of the Boomers (b.1916-1925) from 1995-2003. This replicates a similar pattern observed in the descriptive analysis comparing age groups: the youngest age groups had similar levels of distance travelled to the older age groups.

From 1995-2003 the Post-War Boomers (b.1946-1955) and the World War II cohort (b.1936-1945) had similar mobility patterns as distance travelled increased. After this time point,

mobility declined amongst the Post-War Boomers, although not significantly, whilst it remained constant for the World War II cohort.

The three oldest cohorts in the analysis, the Great Depression cohorts (b.1926-1935) and the Parents and Grandparents of the Boomers (b.1916-1925 and b.1906-1915), are statistically different from one another in terms of distance travelled, with mobility lower with each former cohort.

Mobility declined significantly amongst the Parents and Grandparents of the Boomer cohort from 1995-2008. However, rather interestingly, distance travelled significantly increased amongst men belonging to the Grandparents of the Boomer cohort from 2001-2008. As this cohort has aged during this time, this is a surprising result as previous findings suggested that mobility declined with age.

However, as pseudo cohorts have been constructed from a repeated cross-sectional survey, the people surveyed in these surveys will be different over time. As the relative size of this cohort group declines over time as people pass away, the members that remain may have extreme mobility as they are still living in households, perhaps with others who are able to provide assistance, or greater support networks.

Men that belonged to this cohort group and were surveyed in 2006-08 were perhaps healthier and more active than members of the cohort group that were interviewed in previous years. These people may also be healthier than others given developments in medicine and healthcare as well as increased awareness of the early symptoms of illness. It is difficult to distinguish whether people living to an older age can be attributed to a survival effect or a care effect as a result of living arrangements or support networks and receiving care from their children. It may also be a combination of the effects or the reinforcing of one effect on another. In other words as a result of receiving care from others, medical attention can be sought when required and thus enable people to live longer.

Figure 5.11: **Median** distance travelled per week (km) **excluding** commuting, business and education trips amongst **women** by **cohort group** from 1995-2008 (3-year moving averages with 95% confidence intervals)

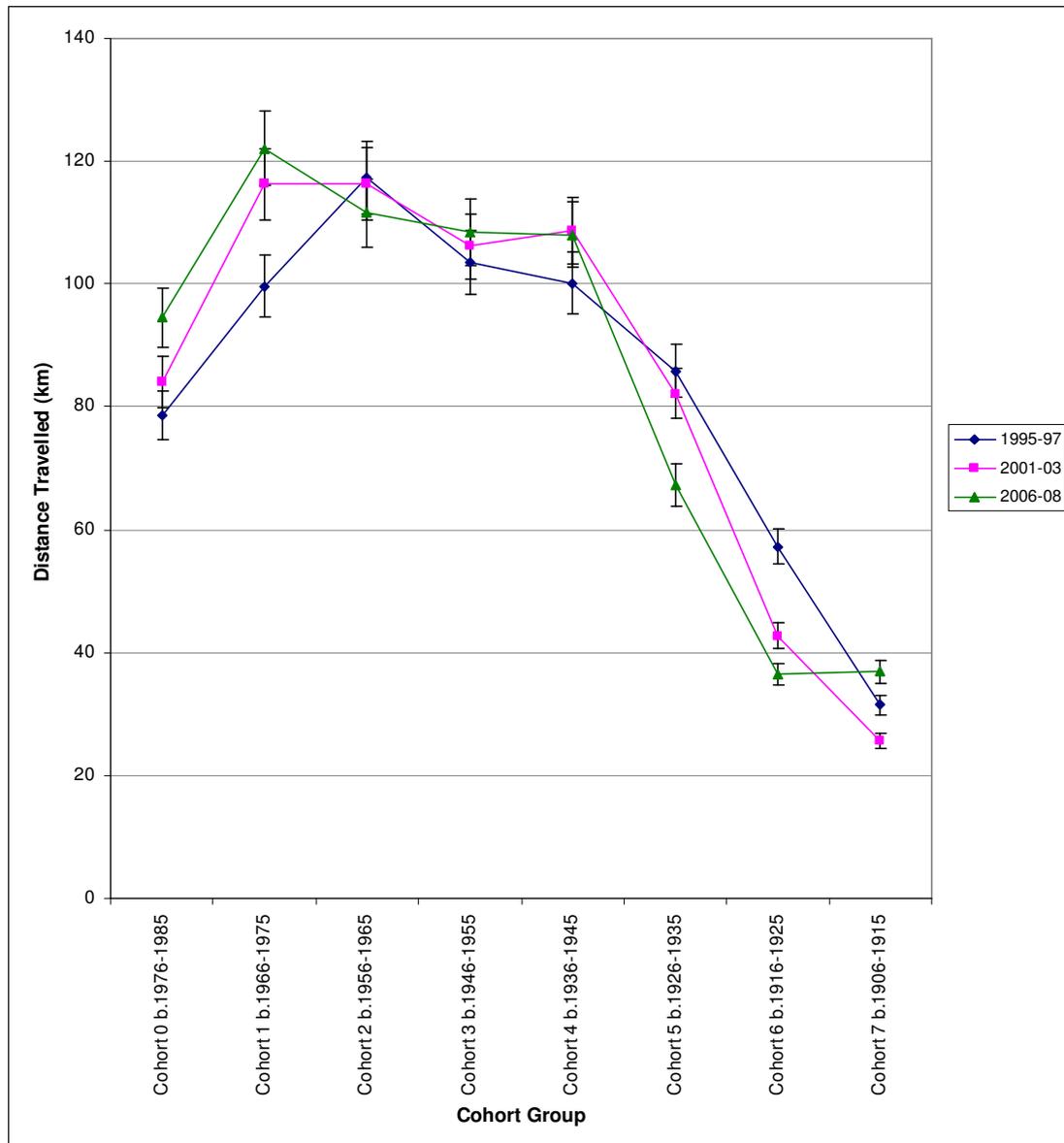


Figure 5.11 presents median distance travelled by female cohort groups. Greater fluctuations in mobility patterns are observed compared to male cohorts.

Women tend to have lower mobility levels in terms of distance travelled, compared to men, particularly amongst the 1960s and Post-War Boomers (b.1956-1965 and b.1946-1955), the World War II and Great Depression cohorts (b.1936-1945 and b.1926-1935), and the Parents and Grandparents of the Boomers (b.1916-1925 and b.1906-1915). Generally, there have been declines in mobility amongst these cohort groups over time, with a few exceptions.

Distance travelled has increased significantly over time from 1995-2008 amongst women belonging to the youngest cohorts in the analysis, Generation Y and X (b.1976-1985 and b.1966-1975).

Women belonging to the Post-War Boomers (b.1946-1955) and the World War II cohort (b.1936-1945) have similar levels of mobility, which have remained relatively constant over time. In 1995-97, the 1960 Boomers (b.1956-1965) had the highest levels of mobility. However, over time subsequent cohorts have higher levels of mobility. In 2001-03 and 2006-08 mobility was highest amongst Generation X (b.1966-1975).

The older female cohorts groups display similar mobility trends to their male counterparts. Women belonging to the Great Depression (b.1926-1935) have higher levels of mobility compared to the Parents and Grandparents of the Boomers (b.1916-1925 and b.1906-1915). However, over time as these cohorts have aged, mobility has declined which suggests that age effects could be coming into effect. This is in line with the previous descriptive analysis which compared distance travelled between age groups. Distance travelled was observed to decline with each older age group.

Somewhat unexpectedly, women belonging to the Grandparents of the Boomers (b.1906-1915) display a contradictory pattern of mobility to that which is suggested by age effects. Distance travelled significantly increased over time and in 2006-08 had higher mobility, above that of 1995-97 levels, and a significantly dramatic increase since 2001-03. A similar pattern was observed in Figure 5.10 amongst men of this cohort. As pseudo cohorts have been constructed from a repeated cross-sectional survey, different interviewees are sampled in each year and therefore a similar explanation can be offered up to explain this result: women belonging to this cohort surveyed in 2006-08 are perhaps healthier and more active compared to those interviewed in previous years.

The mobility trends of women belonging to the Generation Y and X cohorts (b.1976-1985 and b.1966-1975) are interesting as distance travelled has risen dramatically compared to their male counterparts whose levels of distance travelled has remained relatively constant over time. This suggests that gender differences in mobility are converging amongst subsequent cohorts.

Figure 5.12: **Median** distance travelled per week (km) **excluding** commuting, business and education trips by **gender** and **cohort group** from 1995-2008 (3-year moving averages with 95% confidence intervals)

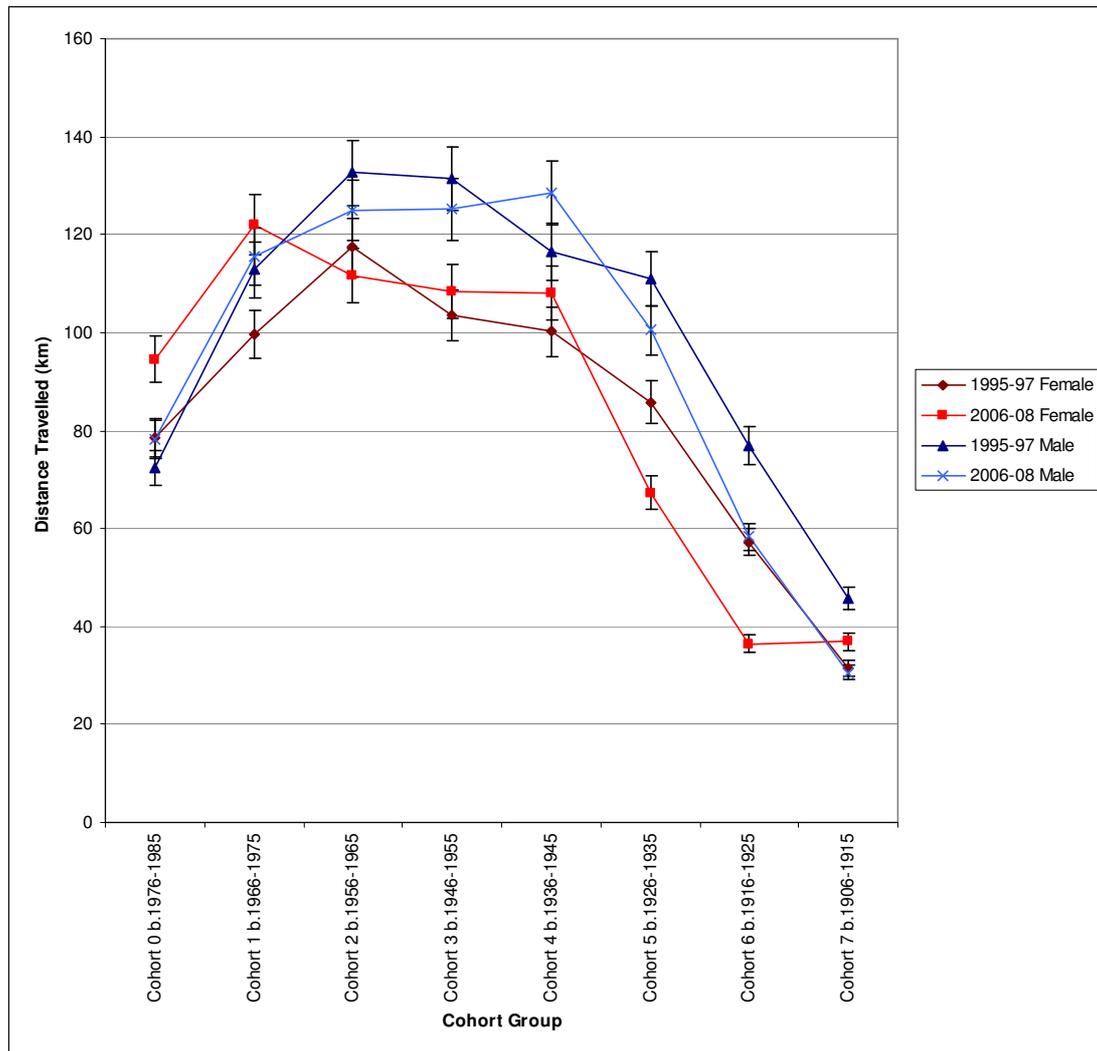


Figure 5.12 presents the median distance travelled by cohort group by gender. Men belonging to the 1960s and Post-War Boomers (b.1956-1965 and b.1946-1955), the World War II and Great Depression cohorts (b.1936-1945 and b.1926-1935), and the Parents and Grandparents of the Boomers (b.1916-1925 and b.1906-1915) have higher levels of mobility compared to women of these cohorts. In stark contrast women belonging to Generation Y and X (b.1976-1985 and b.1966-1975) travelled further than their male counterparts in 2006-08.

These findings suggest that the gender gap in mobility is converging and perhaps even changing nature as women of younger cohorts are travelling further than men. Distance travelled has increased dramatically from 1995-2008 amongst women belonging to Generation X (b.1966-1975) as it was below that of their male counterparts at 99.7km per week but increased to 122.1km per week; greater than the distance travelled by men of this cohort.

The gender gap in mobility is consistent over time amongst the Great Depression cohort (b.1926-1935). Whilst distance travelled has declined from 1995-2008 for both men and women, women still have lower levels of mobility in terms of distance travelled.

Amongst the Post-War Boomers (b.1946-1955), distance travelled fell amongst men from 1995-2008, however, for women belonging to this cohort distance travelled increased over the same time span suggesting that the gender divide is converging for this cohort. Women of this cohort will display different mobility patterns in older age, compared to former cohorts of older women.

5.3.2.2. Summary of Descriptive Results by Cohort Group

Current cohorts of older people including the Great Depression cohort (b.1926-1935) and the Parents and Grandparents of the Boomers (b.1916-1925 and b.1906-1915) have the lowest levels of mobility. The findings suggest that distance travelled declines sharply with each former cohort group. From 1995-2008, distance travelled also declined amongst these cohorts. These findings are in line with the descriptive results that compared distance travelled by age groups, as the older the age group, the lower the distance travelled.

The descriptive analysis comparing the mobility of cohort groups suggests cohort effects are present, as there are significant differences in mobility between them. In addition, age effects are also present as mobility changes as the cohorts age.

The analysis also observed that the 1960s and Post-War Boomer cohorts (b.1956-1965 and b.1946-1955) had the highest levels of mobility in terms of distance travelled. The World War II cohort (b.1936-1945) also displayed similar levels of mobility to the Boomer cohorts.

An unexpected finding is observed amongst the Grandparents of the Boomers (b.1906-1915). Mobility trends differ from other older cohorts as distance travelled increased in 2006-08 for both men and women. The increase in distance travelled is much more marked for women than for men, so much so that distance travelled increased significantly above 1995-97 levels. For men, distance travelled increased significantly above 2001-03 levels. This is an interesting result as it would appear that as people age, distance travelled declines. However, due to the construction of pseudo cohorts and the nature of a repeated cross-sectional data, as different respondents are surveyed each year, members of this cohort that are surveyed in more recent years may be healthier and therefore more mobile compared to previous participants in the survey of the same cohort.

In general, men have higher levels of mobility in terms of distance travelled, compared to women. However, the findings suggest that this gender divide in mobility is converging, in

particular amongst the Generation Y and X cohorts (b.1976-1985 and b.1966-1975). Although distance travelled has remained relatively constant amongst men belonging to Generation Y, amongst women distance travelled increased significantly and they were travelling further than men in 2006-08. Distance travelled amongst Generation X men also remained relatively constant, but for women distance travelled increased over time to the same level as their male counterparts.

It is also important to consider mobility as the cohorts age over time. Considering the mobility of the age of cohort groups over time suggests that differential ageing effects are present. According to the descriptive analysis on the mobility of age groups, those aged 60-69 had similar levels of mobility to those aged 30-59. This suggests that there will be a continuation or extension of higher mobility associated with 'middle-age' into older age due to a cohort effect as the Post-War Boomers (b.1946-1955) have higher levels of mobility. The next section compares the distance travelled of cohort groups at different ages to draw further conclusions about how mobility may change over time amongst the older population.

5.3.3. Comparing Distance Travelled Between Cohorts at the Same Age

The following tables compare the median distance travelled excluding commuting, business and education trips between the cohort groups when they were at the same age. Tables 5.2 and 5.3 present the sample size of the different cohort and age groups. There is almost double the number of female respondents belonging to the Grandparents of the Boomers compared to males, presumably as women tend to have higher life expectancies compared to men (ECMT, 2000, Matheson, 2010). Each cohort group tends to make up the majority of particular age groups. Caution should be taken when interpreting some of the results as the sample sizes for the cohort groups varies considerably when exploring the mobility of age groups.

Table 5.2: Number of **male** respondents by age and cohort group

	19 and under	20-29	30-39	40-49	50-59	60-69	70-79	80 and over
Generation Y b.1976-1985	1681	5949	627					
Generation X b.1966-1975		2680	8451	815				
1960s Boom b.1956-1965			3481	8858	746			
Post-war Boom b.1946-1955				3055	8128	801		
World War II b.1936-1945					2683	6720	511	
Depression b.1926-1935						2325	4865	280
Boom Parents b.1916-1925							1540	1889
Grandparents b.1906-1915								533

Table 5.3: Number of **female** respondents by age and cohort group

	19 and under	20-29	30-39	40-49	50-59	60-69	70-79	80 and over
Generation Y b.1976-1985	1707	6895	715					
Generation X b.1966-1975		3045	9277	871				
1960s Boom b.1956-1965			3866	9440	789			
Post-war Boom b.1946-1955				3262	8665	867		
World War II b.1936-1945					2913	7250	591	
Depression b.1926-1935						2445	5671	394
Boom Parents b.1916-1925							2027	2889
Grandparents b.1906-1915								1138

Table 5.4 and 5.5 present median distance travelled for men and women respectively. These tables permit comparison for the same cohort by reading across the rows and for each age group over time by reading the columns vertically.

Table 5.4: **Median** distance travelled per week (km) **excluding** commuting, business and education trips amongst **men** by **age** and **cohort group** for all years 1995-2008

	19 and under	20-29	30-39	40-49	50-59	60-69	70-79	80 and over
Generation Y b.1976-1985	61.51	77.25	92.59					
Generation X b.1966-1975		107.27	117.08	127.14				
1960s Boom b.1956-1965			133.53	130.33	119.57			
Post-war Boom b.1946-1955				139.05	130.16	117.70		
World War II b.1936-1945					126.98	127.52	125.53	
Depression b.1926-1935						123.94	107.02	65.98
Boom Parents b.1916-1925							78.54	60.35
Grandparents b.1906-1915								32.19

Across all male cohort and age groups, those belonging to the Post-War Boomers (b.1946-1955) aged 40-49 had the highest level of mobility with a median distance of 139.05km. Distance travelled increases amongst men belonging to the cohorts Generation Y and X (b.1976-1985 and b.1966-1975) as they age. For the older cohorts the reverse is true; distance travelled declines as they age. Given the number of years for which data is available, the comparisons can only be made for three age groupings at a time.

By contrast, reading the table by columns indicates a less obvious pattern when comparing median distance by age groups over time. For the 20-29, 30-39 and 40-49 age groups distance travelled is lower for subsequent cohorts. For those aged 70-79 and 80 and over distance travelled increases for subsequent cohorts.

The difficult groups to analyse are the 50-59 and the 60-69 age groups. The Post-War Boomers (b.1946-1955) aged 50-59 years had the highest distance travelled compared to other cohorts of this age. The World War II cohort (b.1936-1945) had the highest distance travelled of the 60-69 age group. For these age groups, the last few years have been ones of significant change in changing demography of 'mid-life' in relation to marriage, leading to changes in personal living arrangements. There have been larger increases in the proportion living alone amongst middle and older age for men than for women (Demey et al., 2011).

Table 5.5 provides the same comparisons as in Table 5.4 but for women.

Table 5.5: **Median** distance travelled per week (km) **excluding** commuting, business and education trips amongst **women** by **age** and **cohort group** for all years 1995-2008

	19 and under	20-29	30-39	40-49	50-59	60-69	70-79	80 and over
Generation Y b.1976-1985	70.17	91.50	106.22					
Generation X b.1966-1975		100.14	121.87	119.94				
1960s Boom b.1956-1965			116.68	116.91	102.04			
Post-war Boom b.1946-1955				108.28	106.22	126.01		
World War II b.1936-1945					99.78	109.92	100.66	
Depression b.1926-1935						89.48	74.03	51.18
Boom Parents b.1916-1925							55.52	38.62
Grandparents b.1906-1915								27.36

Across all cohort and age groups, women belonging to Generation X (b.1966-1975) aged 30-39 years had the highest mobility with a median distance travelled of 121.87km. Distance travelled has increased amongst women belonging to Generation Y (b.1976-1985) and Generation X (b.1966-1975) as they have aged. A decline in distance travel is observed amongst former cohorts as they are also of an older age in the above table.

When reading the table by columns there is a mixed picture for women. Women belonging to Generation X (b.1966-1975) have the highest mobility of the 20-29, 30-39 and the 40-49 age groups. Among the 50-59 and 60-69 age groups, women who are members of the Post-War Boomers (b.1946-1955) have the highest mobility. These results suggest that the Post-War Boomers (b.1946-1955) are very different to former cohorts of older women in terms of mobility. The same also applies to Generation X (b.1966-1975) in that they also differ from former cohorts in terms of their mobility. It is difficult to establish whether they are similar to each other as the results only suggest that they are different from former cohort groups of women. As with males, the changing demography of this 'mid-life' stage could partially explain some of the changes seen in mobility.

Demey et al. (2011) suggests that women of 'mid-life' and older age at the start of the 21st century are more likely to have delayed having children, have fewer children and to remain childless. There has also been a considerable increase over time in the proportion of women living with a partner and without children in old age, whilst there has been little change among men. There were also more female lone parents with dependent children in 2007 than in 1984 (especially among 40-49 year olds).

Table 5.6 compares median distance travelled between men and women across age groups and birth cohorts.

Table 5.6: **Difference** in **median** distance travelled per week (km) between men and women **excluding** commuting, business and education trips by **age** and **cohort** group for all years 1995-2008

	19 and under	20-29	30-39	40-49	50-59	60-69	70-79	80 and over
Generation Y b.1976-1985	-8.66	-14.25	-13.63					
Generation X b.1966-1975		7.13	-4.79	7.2				
1960s Boom b.1956-1965			16.85	13.42	17.53			
Post-war Boom b.1946-1955				30.77	23.94	-8.31		
World War II b.1936-1945					27.2	17.6	24.87	
Depression b.1926-1935						34.46	32.99	14.8
Boom Parents b.1916-1925							23.02	21.73
Grandparents b.1906-1915								4.83

When comparing median distance travelled between men and women across all age and cohort groups, with the exception of Generation Y (b.1976-1985), men travel further than women. Women belonging to Generation Y (b.1976-1985) travel further than their male counterparts across all age groups. Women belonging to Generation X (b.1966-1975) also travel further than their male counterparts at 30-39 years, although men belonging to this cohort travel further at age 40-49 years.

Table 5.6 indicates that there are gender differences in mobility in terms of distance travelled; however, this gap is narrowing with each subsequent cohort. This suggests that when these younger cohorts are of older age, the gender divide in mobility may not exist to the extent that it does at present.

It is also important to consider the moment in time that the age groups and birth cohorts have been analysed. As previous discussion highlighted that the first wave of the Boomer cohort are beginning to contribute to the increasing proportion of older people in society, the two Boomer cohorts will be used to illustrate the implications of this analysis.

Firstly considering the 1960s Boomers (b.1956-1965), this cohort were aged 30-39/32-41 years in 1995-97 to 41-50/43-52 years in 2006-08. The descriptive analysis of the age groups identified that it was between the ages of 30-59 at which distance travelled peaked. The high

mobility displayed by the cohort group could be a result of the age at which this cohort happens to be at the time of the study.

Given that commuting, business and education trips were excluded from the analysis, distance travelled for all other activities is higher than that of younger and older people. Those that are currently of 'mid-life' stage (defined by Demey et al., (2011) as those aged 45-64) have also been termed a 'sandwich generation' as they are likely to have dual caring responsibilities for older parents and (grand) children simultaneously (Agree et al., 2003, Evandrou and Glaser, 2004, Pierret, 2006, Demey et al., 2011).

The Post-War Boomers (b.1946-1955) are also aged 40-49 in 1995-97, the age at which distance travelled is the highest compared to the other cohort groups. Interestingly, they start to contribute to the 60-69 age group in 2006-08, the time at which increases in distance travelled were observed for this age group. This suggests that the Post-War Boomers are contributing to the increasing mobility of this 'younger old' population (those aged 60-69). Similarly for the World War II cohort (b.1936-1945), as they have similar mobility to the post-war Boomer cohort, they are starting to contribute to the increasing mobility of the 70-79 year olds in 2006-08.

Descriptive analysis has been carried out to identify and tease out some of the age, cohort and period effects. The different effects are intertwined and it is difficult to determine exactly how they are being played out in the changing travel behaviour of older people. Therefore, it will be necessary to carry out further statistical testing using a multiple regression model.

5.3.4. Multiple Regression Analysis

Using descriptive analysis, the effect of age and cohort has been explored in relation to changing mobility over time. The descriptive results indicate that age and cohort effects are present in the changing mobility of older people. In order to delve further into examining these effects, multiple regression analysis can assist in explaining the magnitude of these effects on changing travel behaviour, in particular period effects, which cannot be clearly deciphered from the descriptive results alone.

Multiple regression models can be used to explore the effect of different variables on a particular outcome, in this instance distance travelled as an indicator of mobility. In addition to age, period and cohort effects there are other factors which can influence mobility. These can also be controlled for in the regression model.

In order to assess the magnitude of age, period and cohort effects on distance travelled the following variables have been used as a way to control for these particular effects. Survey

year has been used to control for period effects. By examining how distance travelled has changed by year, inferences as to how particular events have influenced mobility can be made. Age group and cohort group have been used as ways of looking at the age and cohort effects respectively. This will establish how age groups and cohort groups differ. As demonstrated by the findings and existing literature, there are gender differences in distance travelled (Pooley et al., 2005b, Rosenbloom, 2006). Therefore, the regression models have been run separately for men and women to draw further conclusions regarding the similarities or discrepancies in the distance travelled between them.

There are a variety of different factors considered most pertinent when examining mobility, particularly in relation to older people. These include: household income; residential area type, for example large urban or remote rural; driving licence holdership; household car access and household structure. These variables will also be controlled for in the multiple regression models.

Very broadly, there are two main factors that heavily influence transport mode choice: time taken and cost of transport. Income can restrain travel choices given that travel by different modes varies by cost. People tend to make a trade-off between the time incurred by using a particular mode and the cost of using it. This is otherwise known as the value of travel time (Wardman, 1998, Hensher, 2001). Given that income has a major role in transport mode choice and resulting influence on travel patterns, income should be controlled for in the multiple regression models. However, as the NTS does not contain a variable for income a proxy variable measure is used. Socioeconomic group has been chosen as this can give an indication of the relative income of an individual.

Residential area type will also influence mobility. Public transport service provision varies geographically, as well as differences in the location of goods, services and amenities in relation to residence. This has an influence on mode choice and the distances people have to travel. Different age groups broadly tend to reside in different locations from each other. For example, there tends to be an out-migration of younger people from rural places towards inner-city and urban living, whilst older people may move to rural or coastal areas during retirement (Atterton, 2006, Champion and Shepherd, 2006, Uren and Goldring, 2007, Bayliss and Sly, 2010).

As previously discussed, transport systems in the UK are greatly organised around the private car. Relatively low costs of motoring, compared to rising public transport fares above the rate of inflation, have encouraged car use. Car users tend to travel more frequently and further distances compared to users of alternative modes (Pooley et al., 2005b, Lucas and Jones, 2009). To control for car access in the regression model, a binary variable has been created to indicate household car access. It has also been highlighted that there is an increasing rate

of driving licence holding amongst older people, particularly women. Although reduced rates of driving licence holding have been observed amongst current cohorts of younger people, a binary variable has also been created to reflect driving licence holding.

It is thought that as an ageing population develops, there will be a greater proportion of people living in single households (Glaser, 1997, Demey et al., 2011). Household structure can influence mobility patterns as larger households may have more complex trip-making patterns than those in single households. There may also be a greater support network in households with multiple generations.

Distance travelled is the dependent variable in the multiple regression models, in line with the descriptive analysis. Commuting, business, and other work and education trip purposes were excluded from the analysis as there were no major differences in the pattern of mobility when they were included in the preceding descriptive analysis.

The results of the multiple regressions are presented in Table 5.7, which contains two multiple regression models for total distance travelled per week excluding trips made for commuting, business and education, disaggregated by gender.

Table 5.7: **Multiple linear regression** model of distance travelled per week (km) **excluding** commuting, business and education trips controlling for: year, cohort group and age group; socioeconomic group; area type; driving licence; vehicle access and household structure

	1. Survey year, birth cohort, age group, socioeconomic group, area type, driving licence, car access, HH structure for Males only			2. As 1 for Females only		
	Coef.	Confidence Interval Lower Upper		Coef.	Confidence Interval Lower Upper	
Year (1995 reference)						
1996	3.163	-6.357	12.683	-4.448	-12.378	3.482
1997	0.009	-9.661	9.678	1.582	-6.385	9.549
1998	-0.879	-10.766	9.008	-0.397	-8.558	7.764
1999	-1.159	-11.072	8.753	-4.815	-12.966	3.337
2000	2.148	-7.497	11.794	-2.672	-10.661	5.318
2001	-2.575	-12.295	7.146	-3.548	-11.521	4.425
2002	-4.783	-13.291	3.724	-0.438	-7.455	6.580
2003	-0.951	-9.434	7.532	-0.495	-7.489	6.498
2004	-6.805	-15.440	1.830	-5.214	-12.335	1.907
2005	-6.061	-14.796	2.674	-5.045	-12.245	2.155
2006	-9.873**	-18.774	-0.972	-5.243	-12.589	2.104
2007	-8.285*	-17.355	0.786	-5.602	-13.091	1.887
2008	-16.985***	-26.274	-7.696	-10.029***	-17.688	-2.370
Cohort (Post-war Boom b.1946-55)						
Generation Y (b.1976-85)	-29.825***	-43.603	-16.047	15.923***	4.430	27.417
Generation X (b.1966-75)	-5.885	-16.207	4.437	12.844***	4.157	21.532
1960s Boomers (b.1956-65)	-1.031	-8.195	6.134	4.489	-1.589	10.566
World War II (b.1936-45)	-2.895	-10.233	4.444	-2.310	-8.513	3.894
Great Depression (b.1926-35)	-16.093***	-27.344	-4.842	-15.988***	-25.437	-6.539
Parents of Boom (b.1916-25)	-34.990***	-50.604	-19.375	-28.879***	-41.587	-16.172
Grandparents (b.1906-15)	-38.699***	-62.624	-14.774	-37.072***	-54.178	-19.967
Age (Age 20-29 as reference)						
Age 30 – 39	-2.702	-10.291	4.887	4.365	-1.918	10.648
Age 40 – 49	4.302	-6.258	14.862	13.183***	4.378	21.988
Age 50 – 59	2.345	-11.222	15.912	10.324*	-1.049	21.697
Age 60 – 69	3.495	-14.161	21.150	19.090***	4.124	34.057
Age 70 – 79	-7.463	-28.261	13.335	7.771	-9.739	25.281
Age 80+	-30.554**	-55.421	-5.687	-9.735	-30.131	10.661
Soc-econ grp (Prof'l as reference)						
Clerical	-28.981***	-33.404	-24.558	-24.317***	-28.121	-20.513
Skilled manual	-88.704***	-93.103	-84.305	-53.747***	-57.799	-49.695
Other manual	-87.701***	-92.997	-82.405	-58.326***	-62.931	-53.721
Retired	-52.555***	-57.852	-47.258	-31.579***	-36.122	-27.035
Other econ inactive	-59.177***	-67.253	-51.102	-39.326***	-45.064	-33.588
Area Type (London as reference)						
Metropolitan	23.388***	17.900	28.875	16.706***	12.194	21.219
Urban > 250k	32.117***	26.710	37.525	22.170***	17.691	26.649
Urban 25-250K	37.232***	32.374	42.090	27.786***	23.777	31.794
Urban 3-25K	64.732***	59.567	69.896	56.250***	51.990	60.510
Rural	77.745***	72.012	83.477	80.194***	75.407	84.980
Driving Licence (No licence as ref)						
Has full driving licence	61.424***	56.725	66.124	63.810***	60.793	66.828
Motor access (No as reference)						
Yes - HH has access	60.934***	55.936	65.932	47.552***	43.804	51.299
HH Structure (Single 60+ as ref)						
Single HH 16-59	3.395	-7.500	14.289	-7.637*	-16.734	1.460
2 adults, at least 1 60+	-0.673	-7.400	6.054	-4.969**	-9.827	-0.111
2 adults, Hoh/HRP 16-59	-1.551	-11.845	8.743	-14.339***	-22.632	-6.045
3 or more adults	-16.568***	-26.106	-7.030	-26.953***	-34.702	-19.204
Single parent family	7.506	-17.426	32.438	-7.224	-16.860	2.411
2 adults, 1 child	-3.770	-14.755	7.215	-7.448	-16.447	1.550
2 adults, 2 children	-3.878	-14.795	7.040	-9.751**	-18.760	-0.741
2 adults, 3+ children	-12.560**	-24.925	-0.196	-16.632***	-26.961	-6.302
3 adults, 1+ children	-10.209*	-20.905	0.487	-25.409***	-34.187	-16.631
Constant	98.939	82.148	115.731	79.020	65.252	92.789
Number of observations	69695			77823		
R ²	0.1215			0.1335		

*** p<0.01 ** p<0.05 * p<0.1

To explore whether the variables included in the multiple regression are inter-correlated, which can cause problems, a sensitivity test on the variance inflation factors was carried out. The following variables demonstrate evidence of co-linearity with a value above 10 displayed in Table 5.8.

Table 5.8: Evidence of co-linearity in Table 5.7

Model 1. Males			Model 2. Females		
Variable	VIF	1/VIF	Variable	VIF	1/VIF
Age 70 – 79	20.63	0.048470	Age 70 – 79	22.52	0.044414
Age 60 – 69	20.17	0.049572	Age 60 – 69	20.27	0.049334
Age 50 – 59	13.59	0.073607	Age 80+	17.44	0.057329
Age 80+	12.35	0.080940	Age 50 – 59	13.34	0.074975
Gen Y b.1976 – 1985	10.58	0.094525	Gen Y b.1976 – 1985	10.74	0.093084
Mean VIF	4.73		Mean VIF	4.84	

To identify whether these were causing a problem in the analysis these variables were removed and the models were run again. The multiple regression results with these variables removed did not change dramatically. Therefore they have remained in the model as they are important in the explanation of the changing mobility of older people in relation to age, period and cohort effects.

5.3.4.1. Multiple Regression Results: Age, Period and Cohort Effects

Model 1 in Table 5.7 suggests that, after controlling for: area type; socioeconomic group; driving licence holding; household car access; and household structure, distance travelled is falling over time amongst men. It has been doing so significantly since 2006 in this model. Model 2 in Table 5.7 also suggests that distance travelled is declining over time amongst women, significantly in 2008, after controlling for the same variables in Model 1.

This decline in distance travelled over time suggests that daily mobility has been in decline since 1995 in line with existing literature that suggests traffic growth has plateaued (Pooley et al., 2005b, Independent Transport Commission (ITC), 2010, Goodwin, 2012), which could be reflected in these results. The significant decline in distance travelled from 2006 onwards observed amongst men, could indicate pre-recessionary effects. It would appear that there is a genuine trend effect and that the fall in distance travelled has been exacerbated by the recession in 2008, particularly for women. Rising congestion and transport costs, including increased public transport fares above the rate of inflation and fuel prices, could be contributing to lower levels of mobility, given that income levels influence transport mode choice.

Mobility has been found to differ between life-course stages, which are associated with different age groups (Oppermann, 1995, Pooley et al., 2005a, Ryley, 2006). To assess the influence of the age effect on the changing mobility of older people, the 20-29 age group is the reference category to understand how mobility changes in line with chronological age.

From the regression models, distance travelled appears to peak at age 40-49 for males, although this is not significant. Distance travelled is highest for women of the 60-69 age group which is statistically significant. As commuting and work-related trips have been excluded from the analysis, other non-work activities are leading to increases in mobility. As alluded to earlier, changing demographic trends relating to 'mid-life' (Demey et al., 2011) could be influencing lifestyle changes and hence mobility patterns.

Some authors have noted that for women in particular there has been an emergence of a 'sandwich generation' (Agree et al., 2003, Evandrou and Glaser, 2004, Pierret, 2006, Demey et al., 2011), where people have dependent parents and (grand) children simultaneously. As an ageing society becomes more prominent, people of this 'mid-life' age are more likely to belong to the 'sandwich generation' with having surviving parents suggesting that cohorts at this stage will be potentially providing assistance to dependent older parents, as well as (grand) children.

Dependent older people tend to have greater needs than those of children (Agree et al., 2003, Velkoff and Lawson, 1998 in Rosenbloom, 2004), therefore there are greater demands on people of the 'sandwich generation' which may produce complex trip-chaining journeys and increased mobility patterns as they may carry out personal business on behalf of others, or provide travel assistance as driving cessation occurs (Rosenbloom, 2010).

To examine how the mobility of birth cohorts differ and the influence this has on the changing mobility of older people, the Post-War Boomers (b.1946-1955) have been chosen for the reference category. This is because this cohort has begun to contribute to the increasing proportion of older people in society and it has been hypothesised that this cohort will have different mobility patterns in older age compared to former cohorts of older people. Using this cohort as the reference category will help to establish differences and similarities to other birth cohorts to assess the future implications on the changing mobility of older people as each successive cohort group ages. As the descriptive results find that men tend to travel further than women, the analysis has been run separately for each gender.

Firstly, considering the changes in mobility amongst male cohorts, men belonging to the Post-War Boomers (b.1946-1955) have the highest levels of mobility in terms of distance travelled. However, men belonging to Generation X (b.1966-1975), the 1960s Boomers (b.1956-1965)

and the World War II cohort (b.1936-1945) also have similar mobility levels to the Post-War Boomers.

According to the multiple regression results, the Post-War Boomers (b.1946-1955) travel significantly further than former older cohorts, including the Great Depression cohort (b.1926-1935), as well as the Parents and Grandparents of the Boomers (b.1916-1925 and b.1906-1915). Although these former cohorts have lower mobility than the Post-War Boomers, it should be noted that they are also of an older age. As each former cohort becomes older, mobility declines, which is in line with the descriptive analysis.

Whilst the descriptive analysis broadly identified that women had lower mobility, compared to men, some surprising results were observed. Women belonging to the Generation Y (b.1976-1985) and Generation X (b.1966-1975) cohorts had very high levels of mobility, above that of their male counterparts. Frändberg and Vilhelmson (2011) and Kuhnimhof et al. (2012) found that the mobility of young males has fallen, mainly due to reduced car ownership and increase of travel by other modes of transport

Women of these younger cohorts also had significantly higher mobility levels than women of the Post-War Boomers (b.1946-1955). This is an important finding as subsequent cohorts of women to the Boomers may be increasingly mobile in later life, as well as contributing to the convergence in the gender divide in mobility and it may no longer exist to the extent it does at present.

With younger people out-migrating from rural to urban areas (Dennett and Stillwell, 2010, ONS, 2012a) combined with increasingly high costs involved in learning to drive and obtaining and maintaining a car (DfT, 2010a), younger people may be limiting their travel horizons to the confines of cities and urban settings and making greater use of public transport. As older people may remain in or relocate to suburban, rural or coastal areas during retirement (Atterton, 2006, Champion and Shepherd, 2006, Uren and Goldring, 2007, Bayliss and Sly, 2010), they may have a greater need for a car given traditionally lower public transport provision in these locations (Gray et al., 2001, 2008, Ahern and Hine, 2012, Velaga et al., 2012).

Considering the influence of household structure on mobility, the multiple regression results suggest that those over 60, living in single households have the highest level of mobility. This is considered somewhat counter-intuitive as other findings suggest that as people age, mobility declines. However, in line with changing demographic trends there has been an increase in single households, particularly amongst men (Demey et al., 2011). Many older women reside in single households (Glaser, 1997, UN, 2005). A single person will have to undertake all household and personal business tasks (if they are able to independently) and

may also have more social activities to participate in. As the NTS is only completed by private households, older people who responded may be healthier and more active. There may be other issues with data collection. Households with children may be more forgetful regarding the trips they have made, leading to underreporting about their mobility patterns.

5.3.4.2. Summary of Multiple Regression Results

There appears to be a trend of an overall decline in distance travelled from 1995-2008 from the multiple regression results. This could be attributed to a variety of trends related to transport costs and may reflect pre-recessionary effects.

Mobility differs between age groups, with lower mobility observed amongst younger age groups. Distance travelled increases and peaks amongst those aged 30-59, before declining to lower levels in older age. Changes in mobility may be associated with activities at different life-course stages, such as employment, childbirth and retirement.

The Post-War Boomers (b.1946-1955) appear to have the highest mobility levels and differ from former cohorts of older people. Once controlling for cohort and age there appears to be a downward trend in mobility over time. The trend of declining mobility may be masked by the increased mobility of some of the 'middle-age' groups (aged 30-59) and the Post-War Boomers.

5.4. Discussion

Age, period and cohort effects are useful for explaining changes in mobility from 1995-2005. By considering the findings, from analysing changes in mobility amongst different age groups and birth cohorts, in line with changing demographic trends, an assessment can be made about the likely changes in mobility amongst older people.

Existing literature has highlighted differences in mobility amongst older age groups and noted that there is an existence of a 'young old' and an 'older old', based on mobility patterns (Noble, 2000, Alsnih and Hensher, 2003, Giuliano, 2004, Newbold et al., 2005, Su and Bell, 2009, Wennberg et al., 2009, Mercado et al., 2010). The 'young' older people are considered to be aged from around 60-79 and 'older' older people aged 80 and over. The descriptive results present clear differences in distance travelled between each of the older age groups included in the analysis and the distinction between the two categories of 'young' and 'older' older people may no longer be sufficient as there are greater differences amongst older people. In addition to this simple dichotomy, there are demographic trends contributing to changing activity patterns and hence the mobility of older people. It may be more appropriate

to develop more categories of older people and to consider other factors than just age when considering the mobility of older people.

It should be remembered that age is just one of many factors that explains differences in mobility between people. There are other socioeconomic factors, such as level of disposable income and household structure that affect individual travel choices (Pooley et al., 2005b, Headicar, 2009). Residential area type and health status is also important. Personal attitudes can also influence mode choice and therefore travel patterns (Anable, 2005). There is also a temporal dynamic involved in many of these factors as they can change over an individual's life as people may become ill and income rises and falls (Lucas, 2012).

5.4.1. Using Age, Period and Cohort Effects to Explain Change

Hakamies-Blomqvist and Henriksson (1999) suggest that if decreasing travel was a truly age-related phenomenon, as opposed to cohort or period related, distance travelled by older people would remain relatively constant over time. However, the descriptive analysis revealed that distance travelled has increased amongst older people from 1995-2008. Amongst former cohorts of older people, mobility has declined over time, as they have aged. This suggests that changes in mobility are not solely attributed to age and other interactions are taking place.

When commuting and work-related trips were excluded from the analysis, distance travelled amongst the Post-War Boomers (b.1946-1955) and the World War II cohorts (b.1936-1945) remained relatively constant over time. The results suggest that these cohorts may be different from former cohorts of older people as their mobility may not change in the same way as they age. However, this may be a reflection of the construction of pseudo cohorts, as different members of the cohort are surveyed at different points in time, therefore different stages of the life-course, which could be influencing mobility trends.

A genuine trend effect was evident from the multiple regression results. There appears to be an overall decline in mobility since 1995, presumably as traffic growth has plateaued (Pooley et al., 2005b, ITC, 2010, Metz, 2010). A significant decline in distance travelled has been observed since 2006 amongst men and 2008 amongst women. This may be a pre-recessionary effect, exacerbating the general decline in distance travelled since the mid-1990s, which has also been observed by Metz (2012).

This finding conflicts with the findings from the descriptive analysis, as distance travelled appeared to be increasing over time amongst the older age groups in particular. This is also reflected in the multiple regression results as distance travelled is higher amongst older age groups (when the 20-29 age group is the reference category). What is interesting about these

results is that mobility has increased amongst the older age groups over time, yet has declined amongst the youngest age groups. However, those aged 70 years and over, encompassing the two oldest age groups in this study, have the lowest mobility even when excluding commuting and work-related trips from the analysis. This suggests that age effects are present as mobility declines in older age, but period effects are having different impacts on the mobility of different age groups.

Whilst pre-recessionary effects have been observed in the findings, the current recession is seemingly having a greater adverse impact on younger people (Eurofound, 2012), and perhaps influencing mobility patterns. If younger people are unable to gain unemployment, disposable income is lower affecting the ability to pay for activities and transport. Amongst the younger male age groups in particular, mobility declined over time according to the descriptive results. This suggests that the age effect is greater than the period effect, which could be masking the downward trend in mobility over time when looking solely at the descriptive results.

Cohort effects are present, as mobility between birth cohorts differs. The Post-War Boomers (b.1946-1955) have significantly different mobility patterns to Generation Y (b.1976-1985) and the Great Depression cohort (b.1926-1935). There are some interesting and unexpected gender differences in mobility amongst and between some of the birth cohorts. Existing studies consistently find that men travel further than women (although women make a greater number of trips) due to the different activity patterns they have, which influence mobility patterns (Turner and Niemeier, 1997, Sarmiento, 2000, Best and Lanzendorf, 2005, Pooley et al., 2005b, Crane, 2007). Mobility amongst women belonging to Generation Y (b.1976-1985) and Generation X (b.1966-1975) is significantly higher than women belonging to the Post-War Boomers (b.1946-1955). However, mobility amongst men belonging to Generation Y and X is significantly lower compared to men belonging to the Post-War Boomers.

Women of Generation X and Y also have higher mobility than their male counterparts. The gender divide once considered the norm in transport studies appears to be converging. The mobility of these women may not differ from men to the extent it does at present, in the future. This is supported by findings from Frändberg and Vilhelmson (2011) and Kuhnimhof et al. (2012) who find that the mobility of younger males is declining.

The combination of descriptive and regression results suggests that age, period and cohort effects are having different impacts on the changing mobility of older people. There is an age effect as mobility declines as people become older. There is also a period effect as mobility is declining over time, which could be in line with the flattening out of traffic growth. Pre-recessionary effects may also be influencing mobility as higher costs of transport and higher levels of unemployment could be contributing to this decline in mobility. Cohort effects appear

to be present as the cohorts have different levels of mobility to each other. However, as they are at different ages in this study, it is hard to determine whether they will behave in similar ways as they age.

Changing demographic trends (a combination of period and cohort effects) could be having different impacts on cohorts which could influence mobility patterns. The Boomer cohort in particular are considered unique as they had higher levels of education and wealth, improved healthcare and access to private vehicles, unlike former cohorts of older people (Falkingham, 1997, Coughlin, 2009). Although subsequent cohorts to the Boomers have also had higher levels of education and improved health, the recession appears to be having a greater adverse impact on these current younger cohorts. As a result these younger cohorts may have fewer opportunities to acquire resources to enable higher levels of mobility, particularly in terms of car use. They may also be more aware of the environmental impacts of transport and prefer using sustainable modes (Stradling and Anable, 2008). Increased urban dwelling among these cohorts may render the use of a car less important, compared to former cohorts when they were of a similar age at a time when people were relocating out of city centres to the suburban periphery enabled by highway infrastructure building.

5.4.2. Changing Demographics and Future Mobility of Older People

Higher mobility levels associated with the Boomer cohorts could continue as they age. This could begin to explain the increase in mobility observed amongst the older population, despite reductions in mobility over time amongst the entire population and as people age (i.e. period and age effects). However, increasing mobility amongst older people could be a temporary state. Given that there is a reducing rate of driving licence holding, combined with lower mobility amongst younger birth cohorts, particularly men, the mobility of older people may decline over time once these current younger cohorts begin to contribute to the proportion of older people.

The nature of gender differences in mobility appears to be changing over time, which could be explained in relation to changing demographic trends. Although some men still travel further than women suggesting that the gender divide in mobility still exists, according to the findings there is some evidence to suggest that this gap is narrowing, particularly amongst younger cohorts.

Women belonging to the Boomer cohort are very different in terms of their socioeconomic and demographic characteristics compared to former cohorts of women. These women have had greater opportunities in terms of higher education, the labour market and learning to drive, as well as having delayed marriage and childbirth (Spain, 1997, Pooley et al., 2005b, Crane, 2007, Demey et al., 2011). This is particularly true for women belonging to subsequent

cohorts. Women belonging to these cohorts are very different from former cohorts of women when they were of the same younger age in the past. These demographic trends can contribute to changing activity patterns thereby influencing mobility. The findings demonstrated that these subsequent cohorts of younger women (i.e. those belonging to Generation X and Y) have higher levels of mobility compared to their male counterparts. This suggests that the gender divide in mobility, particularly for older people in the future, will be different or not exist. This finding illustrates that period and cohort effects are important in explaining changes in mobility.

Other demographic trends could explain increasing mobility observed amongst older people; particularly 'younger' older people (i.e. aged 60-69). According to the findings, mobility peaks around 'middle-age' (considered to be age 30-59). Over time, the mobility of older people aged 60-69 has increased and is similar to the mobility of these 'middle-age' groups, rather than the older population aged 70 and over. Given that childbirth is being delayed, the age range of the 'mid-life' is thought to be increasing. Demey et al. (2011) define this chronologically from the age of 45 (end of childbearing years) to 64 years (about to retire).

This 'mid-life' stage has also been associated with the 'sandwich generation' (Agree et al., 2003, Pierret, 2006, Demey et al., 2011), where people have both dependent (grand) children and older parents as life expectancies have increased. As subsequent cohorts have some similar demographic characteristics to the Boomer cohort such as higher education amongst women, this may lead to delays in childbirth. These subsequent cohorts may have similar mobility patterns to the current 'sandwich generation' as their parents live longer due to increasing life expectancies.

It has recently been identified that 'younger' older people are providing care for grandchildren. They are remaining in their own homes and travelling greater distances, rather than migrating to be closer to these relatives, therefore this is contributing to the overall increases in mobility amongst older people (Cooke, 2011). There has also been an increase of single households among those of 'mid-life' stage, particularly amongst men (Demey et al., 2011). This could also partly assist in explaining the narrowing of the gender divide in mobility, as more women live alone than men (Glaser, 1997, UN, 2005). The socioeconomic position of those in 'mid-life' has improved and differences between men and women have narrowed, borne out in changing mobility patterns.

5.5. Conclusion

Descriptive analysis and multiple regression models have been used in an attempt to tease out age, period and cohort effects to explain changes in mobility trends amongst older people in Britain from 1995-2008. Distance travelled was used to represent daily mobility and

compared across age groups and birth cohorts to identify how mobility differs between cohorts and how mobility changes with age. There is a complex interaction of age, period and cohort effects in explaining changes in mobility.

From the findings there appears to be a genuine trend effect of declining mobility over time, particularly amongst the current and former cohorts of older people, although an age effect is also partly explaining this trend. This decline in mobility is thought to be attributed to the current recession and the results reflect pre-recessionary effects. However, mobility is increasing over time amongst the Post-War and 1960 Boomer cohorts (b.1946-1965). As these cohorts age it appears that mobility is increasing amongst the older population. This increase in mobility amongst the Boomer cohorts could be masking the downward trend in mobility occurring over time.

The findings suggest that the Boomer cohorts, who have begun to contribute to the proportion of older people in society, will be more mobile in older age compared to current and former cohorts of older people. This increase in mobility could be attributed to various characteristics, which are contributing to higher expectations for mobility, such as higher education and wealth accumulated during periods of economic growth. Higher education levels are linked to the acquisition of driving licences and higher incomes. As a result, being able to afford motor cars have greatly influenced their mobility patterns as it has enabled them to travel further than former cohorts, in particular for women.

It is also suggested that the Boomer cohort may be unique in terms of their mobility patterns as a result of certain characteristics. This uniqueness of the Boomer cohort is further reinforced by the characteristics of subsequent cohorts. The current recession is having greater adverse effects on current cohorts of younger people. Due to current high levels of youth unemployment, this population has been termed a 'lost generation' (Eurofound, 2012). Reduced rates of driving licence holding have also been observed amongst this younger population (See Figure 2.1) due to the higher costs of obtaining a licence and maintaining a car (DfT, 2010a). Lower wealth and being unable to drive could contribute to these current cohorts of younger people having lower mobility in later life. Social exclusion issues related to immobility may be exacerbated when these cohorts are older. Given that distance travelled is actually decreasing over time, it may be that once the Boomer cohorts pass away, the mobility of older people will begin to decline.

However, these younger cohorts may compensate for lower levels of mobility in older age by living in urban centres and making greater use of technology. Amongst the current cohort of younger people there are higher rates of city living due to the out-migration from suburban and rural peripheries towards urban centres (Dennett and Stillwell, 2010, ONS, 2012a). Developments in electronic media and telecommunications technology is thought to be

influencing mobility patterns as some services can be accessed online, rather than incurring a physical trip, although the impacts are not yet clear (Lyons and Kenyon, 2003). The presence of technology means that it is available for all; however, there are cohort effects as each cohort will use technology differently. Those born prior to the Boomers may have more limited use of technology. The Boomers grew up with some of the first major developments in technology, Generation X having greater exposure, whilst Generation Y and subsequent cohorts have grown up with the internet. Increased use of technology amongst current younger cohorts (McIntosh-Elkins et al., 2007), may partly explain the decline in mobility amongst younger people over time.

Demographic trends are also thought to be influencing changing mobility patterns. Although current cohorts of younger people have lower mobility, women belonging to the Generation X and Y cohorts (b.1966-1985) have higher mobility than their male counterparts, which has not been seen before in mobility studies, although some have noted that gender convergence is occurring at the aggregate level (Noble, 2005, Rosenbloom, 2006, Frändberg and Vilhelmson, 2011, McQuaid and Chen, 2012). Higher education amongst women could be leading to delays in childbirth and an increase in single households is changing activity patterns amongst men and women, leading to a convergence in mobility patterns. Issues of social exclusion that are linked to gender may change nature in the future as men and women converge in terms of socioeconomic characteristics and mobility patterns.

As the findings of this chapter have demonstrated, it is important to understand the economic and social climate that cohort groups are subject to, to understand the changing mobility of older people and potential future implications. Rather than subsequent cohorts having similar mobility patterns to the Boomers in terms of increasing car use as has been suggested (Rosenbloom, 2001, Rosenbloom and Herbel, 2009), their mobility may be similar to former cohorts of older people. As current younger cohorts are growing up during a deep recessionary period, this may also lower their expectations about mobility.

With this in mind, it is necessary to consider the influence concessionary travel schemes have on the mobility of older people. Concessionary schemes provide all older people in the UK with free bus travel in order to promote social inclusion and encourage sustainable travel. As the first wave of the large Boomer cohort have begun to meet the age criteria for eligibility, there are increasing concerns about the financial sustainability of the scheme (Audit Scotland, 2010). There are also concerns about the inequity of the scheme as it is available to all older people, regardless of income, whilst younger people on lower incomes who may require concessionary travel to help improve access to employment, given reduced rates of driving licence holding amongst younger cohorts, are not eligible. However, there is also great inequality amongst the older population and there are questions about the effectiveness of this scheme in providing alternative transport to the car, particularly as bus subsidies are

being reduced, leading to a contraction in bus services in some areas. The focus of the following chapter will consider the influence of the concessionary scheme in Scotland on older people's mobility to help consider some of these concerns and questions.

6. Influence of the Scottish National Concessionary Travel Scheme on the Mobility of Older People

6.1. Introduction

Cohort analysis was used in the previous chapter to illustrate how age, period and cohort effects can explain changes in the mobility of older people. The findings suggested that the Boomers are a unique cohort and are likely to be more mobile in older age compared to former cohorts of older people. However, given a trend of declining mobility, once the Boomers cohorts pass away, the mobility of older people may decline.

In Britain there is a policy of providing older people with a concessionary travel pass which enables eligible older (and disabled people) to travel for free on public bus services. Findings from Chapter Four revealed that the mobility of older people is rising and the car is becoming increasingly important in the changing mobility of older people. Despite the concessionary policy, car use continues to rise amongst the older population, and bus use and walking trips are declining. Given recent concerns about the financial sustainability and effectiveness of the concessionary scheme, the aim of this chapter is to critically assess the impact the scheme is having on the mobility of older people in Scotland.

Firstly, a brief background to the concessionary scheme in Scotland is provided, along with the rationale for using Scotland as a case study, as well as briefly outlining the data and methods. Secondly, descriptive analysis is used to explore the socioeconomic characteristics and trends of bus and car-driver use amongst concessionary pass holders in Scotland. A 'difference-in-differences' technique has been used to assess the impact of the concessionary scheme by comparing bus use and car-driver use after the extension to the policy in April 2006 amongst older concessionary pass-holders and older non pass-holders.

6.2. Background and Rationale

Scotland has had a devolved government since 1999 and has an elected parliament with primary legislative competence over most domestic policy issues including transport policy (Shaw et al., 2009). The Transport Act in Scotland in 2001 made provision for free concessionary bus travel and on the 30th September 2002, the scheme was made available to older women aged 60 and over and men aged 65 and over, as well as eligible disabled people. It allowed for free bus travel after 09:30am weekdays and all day during weekends and bank holidays but only within the recipients' concessionary scheme area (Rye and Mykura, 2009). On 1st April 2003 the scheme was extended further to allow men aged 60-64 to receive the same travel benefits as women (Transport Scotland, 2009).

On 1st April 2006 the concessionary scheme was extended. Peak hour and boundary restrictions were removed, which allowed older people to travel for free on local registered services and long-distance bus services anywhere within Scotland. By providing free bus travel, through the National Concessionary Travel Scheme (NCTS), the scheme aims to promote modal shift from private car use to public transport and to promote social inclusion by allowing improved access to services. It is these two aims on which this chapter will focus on assessing to consider how the mobility of older people has changed in relation to the extensions made to the policy.

Scotland is being used as a case study to examine the impact of the concessionary scheme, as there is available data to conduct a 'natural experiment' due to the timing of changes made to the Scottish scheme. There are other characteristics which make Scotland a good case study for examining the influence of this policy. There are six main cities and many local authorities with rural landscapes, which allows for comparisons between area types.

Very generally, incomes in Scotland tend to be lower compared to those in England, which will allow the analysis to take into account the social inclusion aspect of the policy. This is an extremely broad generalisation and it should also be noted that there are regions within England where the population also tend to have lower incomes such as North Eastern England and Yorkshire and the Humber. In the past the Labour-Liberal Democrat Coalition in the Scottish Parliament implemented other policies targeted specifically towards older people suggesting that they were more sympathetic towards older people compared to the UK Parliament. An example of this is that of Free Personal Care, which is a legal entitlement for people aged 65 or over who have been assessed as having personal care needs that require care services (Scottish Government, 2010).

The costs of the concessionary scheme have come under scrutiny by budget reviews, as well as the media, questioning the affordability and financial sustainability of the scheme (Audit Scotland, 2010). As the first wave of the large Boomer cohort becomes eligible to claim this benefit, the costs of providing this scheme will increase, further raising concerns, therefore it is important to consider how effective the scheme is in meeting its aims and influencing mobility.

6.3. Data and Methods

6.3.1. Data

The analysis will be undertaken using data from the Scottish Household Survey (SHS). This is a repeated cross-sectional survey and data is available from 1999-2008. The survey is also

unique in that it includes a one-day travel diary element, enabling travel patterns to be linked to household characteristics.

6.3.2. The 'Difference-in-Differences' Regression Technique

To consider the influence of the extension of concessionary scheme on the mobility of older people a 'difference-in-differences' regression technique has been used in conjunction with descriptive analysis. All descriptive analysis has been carried out on those aged over 60. According to Imbens and Wooldridge (2007) this approach has been used to study numerous policy questions and is considered a classic method for analysing the effect of a 'treatment', making it suitable for exploring policy interventions as it controls for the interaction effect of the policy.

Outcomes are observed for two groups for two time periods. In this study the first time period is before the extension was made to the concessionary policy and the second time period is after the extension was made, using 2nd April 2006 to split the data. The first group is exposed to a treatment in the second period but not in the first. The second group is not exposed to treatment during either period (Imbens and Wooldridge, 2007). If only the difference in mobility was considered between the second and first time periods, the difference may be caused, not only by the policy, but other trends. For example, improved vehicles may encourage bus use regardless of the policy. Likewise, if the difference in mobility only focused on the difference between the intervention group and the control group during the second time period only, the difference may not be due to the policy but to a composition effect. The different make-up of these groups may affect the outcome.

The 'difference-in-differences' approach isolates the policy effect from the 'composition' and 'trend' effects as explained above. The analysis examines the difference across time as well as between the control and intervention groups.

The control group, which has not been exposed to any treatment, are those aged over 60 and does not hold a concessionary pass. The problem with only using one control group is that the mobility of the control group may have been influenced by other trend factors to a greater or lesser extent than the intervention group. Therefore the control group needs to be as similar as possible to the intervention group (aged over 60 and hold a concessionary pass). The analysis has also been carried out separately for men and women given that gender differences were found to exist amongst the older population in terms of mobility.

6.4. Results and Findings

Firstly, descriptive analysis explores how the socioeconomic characteristics of Scottish concessionary pass holders have changed over time in terms of gender, income, area type, household car access and driving licence holdership. 95% confidence intervals were plotted to indicate statistically significant differences. Secondly, descriptive analysis was used to explore trends in relation to bus and car-driver use amongst older people who hold a concessionary travel pass. Trip frequency and distance travelled by these modes are used as indicators of mobility. These modes are being considered as one of the main aims of the concessionary policy is to promote modal shift from the private car to public transport modes. It is also thought important to consider the mobility of older drivers due to the increasing rate of driving licence holding amongst older people (see Figure 2.1). Finally, the 'difference-in-differences' technique will consider the influence of the policy on the mobility of older people in Scotland.

6.4.1. Descriptive Analysis: Characteristics and Mobility Trends

Examining changing socioeconomic characteristics of older concessionary pass holders will help to assess how effective the policy is in promoting social inclusion by providing free access to bus services for older people. Exploring changing mobility patterns will help to consider the effectiveness of the scheme in promoting modal shift from the private car to public transport.

6.4.1.1. Socioeconomic Characteristics of Concessionary Pass Holders

Figure 6.1 presents the percentage of older people who hold a concessionary pass from 1999-2008 by 3-year moving averages. 95% confidence intervals have also been plotted. Concessionary pass holding amongst older people increased significantly by 10.97% from 1999-2001 to 2001-03, when free concessionary travel was first introduced in September 2002. From 2001-03 to 2005-07 during which time the extension to the concessionary scheme was made in April 2006, concessionary pass holding increased significantly by another 8.15%. Overall, from 1999-2008 concessionary pass holding amongst the older population in Scotland increased significantly from 65.24% to 87.59%.

Increased take-up of the scheme could be due to increased awareness of the scheme as changes were implemented in 2002 and 2006, which increased the generosity of the concession. As peak hour and local area boundaries were removed in 2006, those living on the border of boundary areas and travelling into neighbouring areas are no longer charged, rendering the take-up of the concessionary pass worthwhile.

This increases the availability of bus services for these pass holders. In line with the cohort definitions as outlined in Table 3.2, the Post-War Boomers (b.1946-1955) became eligible to claim the concessionary pass in 2006. There was a significant increase in concessionary pass holding between years 2004-06 and 2006-08 of 5.84%, however the increase of 3.23% between years 2005-07 to 2006-08 was not significant.

Figure 6.2 presents the percentage of over 60s year olds holding concessionary passes by gender and 3-year moving averages have been plotted with 95% confidence intervals. Prior to the initial change to the scheme in 2002, the results suggest that levels of concessionary pass holding between men and women were not significantly different. During years 1999-01, 64.73% of older women held a concessionary pass, whilst 61.68% of older men did.

From 1999-01 and 2001-03 (free concessions were introduced in 2002), concessionary pass holding increased significantly by 8.08% amongst older men and 15.7% amongst older women. Since 2001-03 levels of concessionary pass holding has differed significantly between older men and women, with a greater proportion of women holding concessionary passes. The greatest difference in concessionary pass holding between older men and women was 17.71% during 2003-05; however, this has been converging since 2003-05.

Concessionary pass holding has been steadily increasing year on year amongst older women from 1999-2008. Whilst there were increases in the proportion of older men holding a concessionary pass, this plateaued between 2001-2005, only increasing (although not significantly) by 0.44%. However; there have been sharper increases in the proportion of older men holding a concessionary pass since 2003-05, a significant difference of 13.96%.

Gender differences in transport are still present, suggested by the significant differences in concessionary holdership. Older women are perhaps more likely to be bus users compared to men as women are more willing to give up driving earlier than men (Burkhardt et al., 1996, Hakamies-Blomqvist and Siren, 2003, Siren and Hakamies-Blomqvist, 2005, 2006, Davey, 2007, Adler and Rottunda, 2006), which may explain the higher rate of concessionary pass holding. Therefore, they are more likely to use it compared to men due to free provision.

Figure 6.1: Percentage of older people in Scotland who are concessionary pass holders from 1999-2008 (3-year moving averages with 95% confidence intervals)

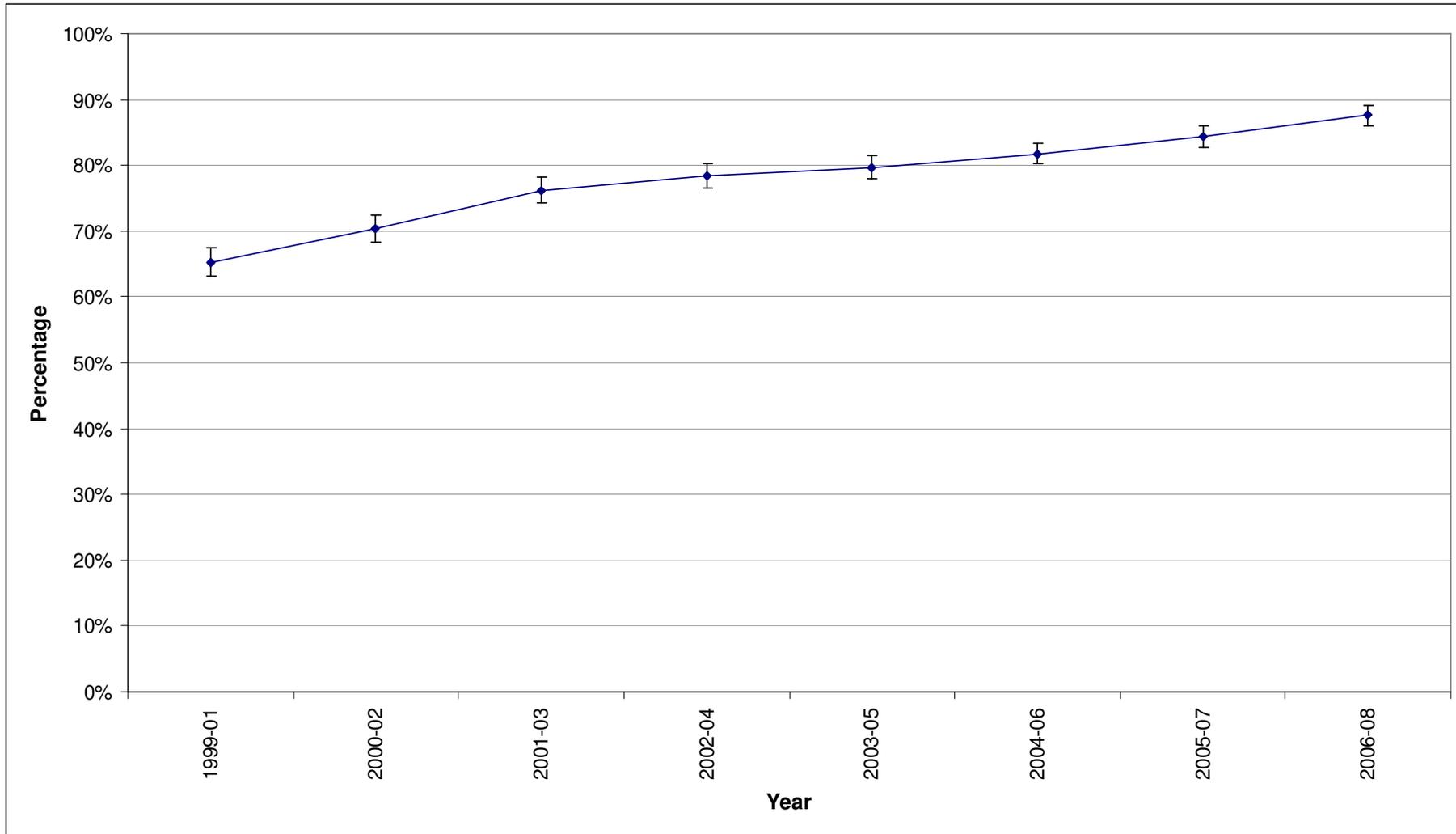


Figure 6.2: Percentage of older people in Scotland who are concessionary pass holders by **gender** from 1999-2008 (3-year moving averages with 95% confidence intervals)

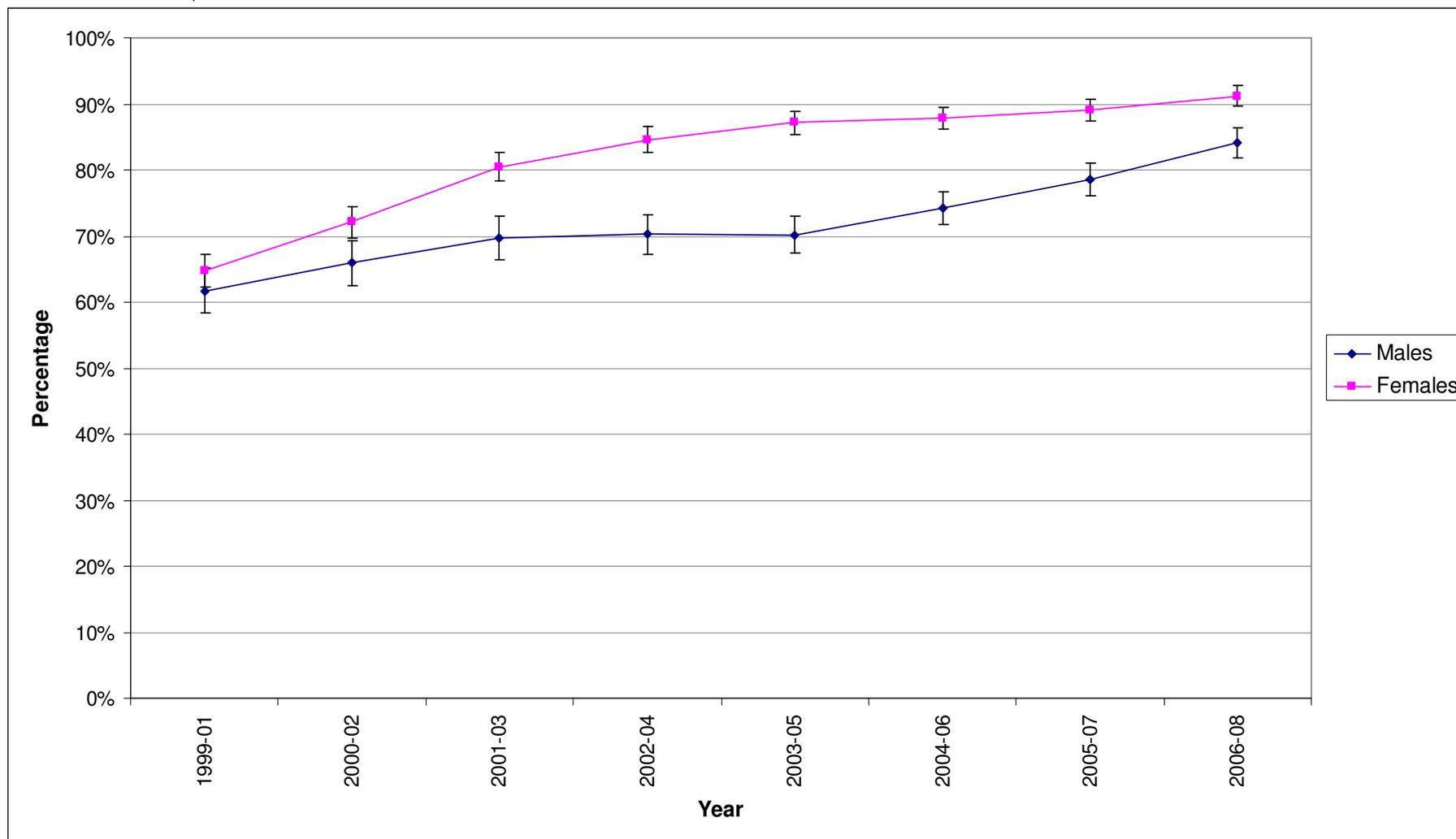


Figure 6.3: Percentage of older people in Scotland who are concessionary pass holders by **area type** from 1999-2008 (3-year moving averages with 95% confidence intervals)

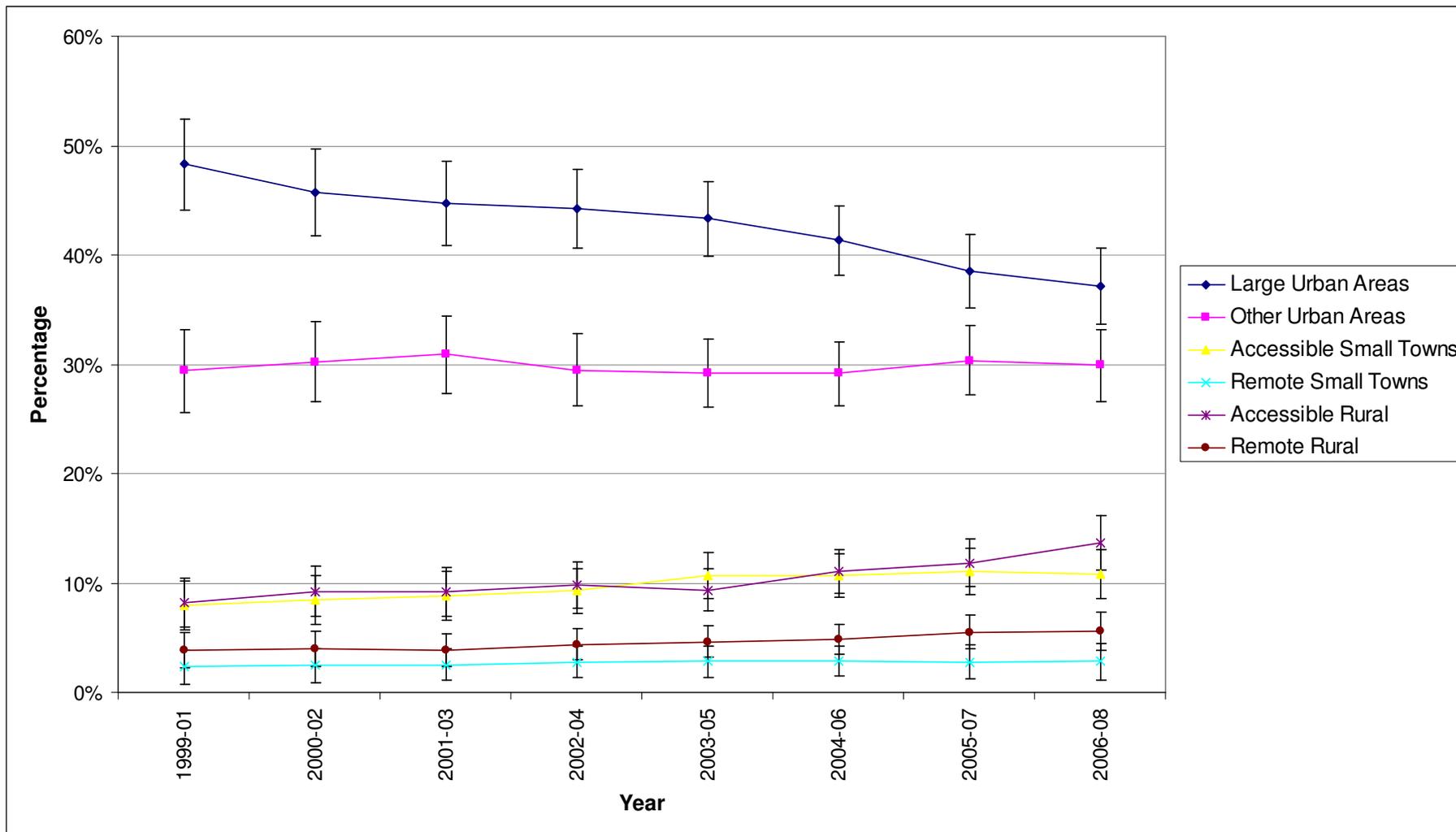


Figure 6.3 presents the proportion of older concessionary pass holders by area type. 3-year moving averages have been plotted with 95% confidence intervals. The greatest proportion of those holding a concessionary pass live in 'large urban' or 'other urban' areas. The proportion of those holding concessionary passes in large urban areas fell significantly from 48.28% in 1999-01 to 37.16% in 2006-08. The proportion of those holding concessionary passes in 'other urban' areas has not changed over time.

The decline in the proportion of those holding concessionary passes in 'large urban' areas is a result of increasing rates of concessionary pass holding amongst older people residing in 'accessible small towns' and 'accessible rural areas'.

The proportion of concessionary pass holders in 'accessible small towns' increased from 7.98% in 1999-01 to 10.78% in 2006-08. There was an increase from 8.17% in 1999-01 to 13.71% in 'accessible rural areas'. As a result of the removal of local area boundaries in 2006, those living in 'accessible' small towns and rural areas may be more likely to benefit from this change by the increase in access to a greater number of bus services, hence increases in the proportion of older people in these areas holding a concessionary pass.

'Remote small towns' and 'remote rural areas' have the lowest proportion of concessionary pass holding amongst older people and this has not changed significantly over time. There are significant differences in concessionary pass holdership between those living in 'accessible' small towns and rural areas and those living in 'remote' small towns and rural areas.

There tend to be fewer bus services in 'remote' areas (Gray et al., 2001, 2008, Ahern and Hine, 2012). A concessionary pass may not be worthwhile for people in these areas if bus service quality is poor. In these 'remote' areas older people may make greater use of alternative modes of transport that are suited to their needs, such as community transport, the car or lifts from support networks (Lucas, 2004, Gray et al., 2006, Velaga et al., 2012)

Figure 6.4: Percentage of older people in Scotland who are concessionary pass holders by **income group** from 1999-2008 (3-year moving averages with 95% confidence intervals)

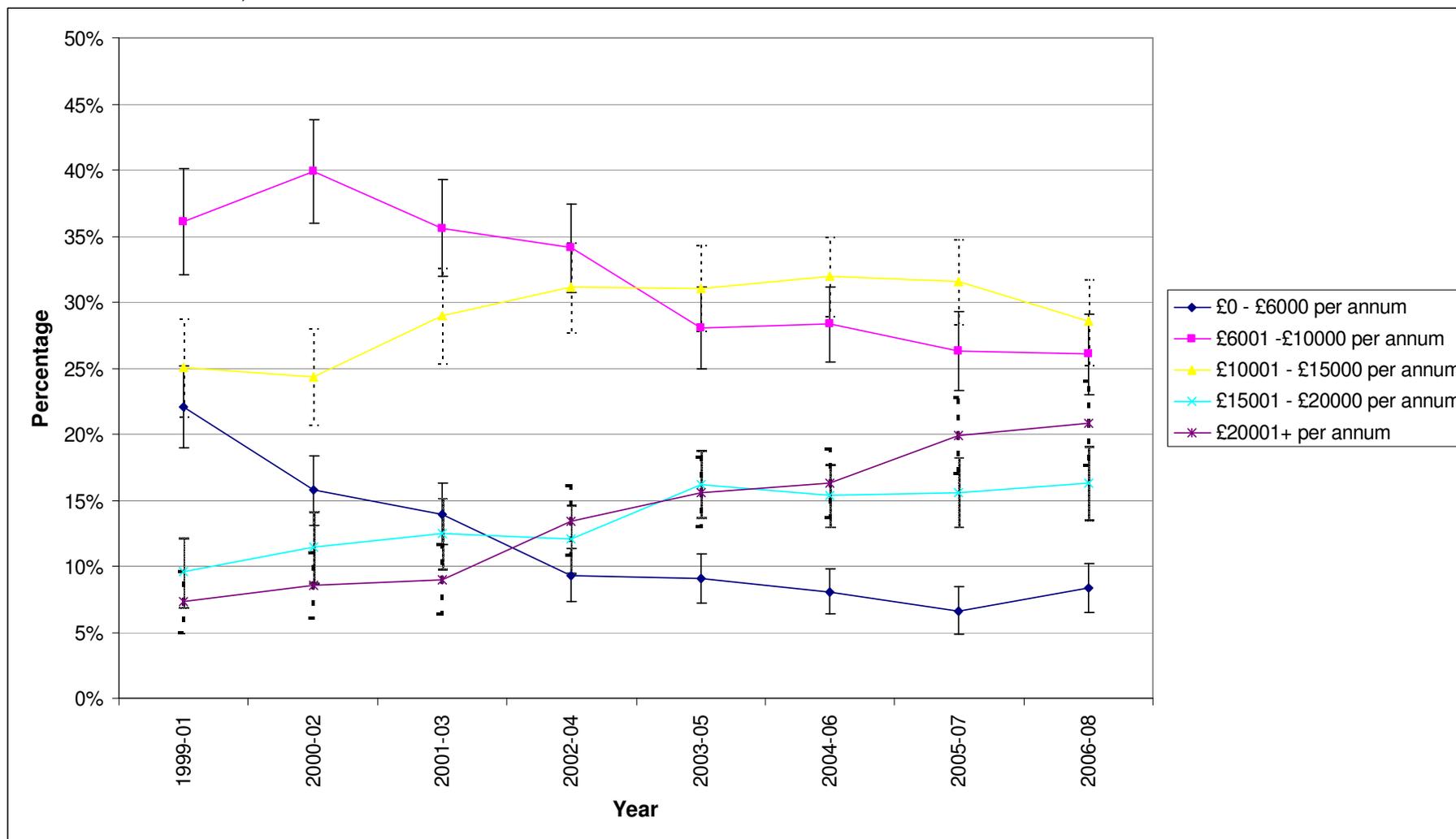


Figure 6.4 presents the proportion of older concessionary pass holders by annual income group by 3-year moving averages with 95% confidence intervals. Given that many of the confidence intervals overlap, different patterns for the confidence intervals have been used for each income group.

From 1999-2008 there have been increases in the proportion of those with higher levels of income holding a concessionary pass along with declines in the proportion of those belonging to the lower income groups in terms of concessionary pass holding.

The proportion of concessionary pass holders belonging to the highest income group (£20,000 and above) from 1999-2008 has increased from 7.29% to 20.84%. The proportion of older concessionary pass holders belonging to the £15,001 - £20,000 income group increased from 9.58% to 16.26% over the same time span.

By contrast, the proportion of older concessionary pass holders in the lowest income group (£0-£6,000) fell from 22.04% to 8.6% over the same time span. The proportion of those belonging to income group £6,001 -£10,000 also fell by 10% from 36.06% in 1999-01 to 26.03% in 2006-08.

Whilst the scheme is a universal benefit for older people, and therefore available regardless of income, the largest increases in the proportion of concessionary holdership have been observed amongst older people belonging to the highest income groups. However, one of the aims of the Scottish scheme is to improve social inclusion through the provision of free bus travel so that older people are able to access services and activities.

As the largest increases in the proportion of people holding concessionary passes have been observed amongst the highest income groups, this raises questions about whether the scheme is likely to meet the aims regarding social inclusion if those on higher incomes are making greater use of the scheme.

Figure 6.5: Percentage of older people in Scotland who are concessionary pass holders by **gender** and **household car access** from 1999-2008 (3-year moving averages with 95% confidence intervals)

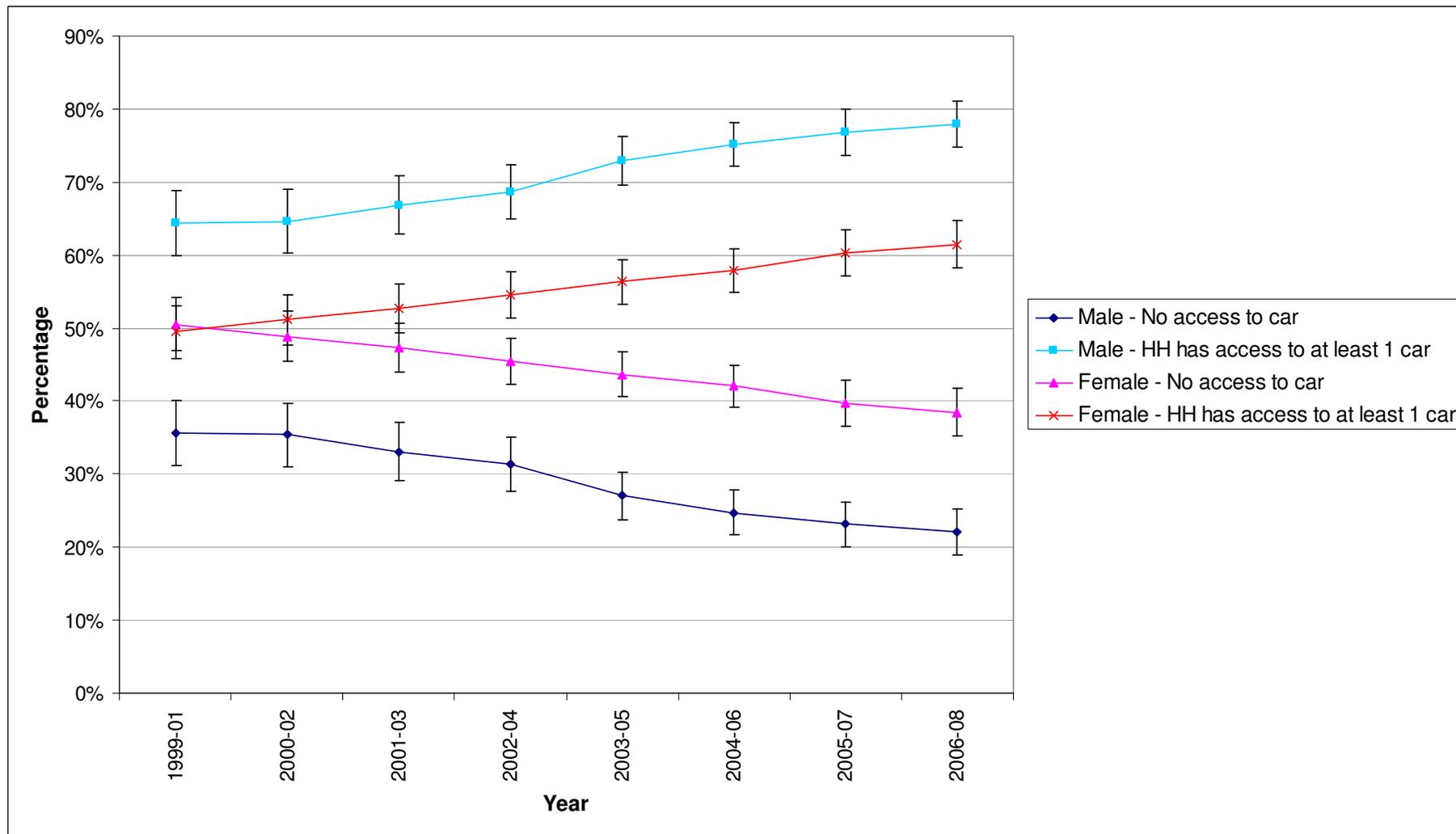


Figure 6.5 presents the proportion of older people holding concessionary passes by household access to a private car by gender from 1999-2008 by 3-year moving averages and 95% confidence intervals have also been plotted.

A distinct pattern of change is occurring over time. The proportion of older men and women holding a concessionary pass that have access to a car in their household significantly increased from 1999-2008. The proportion of men holding a concessionary pass and having access to a car increased significantly from 64.35% in 1999-01 to 77.89% in 2006-08. Amongst older women with access to a car, the proportion increased from 49.48% in 1999-01 to 61.50% in 2006-08.

Amongst older people who do not have a car, the proportion of older men holding a concessionary pass fell from 35.65% in 1999-01 to 22.11% in 2006-08, whilst amongst older women the proportion fell from 50.52% in 1999-01 to 38.50% in 2006-08.

Findings from Chapter Four and existing literature (Rosenbloom, 2001, Rosenbloom and Ståhl, 2002, O'Fallon and Sullivan, 2009, Le Vine and Jones, 2012) find that car use is increasing amongst the older population. Increased driving licence holding has also risen amongst older people, particularly women as illustrated in Figure 2.1, although it still remains higher amongst older men.

Given that concessionary pass holding has increased among men and women who have access to a car, bus transport may be viewed as an alternative and therefore possibly encouraging modal shift from the private car to public transport. However, it could also reflect an increasing car ownership amongst older people; in line with increasing driving licence holding (see Figure 2.1).

Figure 6.6: Percentage of older people in Scotland who are concessionary pass holders by **gender** and **driving licence holdership** from 1999-2008 (3-year moving averages with 95% confidence intervals)

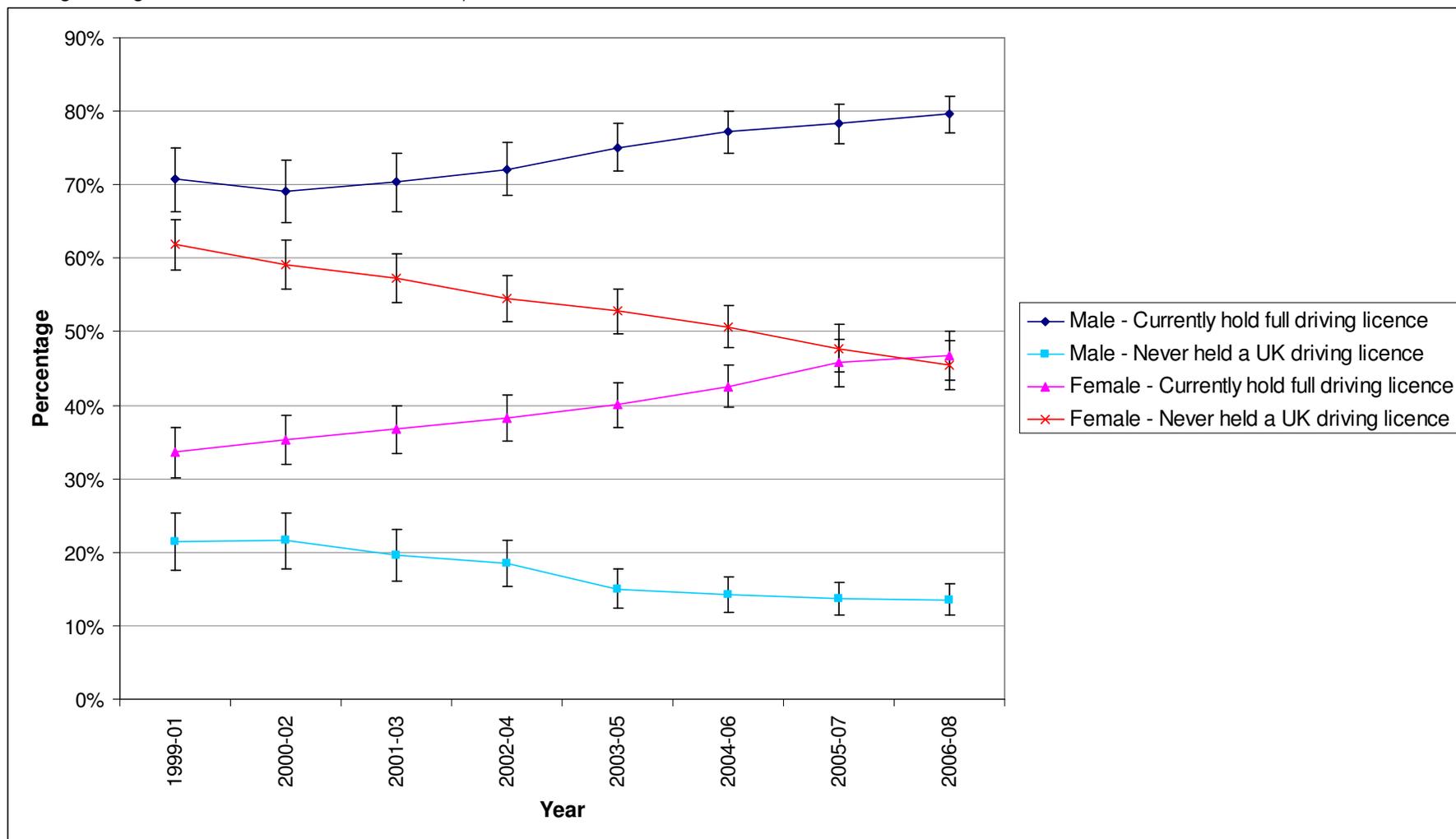


Figure 6.6 presents the percentage of older concessionary pass holders by driving licence holdership by gender from 1999-2008 by 3-year moving averages have been plotted with 95% confidence intervals.

Among those who hold a concessionary pass, the proportion of older women who hold a driving licence has increased from 33.56% in 1999-01 to 46.78% in 2006-08. Amongst men it has risen from 70.69% to 79.57% over the same time span. As the proportion of older women who hold a driving licence has been increasing over time (see Figure 2.1), this is likely to be reflected in terms of those holding a concessionary pass. These women obtained their driving licence when they were younger and as they have aged they have now become eligible to claim for a concessionary pass.

The following analysis will explore the mobility trends of older concessionary pass-holders. As one of the aims of the Scottish concessionary scheme is to promote modal shift from private car to public transport, the analysis focuses on the mean number of bus trips and car-driver trips as well as median distance travelled by these modes on the previous day. The analysis has also been disaggregated by gender.

6.4.1.2. Mobility Trends of Concessionary Pass Holders

Figure 6.7 presents the mean number of bus and car-driver trips amongst concessionary pass holders by gender from 1999-2008 by 3-year moving averages. 95% confidence intervals have also been plotted. Given that some of the confidence intervals overlap, different patterns for the confidence intervals have been used for men and women.

The mean number of car-driver trips made is significantly higher than mean bus trips from 1999-2008, however, there is no significant difference between the mean number of car-driver trips that older men and women make. As the SHS collects travel data for the day prior to the survey only, it does not build up a picture of travel over a greater time compared to the NTS (which collects travel for one week); therefore it will be difficult to identify significant differences as the travel diary data collected for the one day may not be representative or usual for the respondent (although this does also apply to the NTS to a similar extent, as a week may not be representative of usual travel undertaken by the respondent).

The mean number of car-driver trips has not increased significantly amongst older male or female concessionary pass holders from 1999-2008. This may reflect flattening out of traffic growth (ITC, 2010, Metz, 2010, Goodwin, 2012).

There are no significant differences between the mean number of bus trips made by older male and female concessionary pass holders, however, mean number of bus trips has increased significantly over the time span 1999-2008.

Amongst older male concessionary pass holders, mean bus trips increased significantly from 1.84 trips in 1999-01 to 2.09 trips in 2006-08. There was also a significant increase (although less significant than men) in the mean number of bus trips made by older women from 1.86 trips to 2.02 trips over the same time span.

These results suggest that overall mobility is increasing as, although car-driver trips have not increased, the mean number of bus trips has increased over time. The provision of free bus travel through the concessionary scheme could be inducing bus trips (Mellor, 2002, Rye and Mykura, 2009) or some car trips have been substituted for travel by bus, particularly if city centre parking charges are high or there are high levels of congestion (Baker and White, 2010).

Figure 6.8 presents the median distance travelled by bus and car-driver for older men and women who hold a concessionary pass from 1999-2008. 3-year moving averages have been plotted along with 95% confidence intervals. As some of the confidence intervals overlap, different patterns for the confidence intervals have been used for men and women.

The solid confidence intervals plotted along the median values relate to older men with a concessionary pass. No overlap is identified between distance travelled by car-driver and by bus, indicating that older men travel significantly further as the car-driver. The dashed confidence intervals relate to older women with a concessionary pass, and median distance travelled as the car-driver is also significantly higher, with the exception of years 2006-08. As car-drivers travel further than bus users, this result is expected.

The removal of local area boundaries for free bus travel does not appear to have had a significant effect of increasing distance travelled by bus, except in the case of women in 2006-2008. Bus trips tend to be shorter in nature; however, amongst older women if they are more likely to give up driving voluntarily, they may be making greater substitution from car to bus as they are now able to travel for free for further distances.

Median distance travelled by bus or car-driver has not changed significantly from 1999-2008 for either older men or women. As discussed previously, due to the collection of travel data for one day, it may be difficult to identify changes over time as data is only collected over a short period of time.

Figure 6.7: Mean number of trips per day made by older people in Scotland who are concessionary pass holders by **gender** from 1999-2008 (3-year moving averages with 95% confidence intervals)

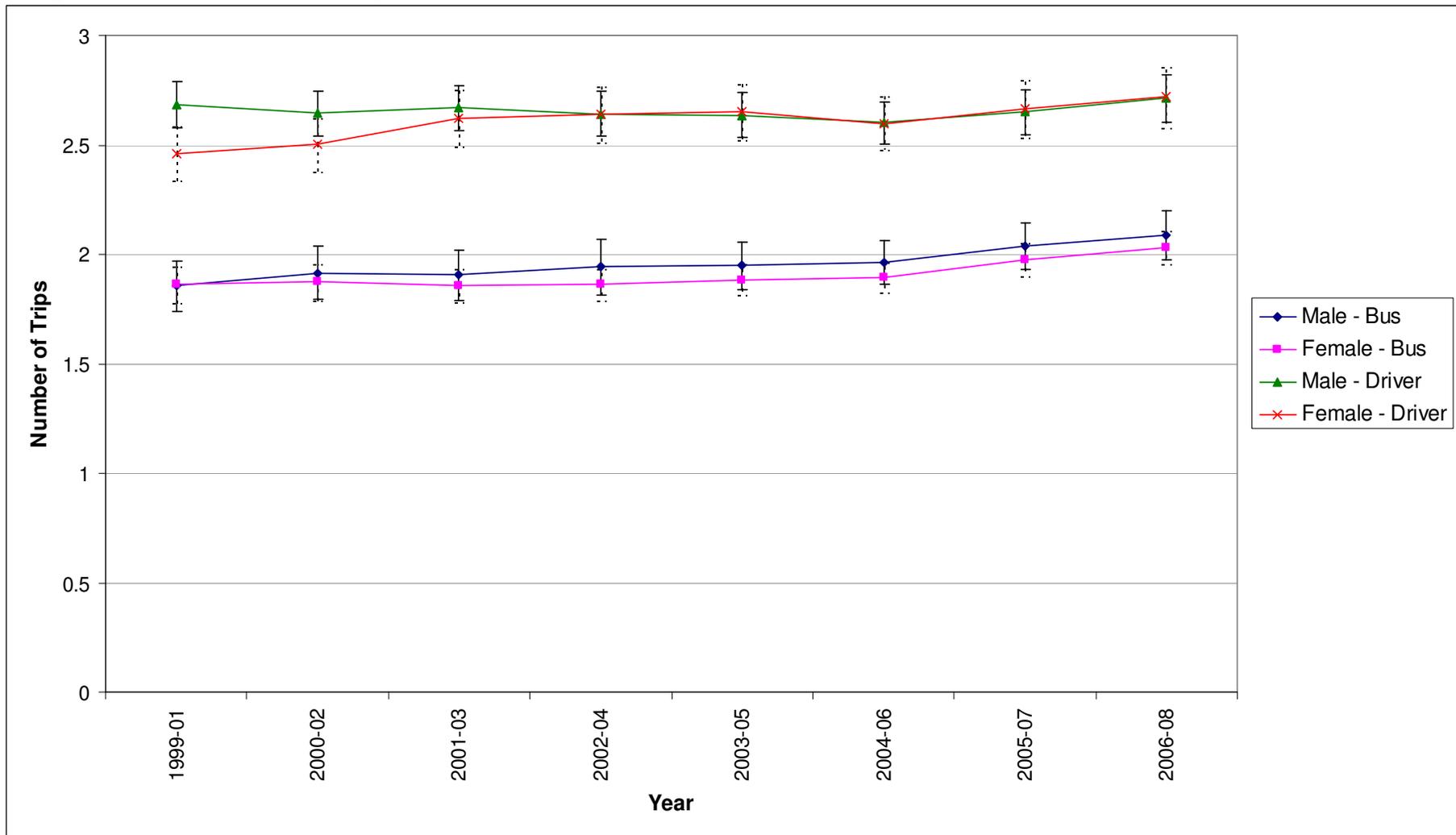
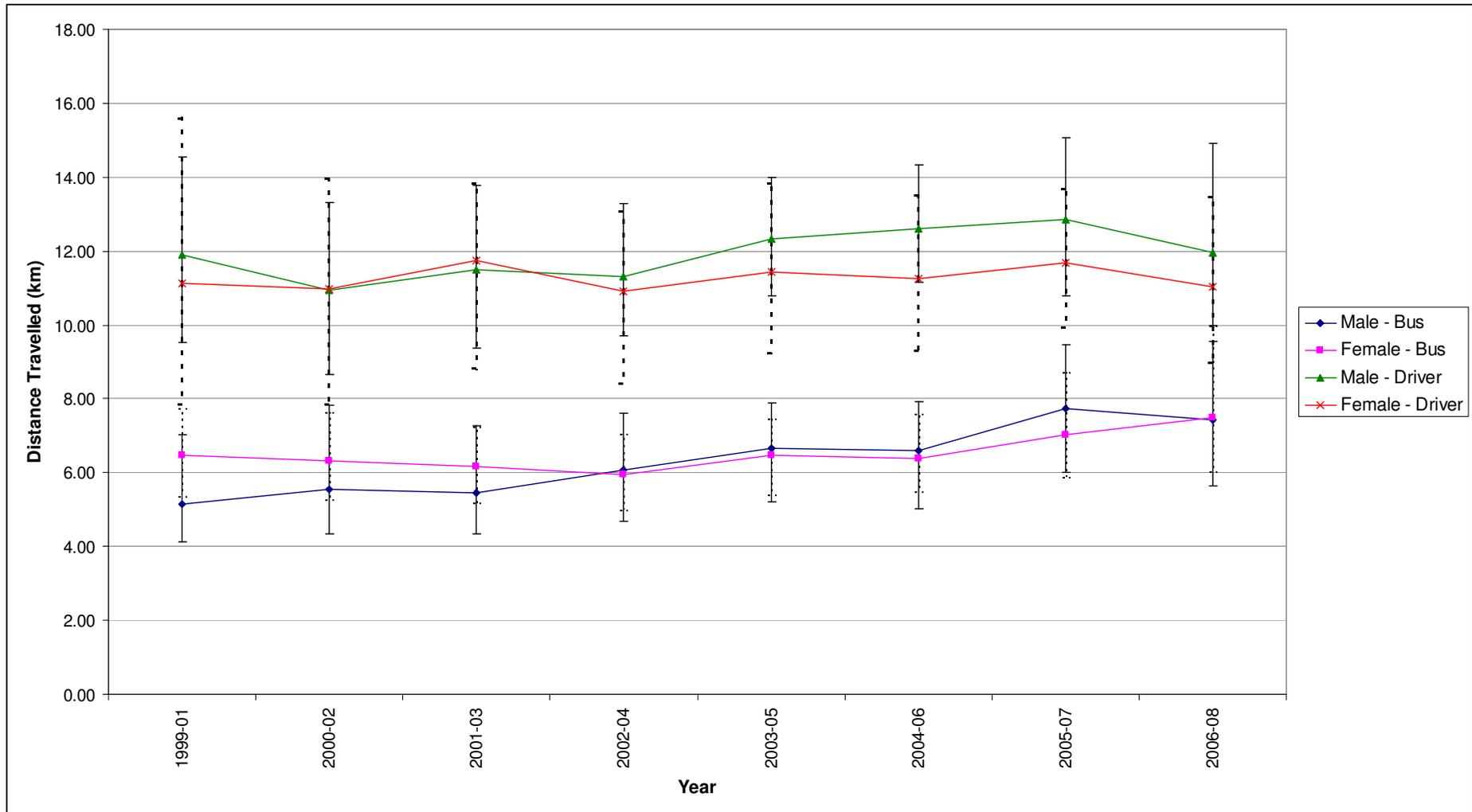


Figure 6.8: **Median** distance travelled per day (km) by older people in Scotland who are concessionary pass holders by **bus** and **car-driver** by **gender** from 1999-2008 (3-year moving averages with 95% confidence intervals)



6.4.1.3. Summary of Descriptive Analysis

From 1999-01 to 2006-08 the proportion of older people holding a concessionary bus pass in Scotland increased from 65.24% to 87.59%. The generosity of the concessionary scheme has increased during this time span and on April 2006 peak hour and local boundary restrictions were removed. This is likely to have encouraged take-up of the scheme. A higher proportion of women hold a concessionary pass, compared to men. Older women are more likely to give up driving earlier than men (Siren and Hakamies-Blomqvist, 2005, 2006, Adler and Rottunda, 2006), which could explain a higher rate of concessionary pass holding amongst women as they may be more likely to use the bus as an alternative, having used it earlier in life (Pooley et al., 2005a).

The proportion of concessionary holders is highest in urban areas as there is likely to be a plethora of services available compared to 'remote' small town and rural areas which have the lowest proportions of concessionary pass holders, where bus service provision tends to be lower (Gray et al., 2001, 2008, Ahern and Hine, 2012, Velaga et al., 2012). Concessionary pass holding has increased amongst those living in 'accessible' small towns and rural areas. As local boundaries have been removed from the scheme, this may provide a greater network of services for free for older people in these areas to take advantage of.

Although the scheme is a universal benefit and available to all those aged 60 and over, this population group varies greatly in terms of socioeconomic characteristics. Older people are widely assumed to have lower incomes as a result of them relying on pensions; however, the proportion of concessionary pass holders belonging to the highest income group has increased over time.

If older people on higher incomes have access to free bus travel more than older people on lower incomes, it questions whether the scheme is truly promoting social inclusion. However, the proportion of concessionary pass holders with access to a car and a driving licence has increased which suggests that it may be encouraging modal shift. Older people may have obtained their driving licences and car when they were younger, which they have brought into older age. This trend of increasing driving licence holdership amongst older people could be partly reflected in the proportion of concessionary pass-holders.

Although older people with higher incomes, driving licences and car access have taken up the concessionary pass, they may not necessarily be using it. Among those with a concessionary pass, a greater number of trips and distance travelled is made as the car-driver for both men and women. The car provides many benefits over public transport, such as greater autonomy, flexibility and independence, which are important for the mobility of older people as there are links to quality of life (Banister and Bowling, 2004, Davey, 2007, Hensher, 2007). However,

there have been increases in mobility by bus, suggesting that the policy may have induced bus travel and as a substitute to a car-driver trip.

6.4.2. Impact of the Concessionary Scheme: 'Difference-in-Differences'

Descriptive analysis was used in the previous section to examine the socioeconomic characteristics and mobility trends amongst concessionary pass holders aged 60 and over. This section will use a 'difference-in-differences' technique to compare the mobility of two groups of older people before and after the change made to the concessionary scheme in April 2006.

Figure 6.9: Changes made to the Scottish concessionary travel scheme policy in line with the availability of SHS data from 1999-2008

Time Period 1	Time Period 2	Time Period 3	Time Period 4
1 st January 1999 – 29 th September 2002	30 th September 2002 – 31 st March 2003	1 st April 2003 – 31 st March 2006	1 st April 2006 – 31 st December 2008
Discretionary fares Women (60+) Men (65+)	Free local travel Women (60+) Men (65+)	Free local travel Women (60+) Men (60+)	Free national travel Women (60+) Men (60+)

Figure 6.9 compares the availability of SHS data to the changes made to the Scottish concessionary scheme. As the travel concession become free from Time Period 2 onwards, the comparison between Time Period 1 against the other time periods may have also been useful in assessing how older people's mobility has changed over time. However, the following analysis will focus on mobility before and after April 2006 as major changes were made to the scheme as local area boundary and peak hour restrictions were removed. It is felt these changes will have the greatest impact on the mobility of older people, as well as increasing awareness of the scheme amongst older people in recent years as the Boomer cohort began to be eligible to claim the concession. In the SHS, people are asked to recall travel made on the previous day therefore the date of 2nd April 2006 has been used to split the data into two time periods as this will capture all trips made from the 1st April 2006.

It should be noted that older men over 60 received the same benefits as women in April 2003. Prior to this they were not able to claim the benefit until they were 65. However, older men aged 60-64 have still been included in the analysis, for years 1999-2003 these men were not entitled to claim the concessionary pass.

The first part of this section presents the results of the descriptive analysis, comparing mean number of trip and distance travelled by bus and as the car-driver between older people with and without a concessionary pass, as well as before and after extension to the concessionary scheme in April 2006. 'Difference-in-differences' multiple linear regression models have been

used to assess the influence of the concessionary scheme on mobility. All analysis has been disaggregated by gender given gender differences in mobility observed in the findings, as well as the literature (Rosenbloom, 2006, Su and Bell, 2012).

6.4.2.1. 'Difference-in-Differences': Descriptive Analysis

Tables 6.1-6.4 consider mobility by bus; tables 6.5-6.8 consider mobility as the car-driver. In each table the mean number of trips or distance travelled by each mode is compared before and after the concessionary policy change in 2006 between older people with and without a concessionary bus pass.

Table 6.1: **Mean number of bus trips** per day by older men

		Before extension to concession in April 2006	After extension to concession in April 2006
Older person has concessionary pass	No	1.86	2.30
	Yes	1.92	2.10

Table 6.1 compares the change in the mean number of bus trips made on the previous day amongst older men. Mean number of bus trips increased after the extension to the concession in 2006 amongst older men both with and without a pass. Prior to the extension, older men without a pass made fewer bus trips compared to those with a pass. However, after the extension, mean number of bus trips were made amongst older men without a pass.

The results are unexpected and interesting as presumably older men without a concessionary pass who are making bus trips would be paying for them, when they are entitled to free travel with a pass. These older men may be unaware of their entitlement to claim the pass and so do not have one. They may be using the bus in an emergency, or might have forgotten to bring their concessionary pass. Also older men aged 60-64 from 1999-2003 are not eligible for pass. As data is only collected for one day prior to the survey, travel behaviour captured over a short period of time may not be representative of usual mobility patterns.

Table 6.2: **Mean number of bus trips** per day by older women

		Before extension to concession in April 2006	After extension to concession in April 2006
Older person has concessionary pass	No	1.84	1.75
	Yes	1.86	1.99

Table 6.2 compared the change in mean number of bus trips made by older women. Older women tend to make fewer trips by bus compared to men in table 6.1. Older women with a concessionary pass make more bus trips compared to those without for both time periods. Those with a pass also make more bus trips per day after the extension to the scheme, whilst those without made fewer bus trips after the extension. These results are expected in line with

the extension to the scheme and contrast that of older men. However, not all older women are claiming the pass.

Table 6.3: Mean distance travelled (km) by bus per day by older men

		Before extension to concession in April 2006	After extension to concession in April 2006
Older person has concessionary pass	No	10.79	9.70
	Yes	11.67	14.43

Table 6.3 compares changes in mean distance travelled by bus amongst older males. Before the extension was made to the concessionary scheme in 2006, older men with a pass travelled further by bus compared to older men without a pass. After the extension, mean distance travelled by bus increased amongst men with a concession pass by 2.76km. Distance travelled by bus declined amongst men without a pass. Given that local boundary area restrictions were removed, it would be expected that distance travelled by bus would increase.

Table 6.4: Mean distance travelled (km) by bus per day by older women

		Before extension to concession in April 2006	After extension to concession in April 2006
Older person has concessionary pass	No	13.13	11.89
	Yes	12.21	15.18

Table 6.4 compared mean distance travelled by bus amongst older women with and without a pass. Although older men make a greater number of trips by bus than older women when comparing tables 6.1 and 6.2, older women are travelling further by bus than men. Before the extension to the scheme in 2006, older women without a concessionary pass travelled further by bus compared to women with a pass. However, after the extension to the scheme, women with a pass travelled further by bus by 2.97km, whilst distance travelled by bus declined by 1.24km amongst women without a pass.

Tables 6.1-6.4 suggest that after the extension to the concessionary scheme in 2006, mobility by bus has increased. Older men make more frequent, shorter bus trips, whilst women make fewer, but longer bus trips.

The influence of the extension on car-driver trips has also been considered, as one of the aims of the policy is to promote modal shift. These results are presented in Tabled 6.5-6.8.

Table 6.5: Mean number of car-driver trips per day by older men

		Before extension to concession in April 2006	After extension to concession in April 2006
Older person has concessionary pass	No	2.63	2.58
	Yes	2.64	2.69

Table 6.5 compares the mean number of car-driver trips amongst older men. Prior to the extension of the concessionary scheme older men with and without a pass had a similar mean number of car trips. After the extension, older men with a pass made a greater number of car-driver trips, whilst car-driver trips decline amongst men without a pass.

Table 6.6: Mean number of car-driver trips per day by older women

		Before extension to concession in April 2006	After extension to concession in April 2006
Older person has concessionary pass	No	2.49	2.60
	Yes	2.59	2.76

Table 6.6 compares the mean number of car-driver trips amongst older women. Prior to the extension of the concessionary scheme older women make fewer car-driver trips compared to men, however, after the extension older women make a greater number of car-driver trips. Older women with a concessionary pass also make a greater number of car-driver trips compared to older women without a pass, both before and after the extension to the concessionary scheme.

Table 6.7: Mean distance travelled (km) by car-driver per day by older men

		Before extension to concession in April 2006	After extension to concession in April 2006
Older person has concessionary pass	No	32.43	30.46
	Yes	23.37	24.65

Table 6.7 compared the mean distance travelled as a car-driver amongst older males. Older men without a concessionary pass travel further as a car-driver compared to older men with a pass in both time periods. Those without a pass are more mobile and therefore may feel like they do not need a concessionary pass. After the extension to the scheme distance travelled as a car-driver amongst men without a pass declines, however, amongst those with a pass, distance travelled increases.

Table 6.8: Mean distance travelled (km) by car-driver per day by older women

		Before extension to concession in April 2006	After extension to concession in April 2006
Older person has concessionary pass	No	24.19	27.08
	Yes	20.62	21.12

Table 6.8 compares mean distance travelled as a car-driver amongst older women. Older women travel shorter distances as a car-driver, compared to older men. Amongst older women without a concessionary pass, distance travelled as a car-driver is higher compared to older women with a pass. After the extension to the concession scheme, distance travelled as a car-driver has increased amongst older women both with and without a concessionary pass.

According to the findings in Tables 6.5-6.8, prior to the extension to the concessionary scheme, older men make more car-driver trips and travel further by this mode compared to older women. However, after the extension to the scheme, car-driver use has increased amongst older women with and without a pass; they also make more car-driver trips than men, although they still travel shorter distances. Amongst older men, car-driver use declined after the extension to the scheme amongst those without a pass, but increased amongst older men with a pass.

6.4.2.2. Summary of 'Difference-in-Differences': Descriptive Analysis

Despite the provision of free bus travel through the concessionary scheme, the car remains important for the mobility of older people. Mean trip frequency and distance travelled is higher amongst car-drivers for both men and women, with and without a concessionary pass. The mobility of older people appears to have increased by both bus and as a car-driver after the extension to the concessionary scheme in April 2006. This could reflect increasing mobility over time, particularly as the first wave of the Boomer cohort have begun to age, as observed from the findings in Chapters Four and Five.

The findings suggest that the car is important in relation to longer distance trips. This may reflect the use of different modes amongst older people to undertake different journey types. The findings also reveal that those with a concessionary pass tend to make shorter trips as a car-driver and travel further by bus, compared to those without a pass. Those with a concessionary pass may have a greater desire for mobility and broader travel horizons than those without.

As distance travelled by bus increased amongst older men and women with a concessionary pass after the extension to the scheme, this indicates that the scheme may be increasing mobility amongst older people by bus. This is not surprising given that the concession is more generous due to the removal of peak hour and local area boundaries restrictions. Changes to the concessionary scheme over time will have been promoted through marketing exercises, therefore increasing awareness of the availability of the concession, leading to older people trialling new services. Providing free bus travel is also likely to induce travelling by bus, as has been noted by others (Mellor, 2002, Rye and Mykura, 2009).

The findings suggest that gender differences in mobility are present, although they appear to be converging. Older men make more bus trips compared to older women and fewer car-driver trips after the extension to the policy. However, older men travel further distances as a car-driver, compared to women. Older women travel further by bus compared to men. Distance travelled as a car-driver amongst men and women is higher compared to the distances they both travel by bus. Older people may be more inclined to undertake longer trips by car if it is available, rather than bus, despite the removal of local area boundary restrictions.

In summary, the descriptive findings suggest that overall mobility is increasing amongst older people, in part due to the concessionary scheme. Findings from Chapter Four revealed that car use has been increasing over time, despite the concessionary scheme. However, car use may have increased further should the concessionary scheme not exist. The results in this section demonstrate that the car remains and is becoming increasingly important for mobility amongst older people as they travel further distances by this mode, particularly for older women.

Older women appear to be more mobile after the extension to the scheme. As women belonging to the Post-War Boomer cohort (b.1946-1955) became eligible to claim the concessionary pass during the year of the extension, they are also more likely to be a car driver compared to former cohorts of women (Spain, 1997, Coughlin, 2009) and therefore more mobile. Amongst this cohort of women the bus may become a less important mode of transport, compared to former cohorts if they are able to continue to drive.

The following section uses 'difference-in-differences' multiple linear regression models to further assess the influence of the concessionary scheme on the mobility of older people in relation to bus and car-driver use.

6.4.2.3. 'Difference-in-Differences': Regression Analysis

This section presents the 'difference-in-differences' multiple linear regression analysis. This technique attempts to isolate the policy effect and allows for a collection of pertinent variables to mobility to be controlled for. Tables 6.9 and 6.10 consider the impact of the extension of the concessionary scheme on bus use, whilst Tables 6.11 and 6.12 considers the impact on car-driver use. The analysis has only been carried out amongst older people and disaggregated by gender.

Table 6.9: 'Difference-in-differences' (DID) multiple linear regression of **number of bus trips** per day amongst older people by **gender** controlling for income, household car access, driving licence holdership, area type, before/after concession policy, concessionary pass holdership and DID interaction

	1. Income, car access, driving licence, area type, before/after policy, concessionary pass, DID interaction for Males only			2. As 1 for Females only		
	Coef.	Confidence Interval		Coef.	Confidence Interval	
		Lower	Upper		Lower	Upper
Income (ref: £0 - £6,000)						
£6,001 - £10,000	0.173***	0.054	0.292	0.008	-0.062	0.078
£10,001 - £15,000	0.092*	-0.031	0.216	-0.086**	-0.164	-0.009
£15,001 - £20,000	0.242***	0.051	0.433	0.061	-0.052	0.174
£20,001+	0.150*	-0.031	0.331	-0.144**	-0.270	-0.018
Car access (ref: no car)						
HH has car access	-0.222***	-0.344	-0.100	-0.107***	-0.186	-0.028
Driving Licence (ref: no licence)						
Person has licence	0.037	-0.072	0.146	-0.007	-0.082	0.068
Area Type (ref: Large urban)						
Other Urban Areas	-0.119**	-0.227	-0.011	-0.062**	-0.122	-0.003
Accessible Small Towns	0.131	-0.174	0.437	0.022	-0.113	0.156
Remote Small Towns	-0.287	-0.731	0.158	-0.203*	-0.478	0.072
Accessible Rural	-0.153**	-0.283	-0.023	-0.052	-0.145	0.041
Remote Rural	0.005	-0.155	0.166	0.016	-0.092	0.124
NCTS Policy (ref: before)						
After policy	0.349	0.209	0.907	-0.112	-0.398	0.175
NCTS Pass (ref: no pass)						
Has pass	0.035	-0.099	0.168	0.008	-0.072	0.087
DID interaction						
Pass * policy	-0.160	-0.731	0.411	0.251*	-0.041	0.543
Constant	1.831***	1.672	1.991	1.936***	1.848	2.023
Number of observations	1328			3245		
R ²	0.0520			0.0234		

*** p<0.01 ** p<0.05 * p<0.1

After controlling for income; household car access; driving licence holdership; area type; before and after the policy extension to the concessionary scheme in April 2006; concessionary pass holding and the 'difference-in-differences' (DID) interaction, according to Model 1 in Table 6.9, bus trips declined amongst older men in Scotland after the concessionary policy was extended. This result is not statistically significant.

Controlling for the same factors as in Model 1 in Table 6.9, Model 2 presents the regression results for older women. In contrast to older men, the number of bus trips made by older women significantly increased after the extension to the concessionary policy scheme. When only taking into account bus trip frequency after the extension, this appears to decline; however, bus trip frequency is higher amongst older women with a concessionary pass.

Considering the influence of each variable controlled for in the regression model and comparing the outcome on the mobility amongst older men and women, income is found to influence mobility differently. Bus trip frequency is higher amongst older men on higher incomes, compared to older men belonging to the lowest income group.

Amongst older women; those belonging to the highest income group of £20,001+ as well as the £10,001 - £15,000 income group, bus trip frequency is lower compared to older women of the lowest income group (£0 - £6,000). Bus trip frequency was lower when older men and women had household access to a car, although driving licence holding does not have a significant impact.

Area type is important as, compared to large urban areas, bus trip frequency is lower in all other area types amongst older men and women, with the exception of accessible small towns and rural areas which do not appear to have a significant influence for men or women.

Table 6.10: 'Difference-in-differences' (DID) multiple linear regression of **distance travelled by bus** (km) per day amongst older people by **gender** controlling for income, household car access, driving licence holdership, area type, before/after concession policy, concessionary pass holdership and DID interaction

	1. Income, car access, driving licence, area type, before/after policy, concessionary pass, DID interaction for Males only			2. As 1 for Females only		
	Coef.	Confidence Interval Lower Upper		Coef.	Confidence Interval Lower Upper	
Income (ref: £0 - £6,000)						
£6,001 - £10,000	0.046	-4.280	4.373	-1.344	-3.698	1.009
£10,001 - £15,000	-1.338	-5.695	3.018	-0.692	-3.443	2.060
£15,001 - £20,000	-1.752	-6.465	2.962	0.037	-3.484	3.557
£20,001+	-3.649	-9.004	1.706	-0.077	-4.276	4.121
Car access (ref: no car)						
HH has car access	4.224*	-0.255	8.703	2.173*	-0.063	4.409
Driving Licence (ref: no licence)						
Person has licence	2.249*	-0.485	4.982	4.596***	1.941	7.251
Area Type (ref: Large urban)						
Other Urban Areas	4.234***	1.202	7.266	3.386***	1.428	5.344
Accessible Small Towns	15.666***	9.091	22.241	7.420***	3.852	10.987
Remote Small Towns	35.187*	-10.666	81.041	15.776**	0.577	30.975
Accessible Rural	13.267***	4.634	21.899	9.297***	5.829	12.765
Remote Rural	23.011***	10.159	35.864	38.956***	27.671	50.241
NCTS Policy (ref: before)						
After policy	1.307	-9.211	11.825	-2.124	-8.677	4.430
NCTS Pass (ref: no pass)						
Has pass	0.809	-2.523	4.140	-0.438	-3.125	2.248
Diff in diff Pass * policy	1.060	-10.117	12.238	4.694	-2.424	11.812
Constant	6.374***	1.414	11.334	9.352***	5.871	12.833
Number of observations	1325			3241		
R ²	0.1170			0.0885		

*** p<0.01 ** p<0.05 * p<0.1

Table 6.10 considers the influence of the extension to the concessionary policy towards the distance travelled by bus amongst older men and women. Controlling for the same factors in Table 6.9, according to Model 1 in Table 6.10 after the extension policy, distance travelled by bus increased amongst older men, although not significantly. Considering the factors in direct relation to the policy extension, distance travelled by bus increased amongst men after the extension, as well as amongst men with a concessionary pass, however, not significantly.

Controlling for the same factors in Model 1 in Table 6.10, Model 2 considers the influence on distance travelled by bus amongst older women. Older women travel further by bus compared to older men indicated by the higher constant value of 9.352 ($p < 0.01$). After the policy extension in 2006, distance travelled by bus appears to decline amongst women. A decline in distance travelled by bus is also observed amongst older women with a concessionary pass. However, after the extension to the NCTS in 2006, distance travelled by bus appears to increase, although this is not significant.

Income does not appear have a significant influence on distance travelled by bus; rather it appears to be more important in whether an older person uses the bus in the first instance. Interestingly, if the household has access to a car it would seem that older men and women travel further by bus, suggesting that bus use could be substituting car use. If so, the extension to the NCTS policy could be promoting modal shift. To support this claim, distance travelled by bus is also higher amongst those with a driving licence.

Area type is significant in influencing distance travelled by bus. As an area becomes more suburban and rural, distance travelled by bus increases and is significant for all area types amongst older men and women. Services, goods, people and activities tend to be located further away in rural areas (Lucas, 2004), therefore longer distances need to be undertaken in order to reach them.

Older men and women display differences in relation to distance travelled by bus. Older men travel further by bus after the policy change, if they have a concessionary pass, whilst amongst older women, distance travelled by bus declines. However, these results are not significant.

As the concessionary policy aims to promote modal shift, it is also important to consider the influence of the policy on car-driver use. Tables 6.11 and 6.12 consider the outcome of the concessionary policy extension on car-driver trip frequency and distance travelled respectively. The variables controlled for in Tables 6.9 and 6.10 are also controlled for in Tables 6.11 and 6.12.

Table 6.11: 'Difference-in-differences' (DID) multiple linear regression of **number of car-driver trips** per day amongst older people by **gender** controlling for income, household car access, driving licence holdership, area type, before/after concession policy, concessionary pass holdership and DID interaction

	1. Income, car access, driving licence, area type, before/after policy, concessionary pass, DID interaction for Males only			2. As 1 for Females only		
	Coef.	Confidence Interval Lower Upper		Coef.	Confidence Interval Lower Upper	
Income (ref: £0 - £6,000)						
£6,001 -£10,000	0.034	-0.146	0.214	0.182**	0.011	0.353
£10,001 - £15,000	0.161*	-0.020	0.343	0.234***	0.066	0.401
£15,001 - £20,000	0.172*	-0.027	0.371	0.204**	0.017	0.391
£20,001+	0.299***	0.113	0.484	0.272***	0.102	0.442
Car access (ref: no car)						
HH has car access	0.467***	0.218	0.716	0.458***	0.193	0.724
Driving Licence (ref: no licence)						
Person has licence	0.641***	0.286	0.995	0.635***	0.428	0.841
Area Type (ref: Large urban)						
Other Urban Areas	0.002	-0.122	0.125	0.049	-0.097	0.196
Accessible Small Towns	-0.164**	-0.313	-0.014	0.045	-0.195	0.285
Remote Small Towns	-0.041	-0.281	0.198	0.180	-0.149	0.510
Accessible Rural	-0.145*	-0.295	0.005	-0.248***	-0.398	-0.099
Remote Rural	-0.227***	-0.383	-0.071	-0.192**	-0.370	-0.013
NCTS Policy (ref: before)						
After policy	-0.117	-0.315	0.081	0.127	-0.117	0.372
NCTS Pass (ref: no pass)						
Has pass	-0.023	-0.134	0.089	0.118*	-0.013	0.249
Diff in diff Pass * policy	0.144	-0.088	0.375	0.025	-0.262	0.312
Constant	1.456***	1.053	1.858	1.272***	0.987	1.557
Number of observations	4930			3319		
R ²	0.0128			0.0346		

*** p<0.01 ** p<0.05 * p<0.1

Model 1 in Table 6.11 considers the impact of the policy extension on car-driver trip frequency amongst older men. Model 2 considers the impact on older women. Both models suggest that after the policy extension car-driver trip frequency has increased although this is not significant.

In relation to car-driver trip frequency, income is an important influence amongst older men and women. The higher the income group, the higher the car-driver trip frequency, which is significant for all male and female income groups, when compared to the lowest income group, except for men belong to the £6,001 - £10,000 group.

Household car access and driving licence holding also significantly influence car-driver trip frequency. Area type is also important. Whilst car-driver trip frequency is lower amongst older people in accessible and remote rural places, compared to urban areas, this is likely to be due to the further distance of these areas from services and activities. This is compared to older people in urban areas who may be more likely to make a higher number of car-driver trips, yet travel shorter distances.

After the concessionary policy extension in 2006, car-driver trip frequency has declined amongst older men, as well as amongst those with a concessionary pass. However, the opposite is true for older women. When considering car-driver trip frequency amongst older people with a pass, after the policy extension, it is higher for both men and women, although this is not significant.

Overall, car-driver trip frequency is higher amongst men; however, the results suggest that the car is becoming increasingly important for women, despite the concessionary policy.

Table 6.12: 'Difference-in-differences' (DID) multiple linear regression of **distance travelled by car-driver** (km) amongst older people by **gender** controlling for income, household car access, driving licence holdership, area type, before/after concession policy, concessionary pass holdership and DID interaction

	1. Income, car access, driving licence, area type, before/after policy, concessionary pass, DID interaction for Males only			2. As 1 for Females only		
	Coef.	Confidence Interval Lower Upper		Coef.	Confidence Interval Lower Upper	
Income (ref: £0 - £6,000)						
£6,001 - £10,000	0.086	-4.804	4.975	0.472	-3.861	4.804
£10,001 - £15,000	1.266	-3.430	5.962	0.407	-3.824	4.639
£15,001 - £20,000	4.586*	-0.701	9.873	2.343	-2.352	7.037
£20,001+	12.863***	7.381	18.345	3.984*	-0.546	8.513
Car access (ref: no car)						
HH has car access	-9.531	-22.877	3.816	4.869*	-1.688	11.427
Driving Licence (ref: no licence)						
Person has licence	18.285***	13.627	22.943	1.937	-3.453	7.327
Area Type (ref: Large urban)						
Other Urban Areas	2.872**	-0.009	5.753	4.074***	1.249	6.898
Accessible Small Towns	11.573***	4.949	18.197	6.226***	2.863	9.589
Remote Small Towns	5.624*	-0.717	11.966	2.631	-5.621	10.883
Accessible Rural	13.758***	9.730	17.787	12.108***	8.349	15.867
Remote Rural	16.960***	11.122	22.799	13.078***	8.561	17.595
NCTS Policy (ref: before)						
After policy	-6.191**	-12.854	0.471	1.933	-4.669	8.534
NCTS Pass (ref: no pass)						
Has pass	-5.280***	-9.016	-1.544	-0.536	-3.577	2.506
Diff in diff Pass * policy	3.849	-3.302	11.001	-2.897	-10.138	4.344
Constant	11.241**	-0.903	23.384	8.730***	2.174	15.286
Number of observations	4925			3318		
R ²	0.0431			0.0323		

*** p<0.01 ** p<0.05 * p<0.1

Table 6.12 considers distance travelled as the car-driver in relation to the extension to the concession in 2006. Model 1 considers the impact amongst older men, whilst Model 2 considers the influence upon older women. The findings suggest that amongst older men with a concessionary pass after the policy extension, distance travelled as the car-driver has increased. Distance travelled has declined amongst older women, although these results are not significant.

Income is an important influence on distance travelled as the car-driver. Older men and women belonging to the highest income groups travel further, indicated by the significance of the results in Table 6.12. Whilst car access is important for older women, as distance travelled as the car-driver is higher amongst those with access, amongst men distance travelled declines with car access, although this is not significant. Considering the influence of area type on distance travelled as the car-driver, compared to large urban areas, distance travelled is significantly higher across all other area types amongst older men and women.

The extension to the concession in April 2006 appears to be having a different impact on the mobility of older men and women. After the extension, distance travelled as the car-driver declined amongst older men, but increased amongst older women, although this was not significant. Concessionary pass holding also has a significant impact as amongst older men with a pass, distance travelled as the car-driver declined. Distance travelled also declines amongst older women with a pass, although this was not significant. Although the 'difference-in-differences' interaction suggests the extension of the concessionary scheme appears to have no significant impact on distance travelled as the car-driver amongst men, there are some significant results suggesting that distance travelled as the car-driver is declining. This suggests that the concessionary policy may be influencing this trend.

6.4.2.4. Summary of 'Difference-in-Differences' Results

The findings from this section suggest that the concessionary scheme has significantly increased bus trip frequency amongst older women in Scotland (0.251 p-value<0.1) from 2006-2008 after the scheme was extended in April 2006. Whilst bus trip frequency declined amongst older men (-0.160), this was not significant. After the extension, distance travelled by bus also increased amongst older men (1.060) and older women (4.694), although not significantly. Despite the extension to the policy, increases in car-driver trips were observed for both older men (0.144) and older women (0.025). Distance travelled as car-driver increased amongst older men after the policy extension in 2006 (3.849), whilst it fell amongst older women (-2.897). These results pertaining to car-driver use were not significant. It would appear that the extension to the concessionary policy is having a greater impact upon the mobility of older women in terms of significantly increased bus trip frequency.

Concessionary travel does not appear to significantly influence other aspects of mobility in relation to distance travelled bus and car-driver use. As data is only available for two years after the extension to the policy was made, the policy impacts may not be as pronounced and significant impacts on mobility may be observed as more data becomes available.

Gender differences are still observed in the findings, most notably in a significant increase in bus trip making amongst older women. Very broadly, older women are considered to be at a greater risk from social exclusion due to poor transport (Hine and Mitchell, 2003, Lucas, 2004). Therefore the policy could be meeting its objectives as it is having a greater impact on and possibly benefiting, older women in this respect. However, as no significant results were observed amongst men and women in relation to car-driver trips, there may be some evidence of gender convergence.

6.5. Discussion

The findings suggest that the concessionary scheme is highly valued amongst older people in Scotland, demonstrated by the high take-up of the scheme which has increased significantly since the extension to the concession in April 2006. However, car-driver use still remains higher than bus use amongst older concessionary pass holders highlighting the continued importance of the car amongst older people. This section will critically assess the impact of the concessionary policy on the mobility of older people in Scotland.

6.5.1. Characteristics of Scottish Concessionary Pass Holders

The socioeconomic characteristics of concessionary pass holders appear to have changed from 1999-2008. A higher proportion of pass holders belong to higher income groups. Whilst the concessionary policy is a universal benefit, one of the aims is to promote social inclusion by enabling older people on lower incomes to access services using bus services. As concessionary pass holding has increased significantly over the time period, it is likely the characteristics of pass holders will change to encompass a greater variety of older people.

Not all people aged 60 and over have low incomes (in fact many still continue to participate in the labour market until retirement age and perhaps beyond, which is 65 years in Britain), but the universal nature of the scheme does not take this into account. Rye and Scotney (2004) highlight that increasing affluence amongst older people is increasing the length of trips they make. Not all older people require free bus travel and are able to access facilities and participate in social networks without welfare state assistance.

Concessionary pass holding has also increased amongst older people living in 'accessible' rural and small towns. The scheme may be more worthwhile for older people in these

locations as boundary restrictions were lifted, increasing the range of bus services to travel on for free.

6.5.2. Mobility Trends of Scottish Concessionary Pass Holders

Although bus use has increased in Scotland, the car remains important for the mobility of older people, despite the scheme being in place. Car-driver trip frequency and distance travelled is higher compared to bus travel, however, car use has not increased. Bus trip frequency has increased, which suggests that the concessionary scheme is inducing travel (Mellor, 2002, Rye and Mykura, 2009) and contributing to the increase in mobility. Car-driver trips may be significantly higher should the scheme not be in place thereby promoting modal shift and contributing to meeting wider environmental objectives, although this may be at a high financial cost.

Despite the high take-up of the concessionary pass by older people, they may not necessarily be bus users. Cost is not the only barrier to using public transport and there are many other barriers that prevent use. These are not exclusive to older people, but are applicable to a range of different people. As people become older their travel abilities and needs change. Barriers to bus use include: bad driving behaviour and poor driver attitudes; concerns about anti-social behaviour by others; fear about the physical condition of buses making them unsafe, unreliable or inaccessible services; concerns about personal safety related to both being on buses and waiting and walking to bus stops particularly at night; perceived interval and length of bus journeys; beliefs that bus timetables are unreliable; perceived lack of direct and/or appropriate routes, as well as concerns about routes travelling through 'undesirable' areas (Lucas, 2004, Stradling et al., 2007, Dobbie et al., 2010). Some studies have found there has been little social inclusion impact as a result of some of these barriers, particularly if services are not frequent or located too far away, rendering the concessionary pass unsuitable (Rye and Mykura, 2009).

The high take-up of the scheme suggests that bus services may be viewed as a viable alternative to the private car amongst older people. As car use is increasing amongst this group, issues of reduced independence, isolation and depression relating to driving cessation (Burkhardt et al., 1996, Marottoli et al., 1997, Ragland et al., 2005, Adler and Rottunda, 2006) may be more pronounced in the future as a higher proportion of older people eventually give up driving. Bus travel could be encouraged through the concessionary scheme; however, it needs to be a viable alternative to the car.

Older women are more likely to voluntarily give up driving earlier compared to men (Siren and Hakamies-Blomqvist, 2005, Adler and Rottunda, 2006, Davey, 2007) which suggests that older women will be more likely to make use of the concessionary scheme at an earlier stage

compared to men. Changes to the concessionary scheme are therefore likely to affect women disproportionately more than men. Amongst current and former cohorts of older people, gender differences in terms of mobility may be more pronounced, as women tend to be driven and are more used to the public transport system from earlier in their lives if no car was available (Pooley et al., 2005a). Taking into account the ageing of the Boomer cohort, the car appears to be particularly important for this cohort as they have 'grown up' with the car (Coughlin, 2009). As women belonging to this cohort become older, they may not be as willing to give up the car as readily as former cohorts of older women.

6.5.3. Has the Concessionary Scheme Increased Mobility Amongst Older People in Scotland?

The extension to the concessionary scheme appears to be having a significant impact on the mobility of older women in terms of bus trip frequency, but no significant impact was observed on the mobility of older men. Car use has not been significantly influenced by the scheme. Mobility appears to be increasing overall amongst older people in Scotland, in part due to the concessionary policy change as the provision of free bus travel, as well as increasing the generosity of the concession by removing peak hour and local area boundary restrictions, induces travel (Rye and Mykura, 2009); however, despite the availability of free bus passes for older people the findings suggest that the car remains important for the mobility of older people as increases in car use were observed after the extension of the scheme.

The concessionary scheme is having a greater impact on the mobility of women, suggesting that women are benefiting disproportionately more from the policy than men, which is important in the context of social exclusion as women have been identified to be at a higher risk of social exclusion as a result of poor transport (Hine and Mitchell, 2003, Lucas, 2004). Current cohorts of older women (as well as women overall), are more likely to use bus services compared to men (Pooley et al., 2005a). This may be reflected in the significant findings amongst women.

From the findings from other chapters in this thesis, it could be argued that increasing mobility amongst older people is due to the ageing of the Boomer cohort. This cohort is associated with higher car use (Coughlin and Reimer, 2006, Coughlin, 2009). They became eligible to claim for the concessionary bus pass in 2006, therefore there may be a cohort effect present as it is unclear as to whether there has been modal shift as a result of the concessionary policy. Given that bus and car use has increased, it could be that car use could be higher without the concessionary scheme in place, or that older people are unable to make bus trips should the policy not be available.

Newer concessionary pass holders appear to have a greater degree of discretionary use; these pass holders are most likely to be the Boomer cohort. External factors, such as increasing and high car parking charges in dense urban areas and recent increases in car fuel costs may have made the bus more appealing for older people to use over this time. Although they may retain use of the car for most trips, due to these external factors they may use concessionary passes for journeys into urban centres where congestion and/or parking charges affect the relative attractiveness of using a car (Baker and White, 2010), so there is greater mobility as well as substitution between car and bus. Whilst this may assist in meeting wider environmental objectives, it does not appear to be having as great an impact in meeting social inclusion objectives.

Although the concessionary pass is available to all aged 60 and over in Scotland, comparisons have been made to older people without a pass, even though they are eligible to claim one. Bus service provision in their area may be of a poorer quality, which means that the benefits of the scheme are distributed unevenly, in addition to many other barriers to bus use (Stradling et al., 2007, Dobbie et al., 2010). Older people may utilise other modes that are better suited to their needs and desires.

6.6. Conclusion

This chapter has considered the influence of the concessionary policy on the mobility of older people in Scotland from 1999-2008. Descriptive analysis identified that the scheme is highly valued as concessionary holding has increased to almost 90% amongst older people. The socioeconomic characteristics of concessionary holders is changing over time with increasing proportions of older pass holders having higher incomes, as well as living in 'accessible' small towns and rural areas. Concessionary pass holding is also increasing amongst older people with access to a car and driving licence. The mobility of older people increased after extensions were made to the concessionary scheme in April 2006, which removed peak hour and local area boundary restrictions, particularly amongst women. This implies there are gender differences in mobility arising from the concessionary policy. Despite the concessionary scheme, the car remains important for the mobility of older people.

It can be concluded that the blanket policy of providing free concessionary bus travel to all older people is very blunt. The findings suggest that this scheme is not very effective in terms of promoting modal shift as car-driver trip frequencies and distance travelled have risen after the extension the scheme, amongst both men and women (although not significantly). Amongst women bus trip frequencies increased significantly after the policy extension; as well as distance travelled by bus, although this finding was not significant. Whilst modal shift may not have been achieved, the provision of concessionary travel may be suppressing potential mobility as the car-driver/use of car; without the concession car driver trips may be higher.

Whilst gender differences are observed in the findings in relation to higher bus trip frequencies, this could reflect higher bus use amongst women more generally (Pooley et al., 2005a). Women are also more likely to give up the car voluntarily earlier than men when they are also in good health perhaps contributing to increased bus use as an alternative transport mode (Burkhardt et al., 1996, Hakamies-Blomqvist and Siren, 2003, Ragland et al., 2004, Adler and Rottunda, 2006, Siren and Hakamies-Blomqvist, 2005, Davey, 2007). Older women belonging to cohorts born prior to the Boomer cohort are also more likely to have not driven or relied on their partner to drive and therefore utilise the bus as their main modes of transport (Pooley et al., 2005a). Although social exclusion is a multi-faceted problem (Lyons, 2003), the concessionary policy could be beneficial and appears to be playing a role in improving and maintaining mobility for older women in particular and therefore potentially promoting social inclusion. However, some studies have found little evidence of social inclusion as a result of barriers to bus use other than cost (Rye and Mykura, 2009)

There is value in mobility, in being able to 'get out and about' and knowing that travel is possible (Metz, 2000) and there are links to quality of life (Banister and Bowling, 2004, Spinney et al., 2009, Ziegler and Schwanen, 2011). Whilst there may be other barriers to using public transport the barrier of cost is removed. Increased up-take of the scheme is valuable as for older people just knowing that a trip could be made is important to prevent social exclusion. Metz (2000) suggests that the concept of mobility needs to include the ability to be able to make a trip should an older person need to. The increase in concessionary pass holding can therefore be seen as an important aspect of this mobility concept of older people. Given that there are strong opinions against scrapping the scheme, with it perhaps being viewed as a 'right' as people eligible to claim have paid taxes earlier in life, the impact should the benefit be taken away should be considered and weighed up against financial savings. The high take-up of the scheme could indicate that the scheme is viewed as a 'safety blanket' should older people not be able to drive in the future. Should the scheme be scrapped, this may lead to increased feelings of isolation as a result of not having mobility options and therefore potentially loneliness and depression.

The next chapter will expand on the implications of the findings from this chapter, synthesizing them with the key findings from the results of the preceding chapters to develop further insight into the mechanisms behind changing mobility of the British older population as the population ages with the ageing of each subsequent cohort.

7. Discussion

7.1. Introduction

Mobility amongst the British older population, in terms of distance travelled, has increased from 1995-2008. Findings from the cohort analysis suggests that the Boomer cohort will have different mobility patterns in older age from former cohorts of older people, and may even be unique in terms of their mobility. This will have implications for the future of the concessionary travel scheme; particularly in relation to financial sustainability as the first wave of the Boomer cohort have become eligible to claim this benefit. This chapter seeks to draw together these key empirical findings and relate them to existing literature to address the wider objective of the thesis of developing insight into the changing mobility of older people in Britain.

The key findings are summarised before examining the wider conceptual issues regarding the relationship between older people, the ageing of cohorts and mobility, over time and through space. The implications for future policy development in the context of the ageing population of Britain will be considered in relation to the concessionary scheme in promoting modal shift and social inclusion.

7.2. Summary of Key Findings

Chapter Four revealed that mobility amongst older people in Britain has increased from 1995-2008. Trip frequency increased significantly from 13.11 to 14.01 trips per week; even when commuting and work-related trips were excluded mean trip frequency still increased significantly from 12.07 to 12.90 trips per week. Mean distance travelled also rose significantly from 146.28km to 167.65km per week. When commuting trips were excluded distance travelled still increased significantly from 132.21km to 150.59km per week. Significant increases in median distance travelled were also observed. The car appears to be playing an important role in this increasing mobility as it is, and has remained, the main mode of transport for older people as drivers and passengers.

Although gender differences were observed amongst the mobility of older people as men made significantly more trips and travelled further than older women, there is some evidence that these differences are converging as median distance travelled per week by older women increased at a faster rate compared to men. In addition, whilst travel as the car-driver accounted for 59.81% mode share amongst older men in 2006-08, travel as the car-driver was observed to be increasingly important for women as they increased travel by this mode from 15.55% in 1995-97 to 23.14% in 2006-08. This reflects the dramatic increased rate of driving licence holding amongst older women (see Figure 2.1). Mode share as the car-driver

is likely to increase amongst older women, as women of the Boomer cohort are likely to continue to hold their driving licences into older age (Spain, 1997, ECMT, 2000, Rosenbloom, 2001).

Cohort analysis was used in Chapter Five to consider the influence that cohort membership has on mobility patterns. Age, period and cohort effects were used to explain changes in mobility amongst older people. As people age through the life-course, mobility changes due to different activities and circumstances associated with different life-course stages (Oppermann, 1995, Pooley et al., 2005a, Ryley, 2006). Those entering early adulthood had lower levels of mobility, which increased and peaked during 'middle-age' (i.e. 30-59 years). Amongst the older age groups, significant differences in distance travelled were observed between them, demonstrating an age effect is present as mobility declines with age due to lifestyle changes and age-related health conditions (Tacken, 1998, Metz, 2003, Guo et al., 2010).

Mobility differed between the birth cohorts, not only at different time points, but also when they were of the same age. The Post-War Boomer cohort (b.1946-1955) appeared to have higher levels of mobility when compared to former cohorts of older people, particularly amongst women. Gender differences were found to be persistent amongst current cohorts of older people, with men travelling further than women across all older age groups and years.

Other findings from the cohort analysis in this study challenged the generally accepted notion that women travel less compared to men (Pooley et al., 2005b). Although other studies have also found that gender differences in mobility have been converging at the aggregate level (Noble, 2005, Rosenbloom, 2006, Frändberg and Vilhelmson, 2011, McQuaid and Chen, 2012), in this study Women of the Generation Y cohort (b.1976-1985) were found to have higher levels of mobility compared to their male counterparts, across all age groups. This finding has not been observed previously, indicating that mobility changes with each successive cohort. Therefore cohort effects are present and are useful in explaining mobility trends.

Although there has been an upward trend in mobility over the past three decades as incomes have risen and car ownership has increased, particularly amongst the poorest fifth of British households over the past decade, more recently there has been a reduction in the rate of growth in travel that began in the mid-1990s (ITC, 2010). This is line with the findings, which observed there has been a decline in distance travelled since 1995. According to the ITC (2010) there was a further 'flattening out' in growth after 2000 when, in the height of an economic boom, long distance travel by car per person ceased to grow. This appears to be a genuine trend effect, which has been exacerbated by the current recession that began in 2008.

As increases in mobility have been observed amongst the older population, as well as the Boomer cohort, the mobility of the Boomer cohort could be masking the overall downward trend in mobility occurring over time. As distance travelled is actually declining over time, it may be that after the Boomer cohort passes away successive cohorts of older people may display lower levels of mobility.

The Scottish concessionary scheme appears to be contributing to the increasing mobility of older people through inducing bus travel. Almost 90% of older people in Scotland hold a concessionary pass suggesting that the policy is highly valued. Bus trip frequency increased significantly amongst older women after an extension to the concessionary scheme in April 2006 which removed peak hour and local area boundary restrictions. Despite the concessionary policy, car use is increasing amongst men and women although not significantly. These findings reflect gender differences in mobility, which may also be reinforced by the policy as women tend to be bus users and are more likely to voluntarily give up driving earlier (Adler and Rottunda, 2006). There are some hints that the scheme is encouraging modal shift, particularly when travelling longer distances. The concessionary scheme may also be suppressing car use amongst older people.

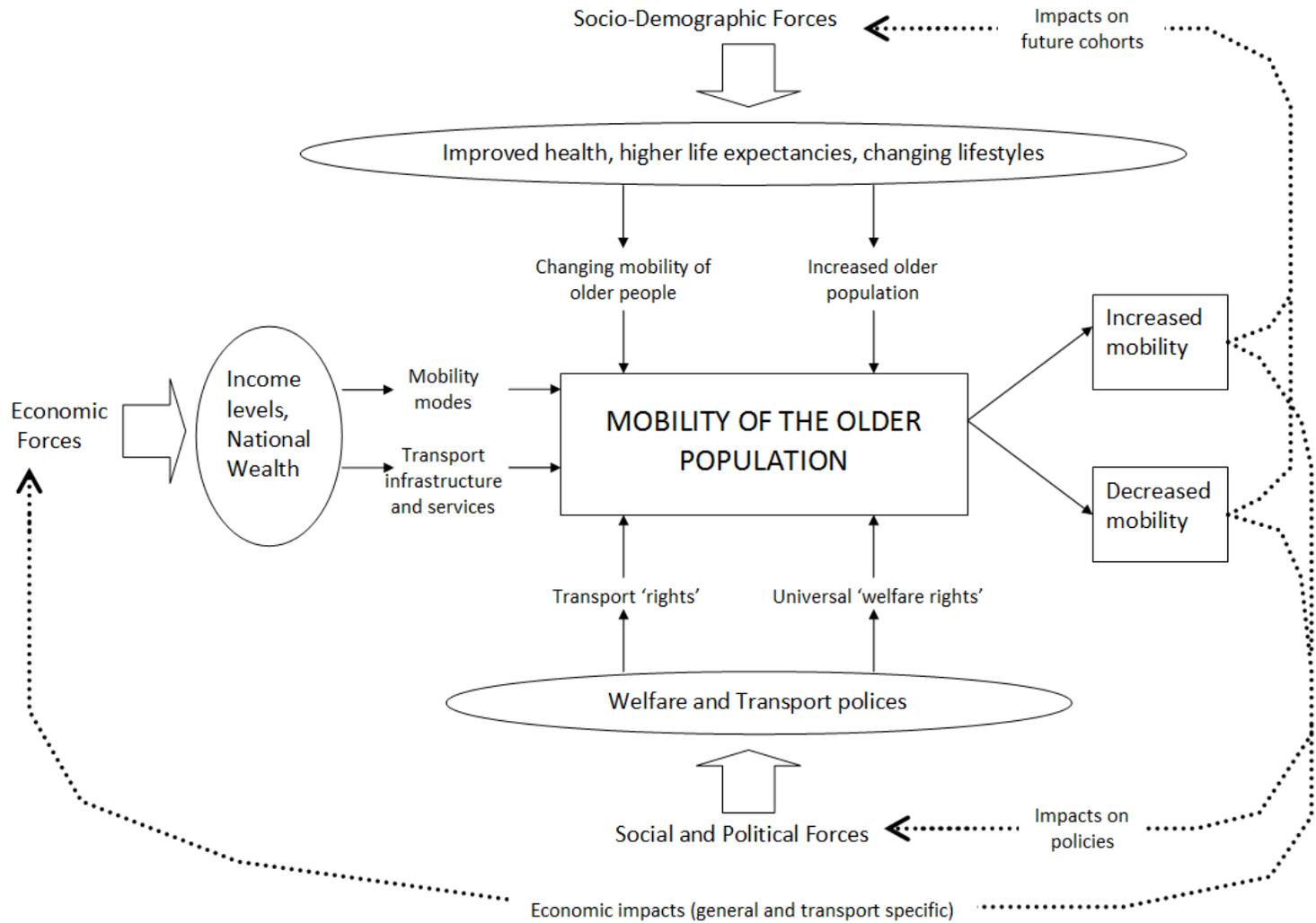
The mobility of older people is usually thought to be lower than the key findings of this study would suggest. Lower mobility levels tend to be a result of age-related health conditions, lack of access to suitable transport due to lower incomes and residing in suburban, rural and coastal locations. These factors could lead to, or be a product of, social exclusion which is a multifaceted problem which is not exclusive to the older population. Due to the higher mobility displayed by the Boomer cohort and subsequent cohorts, there are a variety of forces that influence the mobility of cohorts and therefore leading to changes in the mobility of older people over time.

7.3. Conceptualisation

In light of the findings, it is necessary to re-conceptualise the mobility of older people as a combination of factors appear to be changing the meaning of what constitutes older age (Chapter 2.6) thus affecting how ageing interfaces with mobility. These are produced as a schema in Figure 7.1.

The findings from the cohort analysis indicate that cohort membership is important to understand mobility patterns, as the mobility of cohorts differs. As each successive cohort ages there is likely to be greater variation in the mobility of older people.

Figure 7.1: Structural influences affecting the mobility of older people



Source: Author

7.3.1. Structural Influences Affecting Mobility of Older People

Figure 7.1 illustrates the structural forces affecting the mobility of older people. Causal connections between these forces are illustrated which are contributing to the changing mobility of older people. Within this diagram spatial forces are also inherent within each of the other forces which are outlined in each of the following discussions.

7.3.1.1. Socio-Demographic Forces

Firstly, socio-demographic forces are contributing to the development of an ageing population. Over the coming decades as the Boomer cohort ages, it is large in terms of its number of members. With improved health and medical care, subsequent cohorts are likely to remain active for longer, thus increasing life expectancies (Tinker, 2002, Christensen et al., 2009, UN, 2010). A combination of healthier, much older people will lead to a greater proportion of older people in the population, who will also likely be able to continue driving for much longer.

In particular, the Boomer cohort are used to travelling by car, having grown up with developments relating to it (Coughlin, 2009). Therefore they are likely to have higher expectations regarding mobility compared to former cohorts of older people. As this cohort have also accumulated wealth, having grown up during period of economic growth, they are also likely to have more active lifestyles which will lead to changing mobility patterns amongst older people.

A spatial aspect of socio-demographic forces has been the changing residential locations of older people usually towards outer suburban, rural and coastal areas in retirement (Atterton, 2006, Champion and Shepherd, 2006, Uren and Goldring, 2007, Bayliss and Sly, 2010). Over time there has been increasing dispersal of family networks as adult children relocate to seek work after full time education. As they settle in these areas, time pressures experienced by families has led to changing mobility patterns amongst older people as increasingly active older people (parents of adult children) travel to see relatives, rather than the other way around that was previously the case (Pooley et al., 2005a, Cooke, 2011). These changing lifestyles have been facilitated by increasing car use, resulting in changing mobility cultures as rates of driving licence holding has increased amongst older people, as well as multiple car ownership amongst households (DfT, 2010a). This combination will result in mobility changes amongst older people at the aggregate level, which will impact on wider transport systems and networks as increases in car use can cause higher congestion and increased emissions.

Transport mode choice is heavily dependent on disposable income (Goodwin, 1990, Wardman, 1998, Pooley et al., 2005b, Headicar, 2009). With people staying healthier for

longer contributing to an ageing population, most western welfare economies are re-framing their employment law and pension systems in such a way that people are being encouraged to work longer before being able to claim a state pension. According to the Organisation for Economic Co-operation and Development (OECD) the long-term retirement age in half of OECD countries will be 65, and in 14 countries it will be between 67 and 69. These increases in retirement ages are underway or planned in 28 out of the 34 OECD countries (OECD, 2012). In the UK women's State Pension age will increase more quickly to 65 between April 2016 and November 2018. From December 2018 the State Pension age for both men and women will start to increase to reach 66 in October 2020 and 67 by April 2028 (Directgov, 2012). In addition, the Default Retirement Age (DRA) was abolished in October 2011, meaning that employers can no longer force older people to retire at the age of 65.

One challenge of an ageing population is the smaller tax base that will become evident as an increasing proportion of older people retire combined with a smaller proportion of younger people of working age (Feldstein, 2006); a result of the low fertility levels associated with the Second Demographic Transition (Lesthaeghe, 2000). Increasing retirement ages should partly assist in counteracting this. A 'pension crisis'⁴ is also causing older people to delay retirement due to a combination of decreasing annuity rates and poor investment returns (Simon, 2012).

Increasing retirement ages will influence the mobility of older people in two ways. A continuation of commuting may cause increased congestion, particularly if older people continue to travel by car. Cost is an important factor in transport mode choice, with people on higher incomes able to choose faster modes of transport, therefore having higher mobility levels. Older people may have continued and perhaps increased incomes as a result of remaining in employment for longer, leading to increased mobility.

When older people retire (potentially at a much older age in the future), whilst retirement itself does not affect physical ability to travel, it results in different activity patterns resulting in changes in mobility. There are opposing aspects with retirement associated with income. Amongst older people with higher disposable incomes, who also may have been able to retire early, retirement provides opportunities for new increased mobility, as they will be unconstrained by the routines of a work timetable (van den Berg et al., 2011). Reduced disposable income due to reliance on a pension may limit or constrain the activities people are able to participate in.

Income levels associated with socio-demographic forces also influence transport mode choice and the ability to continue to afford a car. Changes in mobility are also associated with the

⁴ A pension crisis is where there are not enough resources in pension funds to be able to guarantee a comfortable retirement for the current working population, and the shortfall is also thought to be widening (BBC, 2005)

use of different modes of transport as people age, particularly through the provision of concessionary travel and incidence of driving cessation. Reductions in mobility due to driving cessation can be compounded due to the dispersal of family as previously mentioned, as there are fewer support networks to offer alternative means of travel; although there has been a rise of the 'sandwich generation' amongst those of 'mid-life' stage, where care is provided to older parents and (grand) children simultaneously (Agree et al., 2003, Evandrou and Glaser, 2004, Pierret, 2006, Demey et al., 2011). There are other economic forces that influence levels of disposable income and therefore mobility.

7.3.1.2. Economic Forces

Largely addressed in the preceding discussion, economic influences at the individual level in terms of disposable income as a result of employment and unemployment affect activities and transport choices; however, at the national level there are other economic forces that influence mobility. Economic growth or recession impacts on levels of capital investment and subsidy provision into transport systems as well as other associated services by government and the private sector. The labour market is also affected (Fielding, 2010).

There are spatial aspects to economic forces. Most pertinent to this concept is the influence of economic growth and recessions on the housing market cycle (Fielding, 2010), which in turn influences residential migration patterns and locations of older people as well as those of children and grandchildren in relation to them. Residential location has an impact on transport mode choice (Stanbridge et al., 2004), therefore the ability or inability to move within these economic environments will influence mobility outcomes. In the current economic recession Cooke (2011) has observed that older people are not engaging in residential moves, which is resulting in higher levels of mobility.

The current recession has been associated with lower mobility due to higher unemployment and therefore lower levels of commuting (Trafficmaster Plc. and the AA, 2009). Metz (2012) has also observed a downturn in distance travelled in the past three years, most likely attributed to a temporary effect of the economic recession, which is in line with findings in this study that also observed a trend of declining mobility. Rising transport costs, such as increases in fuel prices (BBC, 2012a, Hall, 2012) and public transport fares above the rate of inflation (Hill, 2011, BBC, 2012b, Osborne, 2012) are likely to be contributing to declining mobility. Increases in public transport fares above the rate of inflation also means that the relative costs of the car is lower in comparison, despite current recessionary strains on income (Hopkinson, 2012). Therefore higher car use may be contributing to higher mobility levels.

As a result of pressure on public spending due to the current recession, bus subsidies have reduced, leading to a contraction of services, particularly in outer suburban and rural areas (Transport Committee, 2011), thus reducing transport options for those reliant on public transport in these locations and therefore mobility levels. Whilst for older people the cost of using public transport is removed through the concessionary travel policy, a lack of bus services can result in reduced mobility (Rye and Mykura, 2009).

Developments in telecommunications infrastructure is thought to be having an influence on mobility patterns as some goods and services can be accessed online, rather than incurring physical trips (Kenyon et al., 2002, 2003, Lyons and Kenyon, 2003, Kwan, 2006). This may help improve accessibility for older people, however, technology and internet connections are distributed unevenly both geographically and socially (Digital Britain, 2009, Boulton, 2010).

Other technological developments in assistive tools relating to driving, as such as satellite navigation devices and in-car vehicle technology may enable older people to drive for longer, thus potentially preventing social exclusion (Guo et al., 2010, Emmerson, 2012). Coughlin (2009) suggests that car design has adapted to the life-course of the Boomer cohort, for example the development of estate cars when they were having children. The recent development of 'driverless' cars by Google (Thrun, 2010), suggests evidence of catering for the Boomer cohort and an ageing population. However, this is a long way off and will be expensive initially.

7.3.1.3. Social and Political Forces

Mobility is also influenced by social and political forces, which can be broadly understood in the form of transport and welfare 'rights'. Such welfare rights or 'entitlements' may be provided through welfare services by government. Such forces have been highlighted, as historic transport policies have partly contributed to issues of social exclusion as a result of poor transport. This has been recognised in recent years and attempts have been made to rectify these issues through the development of transport and welfare policies. Mobility is also considered important for older people's quality of life (Banister and Bowling, 2004, Spinney et al., 2009, Ziegler and Schwanen, 2011), which can suffer due to driving cessation and lack of transport (Adler and Rottunda, 2006, Davey, 2007). Therefore there are concerns about the mobility of older people, which different policies attempt to address.

Headicar (2009) distinguishes between three conceptions of rights: political, human and welfare. Political rights are basic freedoms which the state protects and by definition embody some conception of human rights. It is in the provision of welfare services that the notion of 'rights' assumes importance in an everyday sense. Transport rights can be considered as the 'right' to mobility in order to access goods, service and activities needed, as well as generally,

for quality of life. People have expectations about mobility and being able to participate in activities. Farrington and Farrington (2005) highlight that individuals have certain rights in choosing where to live and whether to own a car, although these choices can be constrained by individual factors, such as income or disability.

In recent years there has been emphasis on 'ageing in place', which advocates that older people should remain in their own homes (should they wish to) as it is thought to be beneficial for well-being and quality of life for older people as it helps maintain social networks, independence and provides a sense of familiarity (Means, 2007, Sixsmith and Sixsmith, 2008, Wiles et al., 2011). Residential location influences mobility patterns and older people have tended to choose to reside in outer-suburban and rural areas, away from urban centres during retirement (Atterton, 2006, Champion and Shepherd, 2006, Uren and Goldring, 2007, Bayliss and Sly, 2010). These relocation decisions may have been undertaken in earlier life whilst they are still able to drive (Stockdale et al., 2012). With increasing numbers of older people potentially ageing in place and as driving cessation occurs this raises concerns about the future mobility of older people currently living in sparse suburban and rural areas with low public transport provision.

Income also influences mobility as transport costs vary between modes. Older people are entitled to receive a state pension, which falls under the remit of welfare policies and therefore are generally assumed to be living on lower incomes (Tacken, 1998, Tinker, 2002). Provision of free bus travel through concessionary schemes aims to promote social inclusion by providing an alternative transport to the car, however, the results suggest that this is a blunt approach, which is not particularly effective. Due to spatial variations in bus service provision, the benefits of the scheme are distributed unevenly across the older population. Other transport policies also have an impact on the effectiveness of the concessionary policy. For example, there has been a contraction in bus service provision as a result of reduced subsidies (Transport Committee, 2011), therefore the effectiveness of the concessionary scheme is reduced. There are also increasing concerns about the affordability of continuing to provide the concessionary travel scheme as the proportion of older people in society increases.

7.3.1.4. Mobility Outcomes

Each of the structural forces outlined above interact with one another, influencing the mobility of older people at an aggregate level. Depending on which forces are more prominent or weaker will lead to an outcome of increased or decreased mobility amongst older people. As the proportion of older people in society rises, mobility patterns of this population will have a greater impact on wider transport systems.

Outcomes of increasing or declining mobility levels amongst older people will also have reinforcing or differing impacts on each of the forces identified, influencing mobility outcomes as described in the preceding discussion.

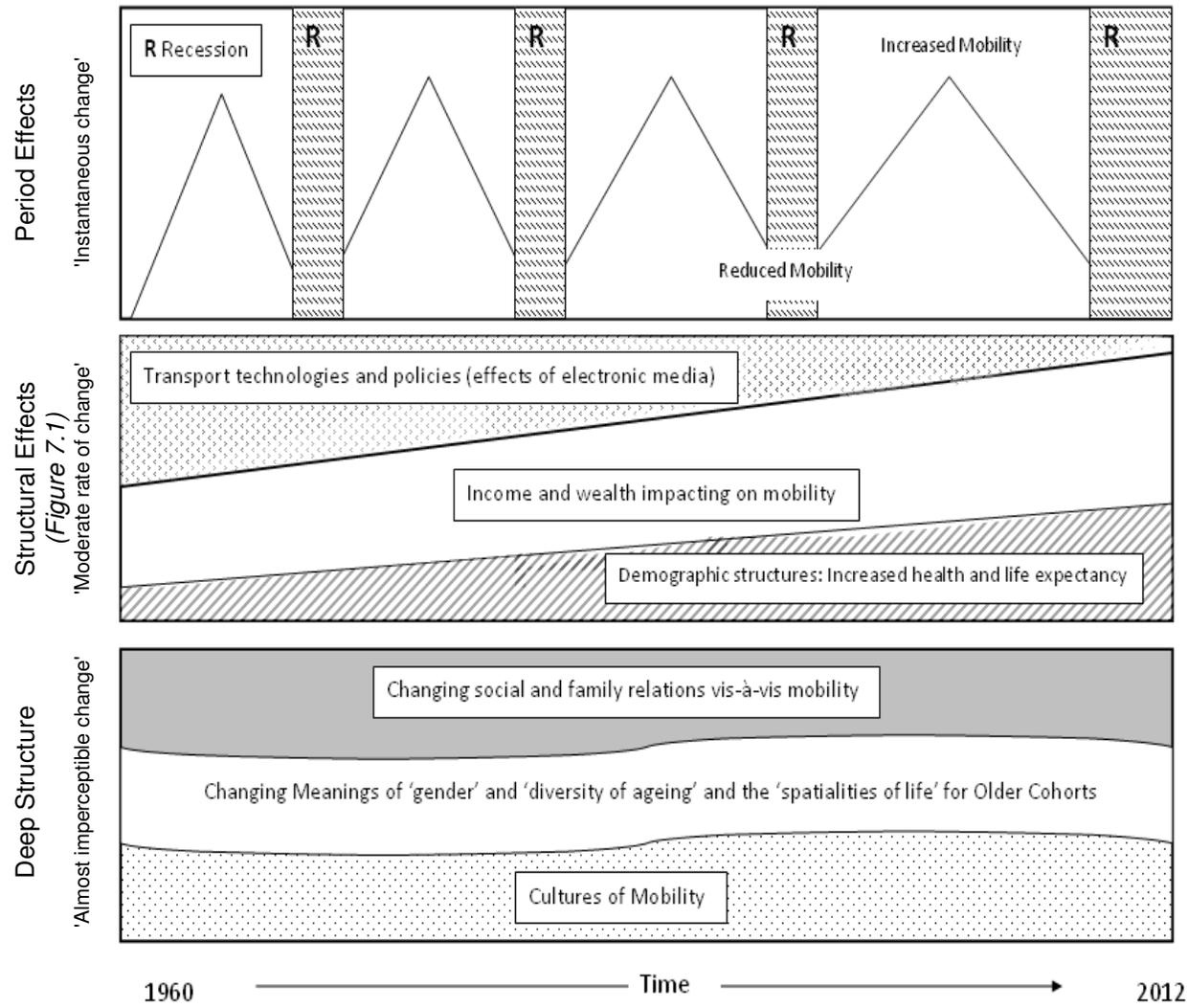
Mobility levels of older people will have impacts on future cohorts, in line with demographic trends. For example, changing demographic trends are changing the nature of 'mid-life' and the rise of the 'sandwich generation' have meant that these people are providing care and support to older people in addition to younger (grand) children (Evandrou and Glaser, 2004, Pierret, 2006, Demey et al., 2011). As families have become more dispersed people may be travelling further to provide care and support to other relatives (Rosenbloom, 2001, Pooley et al., 2005b),

A rise or decline in mobility amongst older people also has economic impacts, both general and transport specific. Increasing participation in activities suggests rising mobility as incomes rise, particularly as the Boomer cohort ages. With retirement ages rising, increased employment amongst older people has economic benefits in terms of increased individual income and contributions to economic wealth. This can influence the level of investment into transport systems. Declining mobility may have negative economic consequences in relation to consumer spending amongst older people for example, as well as for quality of life.

Government intervention in terms of social welfare policies, that may also directly relate to transport, may be required depending on mobility outcomes of the older population. Declining mobility may require policies to mitigate negative outcomes such as isolation and loneliness amongst older people. Increasing mobility may have adverse environmental impacts and policies to encourage sustainable travel may be required. For example, the aggregate impact of an increasing proportion of older people will increase the cost of providing the concessionary travel scheme. However, due to reduced bus service provision in some areas, other policies may be required to address this. These issues may also move up the political agenda as the electorate becomes older.

Existing research on the mobility of older people has generally been considered at single points in time and tended to focus on negative issues related to driving cessation and transport disadvantage (Morris et al., 2006). Whilst this is not unimportant, Figure 7.1 illustrates that a deeper and dynamic understanding is needed of the wider multi-level forces that influence changes in mobility patterns over time amongst older people, as outlined in Figure 7.2.

Figure 7.2: A dynamic schema of the multi-level forces stimulating mobility change for older people



1. Economic growth and recession cycle affects size of Government budgets (cuts vs. spending influencing level of capital transport investment and subsidy provision for transport schemes and policies). There are also geographical variations in provision.
2. Other economic effects e.g. unemployment rates and rates of inflation, influence disposable incomes of individuals, affecting activities they partake in e.g. commuting therefore resulting mobility in different mobility levels over time. Economic growth usually associated with high mobility and vice versa.
3. Housing market affected leading to mobility as substitute for residential migration and vice versa.

1. Changing planning and transport policies leading to use of different modes due to dispersal of people and services away from CBD so transition from bike and public transport to car and ICT influencing meaning of travel e.g. working on public transport during travel to employment; travel for inherent pleasure rather than derived demand.
2. Individual wealth influencing transport mode choice (value of travel time - cost vs. time).
3. Demographic trends; ageing population and healthier older people leading to changing activity patterns influencing mobility.

1. Changing demographic trends influencing mobility: dispersal of family support networks and rise of 'Sandwich Generation'.
2. a. Gender convergence in mobility (changing role of women);
b. Unequal ageing and changing lifestyles of older people;
c. Changing residential locations amongst older cohorts e.g. prefer rural/coast, future older cohorts preference towards urban.
3. a. Expectations about mobility: holidays; activities; visiting family and friends;
b. Perceptions of transport modes due to policies and culture
i. Thatcherite Govt 'failure if on a bus at 26' reinforcing car use;
ii. London congestion charging & public transport investment;
iii. Introduction of 'Boris bikes' and sustainable, healthy travel.

Adapted from Fielding (1993, 2010)

7.3.1. Multi-Level Forces Stimulating Mobility Change for Older People

Figure 7.2 identifies three different layers of effects over the past 50 years that are contributing to changing mobility trends amongst older people. The empirical findings of this study identified that, at the aggregate level, the mobility of older people is increasing over time. This has been attributed to increasing car use and different mobility characteristics associated with the Boomer cohort as they age (ECMT, 2000, Cobb and Coughlin, 2004, Mercado et al., 2007, Coughlin and Tompkins, 2009, Su and Bell, 2009). A combination of processes is influencing the changing mobility of cohort groups at three different levels.

The simultaneous operation of these three levels is having different impacts on the mobility of cohorts as they age, which is influencing mobility outcomes at the aggregate level. Examining how these three layers interact with each other and the resulting impact on mobility, can help build a picture of how mobility changes as cohorts age. Examining the interactions of these longer term shifts is of conceptual importance to understand future implications as well as being profoundly significant for policy.

This conceptual framework has been adapted from Fielding (1993, 2010) who used a similar framework to schematise economic processes in relation to mass migration. It should be noted that the changes in mobility discussed here relate to 'everyday mobility', whereby journeys tend to be shorter and more repetitive in nature (Pooley et al., 2005b). Whilst some notions are applicable to longer journeys, for example holidays, this is not the main focus in the discussion. However, it is recognised that mobility of this nature will be influenced by these effects, as well as differ between cohorts.

7.3.1.1. Period Effects

Firstly, examining the top layer, shorter-term economic processes have been identified to affect mobility patterns across the population, also known as period effects. These affect all cohorts at the same time, but result in differing impacts on mobility. Recession periods since 1960 have been identified in Figure 7.2. According to Fielding (1993), periods of economic growth are a 'self-reinforcing process' as higher sales leads to improvements in business confidence and investments, increasing the demand for labour, thereby lowering unemployment. This cycle is eventually 'broken' resulting in opposite impacts; leading to falls in business confidence and unemployment increases. This cycle is also reflected in the UK housing market which influences the timing of residential migration choices. This cycle can also be observed in relation to aggregate mobility, although whilst all cohort groups are affected by the recession effects, such as increase in fuel prices, the impact on mobility can differ between and within cohorts as well as geographically.

The effects of economic recession can contribute to declining mobility. Rising unemployment coincides with declining mobility as fewer people are making commuting and work-related trips. Unemployment also reduces disposable income, which influences purchases of goods, services and activity participation, particularly as inflation increases. Older people who are retired and receiving a pension may also have real disposable income reduced if pension levels remain static. People may retire earlier than expected also leading to reduced disposable income. Rising transport costs have been observed in the current recession as fuel prices and public transport fares have increased. Older people may self-impose constraints on their mobility as a result of rising transport and activity costs, particularly if there are no suitable alternatives (Burkhardt et al., 1996, Adler and Rottunda, 2006, Davey, 2007). There have also been spending cuts in the current recession, which has resulted in a reduction in public transport subsidies leading to a contraction in services.

In relation to the housing market cycle there is evidence that residential migration is being substituted for increased mobility in addition to changing demographics and lifestyles amongst older people. As house prices have fallen and stagnated, residential mobility has fallen resulting in higher travel mobility as older people do not wish to lose equity gained on their property. Amongst former cohorts of older people grandchildren would visit grandparents, now it is the other way around (Pooley et al., 2005a). Previously, grandchildren also lived relatively close by to grandparents but due to dispersal of family and time pressures, grandparents would migrate to be closer. However, grandparents are engaging in higher mobility to visit grandchildren as a result of the economic climate therefore producing new mobility patterns (Cooke, 2011).

7.3.1.2. Structural Effects

In addition to these short-run economic processes there are other structural forces affecting mobility which involve mid-term changes which occur at a more moderate rate of change. Demographic changes, such as increasing life expectancies contributing to the development of an ageing population, are addressed and outlined more comprehensively in the preceding discussion relating to Figure 7.1. Within this layer of structural change, national wealth and personal income has increased, influencing mobility mainly through car use. The influence of personal incomes on mobility has also been addressed in the preceding discussion; therefore this discussion will focus on the influence of national wealth.

National wealth influences infrastructure investment. Post-war planning has contributed to an increase in car use over time as processes of suburbanisation and counter-urbanisation encouraged residential homes and places of employment to be located on cheaper land on the suburban fringe, away from urban centres (Pooley et al., 2005b, Power, 2012). Investment in the road network combined with rising incomes also led to increases in car

ownership and rising mobility, especially as goods, services and activities became increasingly dispersed in relation to residential location, forcing longer distance travel (Lucas et al., 2001). New transport technology enabled people to travel faster over long distance, leading to the shrinking of space and undertaking of more activities (Pooley et al., 2006). Knowles (2006) argues that there has been differential shrinking in time/space, which has been very uneven spatially, economically and socially. As a result there are inequalities in terms of travel time, accessibility to goods, services and activities in relation to location as well as transport modes. Whilst this study finds evidence of higher mobility amongst older people at the aggregate level, the effects of transport technologies and policies will impact differently within and between cohort groups.

Developments in electronic media and telecommunications have enabled the dispersal of activities and services. The rise of virtual mobility brought about such technology including the smartphone and mobile internet which is changing the nature of mobility patterns (Lyons and Kenyon, 2003, Kwan, 2006, Jain and Lyons, 2008). Although, rather than telecommunications technology having direct causal impacts on mobility, they in fact 'afford' certain practices (Schwanen et al., 2008). It has also been argued that technology will not be able to replace the need for meeting face-to-face and social contact in a physical presence (Urry, 2002a). Increases in mobile phone use has increased flexibility of activity patterns (Kwan, 2006), for example being able to baby-sit at short notice, which will influence mobility. However, due to the cost of technology and infrastructure provision these connections are distributed unevenly spatially and socially (Knowles, 2006, Gray et al., 2008, Digital Britain, 2009, Boulton, 2010).

7.3.1.3. Deep Structure Effects

Finally, underpinning these layers are 'deep structural' processes. These processes develop slowly in relation to the experiences and values held by cohorts and wider society as a result of period and structural effects. These also contribute to the development of socially constructed norms relating to mobility, which impact on mobility patterns.

Firstly, over time there have been changing social and family relations in relation to mobility. With increasing life expectancies grandparents are living longer and are more active compared to former cohorts of older people and have adopted caring roles for younger grandchildren, differing from former cohorts. Pooley et al. (2005a) indicate that grandparents are more likely to visit grandchildren and assist with childcare duties, whereas amongst former cohorts grandchildren would visit grandparents. Cooke (2011) has also found evidence of grandparents visiting grandchildren over longer distances, substituting residential travel for migration. Pooley et al. (2005a) also noted that the dispersal of family members has not only had implications for the mobility of older people, but also amongst current cohorts of younger people. Due to the dispersal of family networks, grandparents are likely to live further away

than before and unable to accompany younger children outside. Current cohorts of younger people are more likely to have constraints on their mobility as they are not able to travel unaccompanied, unlike former cohorts when they were of a younger age.

The second process in this layer has been termed the: “Changing meanings of ‘gender’ and ‘diversity of ageing’ and the ‘spatialities of life’ for older cohorts”. The changing meaning of ‘gender’ relates to the rapid changing role of women that has been observed during the past 50 years in relation to the labour market and delays in childbirth and increases in driving licence holding, producing different activity patterns and higher mobility. Gender differences in mobility that were considered persistent have converged over time, according to the findings of this study. The rate of convergence in mobility also differs between cohorts, with women belonging to current younger cohorts travelling further than their male counterparts.

‘Spatialities of life’ refers to the changing of locations of older people. Residential locations change over time as people age, particularly as they enter retirement. Older people have tended to migrate to rural and coastal areas in retirement (Atterton, 2006, Champion and Shepherd, 2006, Uren and Goldring, 2007, Bayliss and Sly, 2010). However, there is some evidence of changing attitudes towards retirement locations with an increasing desire amongst people of all ages to move to vibrant urban centres in retirement (Anchor, 2010). Younger cohorts at present are concentrated in dense urban areas (Dennett and Stillwell, 2010) including university cities, especially London according to the 2011 census (ONS, 2012a) and amongst parents of these cohorts, there has been some suggestion that they desire to be closer to their children who may have moved into urban areas for employment (Ambrosi, 2011). These urban locations appear to be viewed as more appealing as people take into account transport options to maintain mobility as well as having increased opportunities for activities particularly with the notion of ‘ageing in place’, suggesting that retirement destinations will change in the future.

‘Diversity of ageing’ refers to the different experiences of ageing. Ageing is an unequal process (Cann and Dean, 2009), which leads to differing mobility requirements and care and levels of support which also influence mobility at the aggregate level. Alongside the changing meaning of ‘older age’, there is recognition of a shift in what constitutes older age (Dannefer and Shura, 2009) brought about by the significance of the Boomer cohort and the different values and expectations that they hold which they are carrying into older age, particularly in relation to mobility. As the proportion of older people in society increases this ‘diversity of ageing’ will intensify and have an impact on mobility.

Finally, ‘cultures of mobility’ relate to the expectations about the mobility people have, and include expectations about visiting relatives and holidays. Findlay et al. (2001) identify that particular ‘mobility cultures’ are associated with people who have chosen to migrate to rural

areas from urban areas as they choose to engage in high mobility to continue to access goods and services in urban areas. This produces a 'culture' of high mobility; they expect to travel as they want the benefits of living in rural countryside areas, but still desire access to urban areas in order to maintain some aspects of the previous lifestyle they had access to in urban centres. A similar principle can be applied to cohorts regarding the expectations that they hold about mobility and how it has changed over time.

Government opinions on policy may have influenced mobility cultures. For example, in 1986 during the deregulation of bus services, it was reputed to have been said by a member of the Thatcher Government that if an individual was aged 26 or over and still using a bus, that this deemed them a 'failure' (Anon., 2006), which would invoke a perception of such individuals. During this time there was an increase in the number of car users, combined with a fall in bus patronage. However, from a London-centric perspective the following policies illustrate how there can be a shift in attitudes and therefore modal shift.

Congestion charging was introduced in the centre of London in February 2003, with the basic charge for drivers entering the zone raised from £5 to £8 per day in July 2005. In February 2007 the original central London congestion charging zone was extended westwards. This was combined with high investment into bus services and an integrated ticketing system, leading to reduced car use with less congestion and increased public transport use in London (Transport for London (TfL), 2008). More recently with the introduction of 'Boris Bikes' into the capital in July 2010, a public bicycle hire scheme, combined with high profile cycling achievements in 2012 relating to the Tour de France and London Olympics may have changed perceptions of cycling and encouraged use (TfL, 2010, Grous, 2012). The perceived higher costs of car ownership and increasing public transport fares could also be contributing to bicycle use.

'Cultures of mobility' may also relate to images and identities associated with particular transport modes (Pooley et al., 2005b, Urry, 2007). For example, obtaining a driving licence was considered to be a 'rite of passage' as well as owning a car (Weissman, 2012). This may translate into aspiring to own particular cars; travelling by particular transport modes and longer distances that evoke a particular perception, based on mobility, such as a 'jet-setter'. These 'hyper-mobility' cultures, especially amongst the very wealthy (Elliott and Urry, 2010), invokes a particular image and perception of someone that they may also want to present to others. People may also wish to present an image of being environmentally aware and sustainable, thus choose to use transport modes that reflect and reproduce this identity.

7.3.1.4. Path Dependencies

The path dependency concept has been used to explain why car use has become a dominant feature of travel (Pooley, 2009) and is considered a useful concept to apply to Figure 7.2 in considering the mobility trajectories of cohorts as they age. Transmission occurs between the three layers identified in Figure 7.2 at a point in time, which will impact differently on each cohort in relation to socioeconomic factors and therefore mobility. These cyclical effects can produce inertia or scarring effects on the mobility of cohorts and become structural, leading to path dependencies. These may have negative repercussions on the mobility of older people in the future. This section considers the interactions between period and structural effects and resulting influence on different cohorts and the implications for mobility in older age.

The Boomer cohort differs from former cohorts of older people as they benefited from free education and experienced long periods of economic growth enabling them to acquire wealth over time as well as being involved in various social and civil rights movements (Spain, 1997, Hamilton and Hamilton, 2006). The Boomer cohort was also brought up alongside the development of the private car and road system (Coughlin, 2009). As a result of these various factors, the Boomer cohort are predicted to have higher expectations about mobility, as well as being healthier, leading to increased mobility in older age, compared to former cohorts. This account briefly and broadly illustrates a combination of effects that have influenced mobility patterns amongst this cohort. These have contributed to changes in the mobility of older people at the aggregate level.

A combination of various structural forces at points in time will have differing influences on the mobility of cohort groups, which can affect mobility as they age. Period effects are those which affect the population at the same moment in time, but have different impacts on cohort groups. Cohort effects are those attributable to differences in historical, social, economic, cultural, and technological contexts, in which different cohorts have grown up (Rafferty and King-Hele, 2010); in essence these characterise cohort groups. Structural forces will influence the mobility of cohorts differently, depending on the moment in time and associated characteristics with the cohorts that have evolved as a result of structural forces over time. The accumulation of resources through the life-course will influence mobility outcomes in the future (Bailey, 2009, Rosenbloom and Herbel, 2009). The acquisition of resources is influenced by structural forces and will therefore differ for each successive cohort as they will experience different effects of these forces at the same point in time, but will be at different stages of the life-course.

Whilst much existing literature has focused on the mobility of the Boomer cohort in older age, less consideration has been given to subsequent cohorts. As an ageing population becomes more prominent in the future, there will be more cohorts contributing to this proportion of

society. Current structural forces may be having an adverse influence on the mobility of younger cohorts.

The current recession, whilst having varying impacts on the whole population, has most certainly had greater adverse effects on current cohorts of younger people. Youth unemployment has increased dramatically, not only in Britain but in other EU countries as younger people leaving education have been unable to gain entry to the labour market. The lasting impact of unemployment has raised concerns about these cohorts being a 'lost generation' (Eurofound, 2012); perhaps similar to the 'silent generation' who grew up during the Great Depression (Strauss and Howe, 1991 in Lehto et al., 2008).

The findings reveal that mobility has fallen over time amongst young adult age groups (aged 16-29 years), combined with a reducing rate of driving licence holding (see Figure 2.1). Effects of the recession leading to increases in fuel prices, combined with lowered wealth due to a lack of employment opportunities are exacerbating the barriers to learning to drive amongst this cohort, as cost factors are quoted as the main ones, such as unable to afford lessons, car purchase, fuel prices and insurance (DfT, 2010a). An accumulation of resources through the life-course will influence mobility outcomes in the future. Therefore there may be potentially damaging ramifications on the mobility of these current younger cohorts when they are older as a result of being unable to drive. In a car-centric society, being unable to drive also affects the ability to access employment opportunities. These cohorts may be more reliant on public transport services, but due to reductions in bus subsidies there has been a contraction in services in some areas, further reducing mobility options for this cohort (in addition to current older people who may be reliant on these services). The lack of adequate resources for mobility may lead to issues of social exclusion (Lucas, 2012). Some cohort groups are more socially excluded than others at the same and different moments in time. Acquiring a licence and being able to afford a car has been different for each cohort. The Boomer cohorts look set to be highly mobile in later life as a result of higher wealth and being able to drive.

Other structural forces may lead to younger cohorts compensating for or offsetting lower mobility. During the lifetime of younger cohorts there have been rapid developments in electronic and telecommunications technology (Foot and Stoffman, 2000, McIntosh-Elkins et al., 2007). These younger cohorts differ from current and former cohorts as they have grown up alongside these developments, much like the Boomer cohort grew up with developments in the car (Coughlin, 2009). There is some evidence to suggest that younger cohorts value technology, particularly the smartphone and good internet access, as opposed to car ownership (Weissman, 2012). Use of such technology amongst younger cohorts may be an alternative to travel, or desire to use it whilst travelling as it produces more 'valued' travelling time (Lyons and Urry, 2005, Lyons et al., 2007, Jain and Lyons, 2008). As this has become

more important, it may override the desire for higher mobility sought by former cohorts thus producing a different culture of mobility and changing the meaning of mobility and space for these cohorts. Mobility decisions may be integrated more fully into residential migration decisions, particularly if these cohorts are unable to drive. Evidence of this may already be occurring, reflected in the changing desires for retirement locations towards city living where public transport services tends to be of a higher quality (Anchor, 2010).

A combination of structural effects has influenced the mobility of cohorts differently. Changing demographic trends also contribute to the development of increasingly complex activity patterns in older age. Therefore, changing events and life-courses of cohorts in relation to mobility, as well as resulting interactions with space and place, needs further consideration.

7.3.2. Future Implications for Mobility

Pooley et al. (2005a) highlight that variations in mobility can be associated with life-course factors, but these have rarely been explored. Dannefer and Shura (2009) also suggest that the size of the cohort can have significant influences on developments in society and have a greater influence on mobility outcomes. The ageing of cohort groups can have a significant bearing on the evolution of different life-course stages, which change as each successive cohort is influenced by different structural effects. There are impacts on mobility as illustrated by the changing activity patterns of the 'sandwich generation' due to dual caring roles (Demey et al., 2011). Mobility over the life-course is influenced by the timing of experiences and events such as retirement (Bailey, 2009), which requires further consideration in the context of the changing mobility of older people. Identifying these and associated mobility patterns may help improve policy development. Due to a greater diversity of lifestyles amongst older people, it is necessary to re-conceptualise older people in the life-course. Particular attention also needs to be paid to the spatial aspects of different life-course stages as this has implications for mobility patterns.

7.3.2.1. Cohorts and Life-Course: Mobility Trajectories

The size of each cohort group will also influence its overall status in society (Dannefer and Shura, 2009). As the cohort ages, this will have an influence of the perception of older population groups. In terms of mobility, the relative size of cohort groups may have a greater or lesser influence on the mobility outcomes for a population group. Life-course events and experiences associated with different cohorts; as well the influence of structural effects also contributes to this impact on mobility. Coughlin (2009) has argued that as the Boomer cohort have aged they have influenced the development of varying vehicles types adapting to their changing needs for travel to suit the stage in the life-course.

Massey (1994, p.150) argues: "the time-space compression of some groups can undermine the power of others"; that 'control' over mobility both reflects and reinforces power, with the mobility of some groups weakening that of other groups, particularly those who are already weak. Time-space compression was brought about by developments in the car, which the Boomers have grown up with. It has also been argued that the Boomers have been catered for in terms of car design and motorway developments. This has perhaps been at the expense of other groups, which suggests that the Boomers have a greater 'control' over mobility than other cohorts. As the Boomers are beginning to reach the age of retirement, they may exercise greater power over mobility spaces in the future, skewing them in their favour to address their mobility needs and desires in older age. For example, Massey (1994) argues that every time a car is used, whilst personal mobility is increased, the social rationale as well as the financial viability of the public transport system is reduced. This also potentially reduces the mobility of those who rely on these systems. If the Boomers, a large cohort, continue to drive into older age, they may contribute to such a scenario.

As the Boomer cohorts also have higher expectations and different characteristics in relation to mobility, which they will continue to hold in older age, this will contribute to higher mobility amongst the older population. This will challenge the current assumption of older people as having lower mobility. There may be a transfer of 'mobility' power towards the older population over time, in keeping with the developments that have been observed in car technology as the Boomers have experienced life events and stages (Coughlin, 2009). Of course there are variations in socioeconomic situations within cohort groups which influence mobility, but in general terms, at the aggregate level, the influence and power of mobility is due to the relative size of the cohort group.

As cohort groups have different characteristics, this will change assumptions about population groups that are based on age over time (e.g. younger or older people). It is not appropriate to consider the mobility of such groups in silos. Whilst some aspects and assumptions about the mobility of such population groups may hold, there should be recognition that these are subject to change as each cohort is influenced by a variety of structural effects at moments in time.

Due to the influence that successive cohorts may have on changing assumptions of population groups over time, from which policy is developed, it may be more appropriate to consider life-course stages and events from which to benchmark changes in mobility, particularly as each cohort is different in understanding how mobility of older people changes over time.

The Second Demographic Transition has led to varying lifestyles and therefore deinstitutionalisation of life-course (Dannefer and Shura, 2009), meaning that life-course

stages are no longer tightly coupled with age. Life-course stages associated with different cohorts have evolved in line with demographic trends. Bailey (2009) suggests that events should also be incorporated into the development of life-course research. The use of events may provide a more appropriate framework to understand changing mobility patterns as age may not be representative of populations. Due to the nature of activities that are associated with stages and events, such as caring roles, there will be influences on mobility patterns.

For example, as retirement ages have increased, this 'event' is being delayed until later life. People continuing to work for longer may change the meaning of what constitutes older age and mobility patterns may not be comparable to former cohorts of older people. Events and 'rites of passage' are changing amongst current younger cohorts, such as obtaining a driving licence, so life-stages associated with them are unlikely to be comparable to former cohorts. As a result, particular life-stages may encompass a range of age groups. Events from which to benchmark mobility are fluid due to cohort effects and structural effects, therefore rather than comparing mobility based on age, cohorts are preferable. Additional consideration should also be demographic changes such as life-course stages and events within this approach, when examining mobility change.

7.3.2.2. An Ageing Population: Mobility, Space, Place and Environment

Cohort membership has been shown to influence mobility patterns; however, people born in different places will also have different travel behaviour. In addition, social background will have effect on mobility outcomes as people have varying access to resources and social networks to assist with mobility needs (Ohnmacht et al., 2009). For example, Li et al. (2012) highlight that those living in deprived areas tend to have lower incomes and access to cars in addition to suffering from various area based disadvantages.

The life-course model of residential mobility suggests that preferences for changing residence and locations over the life-course differs between socioeconomic age groups (Morrow-Jones and Kim, 2009). Older people tend to locate in different area types to younger people, which impacts on mobility patterns. Therefore, the migration decisions of older people are important in explaining the changing mobility of older people. The proportions of older people in local populations are higher in rural areas than in urban areas in most countries of the world (Wenger 2001). A distinction needs to be made between the mobility of older people ageing in place in rural areas and those who have chosen to move to rural areas in later life. The trend of moving away to rural areas coincides with higher mobility as this incurs travelling longer distances to access services, social networks or leisure activities, given that these tend to be fewer in rural areas and that those who migrate to these areas are more likely to be car owners than those who already live there (Findlay et al., 2001).

Transport services differ between rural and urban areas, with 'rural' locations having a 'problem' (Gray et al., 2008). As the findings from this study observe that older people are becoming more mobile and utilising the private car, in particular with older women increasing mode share as the car-driver, it suggests that the current view of the rural landscape as problematic for older people is being challenged. Contraction in bus services in these areas may be mitigated by the increasing car use by older people. Older people moving to these areas choose particular mobility cultures that are highly mobile due to dispersed lives, making the need to travel greater. However, with people tending to choose residential location earlier in the life-course (Giuliano, 2004) and a potentially greater proportion of people ageing in place, temporal changes may lead to issues of social exclusion as driving cessation occurs (Farrington and Farrington, 2005, Lucas, 2012).

As the lifestyles of older people intertwine with the lifestyles of younger cohorts (their children), there is evidence that older people may be taking these into consideration when making migratory decisions, indicated by changing residential preferences during retirement. As family dispersal has occurred with children having moved away to urban areas for employment, there is some suggestion that older people may be mitigating for this trend by also moving to these areas as they desire to be closer to their children (Ambrosi, 2011). Older people are having to change their lifestyles to maintain family ties and ensure support networks. Pooley et al. (2005a) and Cooke (2011) both identify that current cohorts of older people are making these changes.

Cities are becoming more attractive future retirement locations amongst people of all ages as they provide shopping, amenities and good transport links (Anchor, 2010), suggesting that people are considering the availability of alternative modes of transport to the private car to account for ageing in place. Preference for urban dwelling may be higher amongst younger cohorts in older age. This is part of the current younger cohorts' mobility story with reduced driving licence holding among this cohort and the recognition that they will not be mobile without a car in rural and suburban fringe areas.

Physical aspects of outdoor environments can be problematic for older people in a variety of ways including the design, layout and condition of such spaces, of which some aspects may be difficult for older people to navigate, particularly if they have health conditions which limit physical mobility (Tacken, 1998, Metz, 2003, Guo et al., 2010). A lack of suitable facilities in public spaces, such as adequate seating, can also lead to constraints on the mobility of older people (Risser et al., 2010). These physical barriers are particularly important for the oldest old i.e. those aged over 80 years (Wennberg et al., 2009).

The mobility of groups in space and place also affect others. As identified by Massey (1994), different social groups are placed in distinct ways in relation to flows and interconnections that

occur in places, which produces differentiated mobility. Older people place self-imposed constraints on their outdoor mobility due to perceived and real fears due to the behaviour of others, such as car-drivers driving at high speeds (Risser et al., 2010). Ageing has been associated with increased feelings of vulnerability in public spaces, including public transport. This can lead to exclusions from these spaces as a way of mitigating the risk of perceived attacks, therefore potentially reducing mobility (Pain, 1995, 1997a, Koskela, 1999, Lucas, 2004, Pooley et al., 2005a).

Pooley et al. (2005a) found some evidence to suggest that the car provides feelings of safety in public spaces whilst maintaining mobility. As the Boomer cohort has grown up with the car there may be greater perceived barriers to using public transport relating to fear, which the car overcomes. Car use means that older people are less constrained by fear in public spaces from the perception of others and therefore able to engage in more activities leading to increases in mobility.

Whilst mobility and car use increases amongst the older population, Massey (1994) argues that in relation to increased car use, whilst personal mobility is increased, the social rationale and the financial viability of the public transport system is reduced, potentially reducing the mobility of those who rely on these systems. The reduction of these systems may lead to further use of the car due to a lack of viable alternatives (Davey, 2007) and perpetuating further decline of public transport systems. Given the large relative size of the Boomer cohort they may become more influential as they age and demand better services to suit their needs, but perhaps at the expense of other population groups. The concessionary scheme could be deemed unequal as it is provided for at the expense of other younger cohorts for whom it could be argued are in more social need of receipt of such benefits. Whilst the concession for older people is protected by statute, yet concessionary fares for younger people are discretionary and have been cut by local authorities in conjunction with the rising cost of public transport. This cost is becoming a barrier for younger people in accessing transport (Bourn, 2013).

Indeed older people have retained a variety of other universal benefits, including winter fuel payments, free prescriptions and free eye tests, whilst younger people and families have experienced cuts to housing benefit and child benefit (Leach, 2013). This distribution of welfare benefits are skewed towards provision for older people and it has been suggested that maintenance of current levels of income and wealth for older cohorts can only be sustained by increased cutbacks for younger cohorts (Higgs and Gilleard, 2010). This is perceived as unfair, increasingly so as the Boomers begin to enter older age and retirement (Willettts, 2010). The following section turns to consider the issue of transport policy, including existing concessionary policy in relation to an ageing population.

7.4. Transport Policy Implications for an Ageing Population

The findings of this thesis observe that car use is increasing amongst older people, particularly older women, contributing to increased mobility. In the short to mid-term the increasing mobility of older people will be a result of the ageing Boomer cohort and the different characteristics they exhibit compared to current and former cohorts of older people. With a focus on 'ageing in place' along with the current economic climate, older people may be less inclined to engage in residential migration and lose any potential equity on residential property that may have been acquired during periods of economic growth. Rather than migrate, they are more likely to substitute for this by travelling further, resulting in higher mobility (Cooke, 2011), especially given increasing car use amongst older people as observed in Chapter Four. There are environmental policy implications related to this high mobility in terms of increased emissions and congestion.

Findings from Chapter Five indicated that mobility declines as people become older. The car is seen as an important prerequisite for mobility and quality of life (Banister and Bowling, 2004, Davey, 2007, Hensher, 2007). As driving cessation occurs later in life amongst the future older population, particularly if they have 'aged in place', in addition to reduced mobility amongst current younger cohorts, issues of social exclusion as a result of poor transport may become more pertinent amongst older people in the longer term future.

There are two important, and potentially conflicting, policy concerns that arise in relation to these findings from each chapter: environmental impacts and social inclusion. These concerns have attempted to be addressed through the administration of the concessionary travel scheme. However, despite the availability of free bus travel for older people the findings suggest that the car is becoming increasingly important, although the policy may be suppressing car use. There are concerns that the concessionary policy is not particularly effective in promoting modal shift or social inclusion. As the Boomer cohort become eligible to claim the benefit the costs of providing the scheme will increase and there are concerns about its financial sustainability. In light of the findings, the following section considers the policy implications and the suitability of providing universal benefits in the form of financial incentives to older people to help maintain mobility via public transport.

7.4.1. The Future of the Concessionary Travel Scheme

In Britain, the concessionary scheme is intended to enhance the mobility of older people, who would otherwise be limited by low incomes (Metz, 2003). Older people are usually on lower incomes owing to the fact that they are usually retired or more likely in part-time work hence the provision of free bus travel. It is a universal benefit, based on age, thus assuming (as well as reinforcing) that older people have similar mobility requirements based on an assumption

of lower incomes. The findings suggest that the blanket policy of free bus passes is very blunt given the changing mobility patterns of older people. Findings in this thesis suggest that 'younger' older people (aged 60-69) have similar levels of mobility to 'middle-age' groups (aged 30-59). As the current retirement age is 65, yet in Scotland the benefit is available to people aged 60 and over, this calls into question the appropriateness of providing the policy to those in employment, whilst other younger population groups receive no such benefit.

As the concessionary scheme is funded by public subsidies, the financial sustainability of the concessionary policy has been called into question, particularly since the economic recession in 2008. Following the election of the Conservative-Liberal Democrat coalition government in 2010 there has been increasing focus on the need for public sector budgetary cuts. According to Butcher (2011) current spending on the concessionary fare scheme totals over £1bn per year at a cost to the UK Government. In Scotland, in 2010 the Confederation of Passenger Transport agreed to concessionary travel budgets of £174.2m for 2010/11, £180m for 2011/12 and £187m for 2012/13 (Transport Scotland, 2012).

Whilst current Governments have publicly stated that they remain committed to the scheme (Butcher, 2011, Transport Scotland, 2012), the costs of the scheme are expected to continue to increase with the Boomer cohort continuing to become eligible to claim the benefit in Scotland. Based on current levels of concessionary journeys and a range of fare increases, Audit Scotland (2010) projected that the uncapped costs of the concessionary scheme could reach between £216 million and £537 million a year by 2025.

With concerns about increasing costs of providing this benefit in the longer term, there are concerns regarding the efficiency and fairness of the universal eligibility aspect of the scheme. The findings from assessing the Scottish scheme suggested that the concessionary scheme is contributing to increasing mobility amongst older people; however, car use has also continued to increase. Given that one of the objectives is to promote modal shift from the private car to public transport, it is not clear whether this objective is being met, although the policy may be suppressing car use.

There are also concerns that there is little evidence of the scheme promoting social inclusion as it is available to all older people despite income. The findings show that concessionary pass holding has increased amongst those on higher incomes, with car access and a driving licence. Although providing this fiscal policy overcomes part of the structural issue of cost and income, location is also important (Farrington and Farrington, 2005). Others have also found little evidence of social inclusion due to the quality of bus service provision in some areas (Rye and Mykura, 2009). Bus subsidies have also reduced recently, which have led to a contraction of bus services in some areas (Transport Committee, 2011). Lack of demand for rural transport can be cited as the reason for cutting public transport as it is not cost effective

(Ahern and Hine, 2012); however, this is problematic as the bus is put forward as the only alternative via the concessionary scheme. Bus services need to be a viable alternative to the private car for the scheme to be effective. There are many barriers to its use amongst older people (Hine and Mitchell, 2001, Lucas, 2004, Dobbie et al., 2010) and bus service provision varies geographically (Gray et al., 2008, Rye and Mykura, 2009). Despite being a universal benefit, it is distributed unevenly due to differences in residential location amongst older people. Recent studies also suggest that health benefits are gained from older people using the English scheme (Coronini-Cronberg et al., 2012, Webb et al., 2012), therefore similar benefits could also be produced through the Scottish scheme, although this study has not been able to capture these.

Due to existing pressure on public spending, this has led to a variety of suggestions seeking to change the scheme. Whilst the eligibility age is set to increase in line with the age for claiming a state pension there have also been calls to means-test the scheme (Kirkup, 2011), as it is currently a universal benefit; for older people to contribute towards the cost of the scheme by paying a flat fare towards the cost of the journey (Audit Scotland, 2010, Millward, 2011); to not use the scheme if they do not need to (BBC, 2010); for the scheme to be taxed while maintaining universality (Bingham, 2012, Burke, 2012); for changes to be made to the way bus companies are reimbursed (Audit Scotland, 2010); and for an outright scrapping of the scheme altogether, particularly in the current austerity climate, as it does little to enhance economic growth and would save £1bn annually (Mulheirn, 2012).

Whilst increasing the eligibility age to 65 or even 70 reduces short-term financial pressure on the scheme, this may simply serve to postpone the costs of the scheme until the future as the large Boomer cohort ages. Means testing can also increase the costs of administering the policy (National Audit Office, 2011). Scrapping the scheme on the grounds of cost would achieve short-term financial savings in the immediate future; however, there are longer-term implications to consider.

Without the scheme in place, given the current price of public transport fares, older people who are not able to afford fares may reduce their activities leading to lower mobility and quality of life. Older people may self-impose restrictions on activities where there are no alternative transport modes. The concessionary scheme can also help older people maintain their mobility and assist in making 'discretionary trips' which are those that are taken for pleasure or 'on a whim' such as trips to coastal areas or other natural landscapes; for eating out or special shopping trips. Alternative modes of transport to the car are difficult to find to partake in these trips as older people are unwilling to ask for lifts for these types of trips or use of a taxi is considered too extravagant (Davey, 2007).

Concessionary schemes have formally been in place in Britain since 1985. However, this has been considered a 'gimmicky' policy as older people are more likely to vote (Spain, 1997, Mellor, 2002), thereby making it a politically sensitive issue (demonstrated by the considerable amount of media attention it receives) and it is therefore difficult to change the eligibility requirements or remove the policy. As the proportion of older people increases, this demographic group may also wield greater political influence in the future. The following section considers the suitability of providing universal benefit for public transport use for older people. Instead it is argued that flexible policy initiatives are required in relation to increased population forecasts of older people and increasing economic uncertainty.

7.4.2. Policy Recommendations

Mobility is considered an important prerequisite for quality of life and the car has an important role in this (Banister and Bowling, 2004, Davey, 2007, Hensher, 2007). Although the mobility of older people is increasing due to increased car use, driving cessation will eventually occur perhaps due to age-related health conditions or ability to afford a car (Adler and Rottunda, 2006). Health status is an important determinant of driving decisions; many people continue to drive out of necessity due to the lack of acceptable transport alternatives, which poses additional safety concerns. A lack of alternative transport modes can also lead to older people restricting their own mobility and reducing quality of life (Burkhardt et al., 1996, Adler and Rottunda, 2006, Davey, 2007).

Concessionary fares aim to remove the cost barrier to using public transport for older people and attempts to be equal as it is available to all older people. The universal nature and national blanket approach of the concessionary policy goes against the grain of transport policy which tends to be focused on local solutions and targeted responses in line with the 'new realism' (Goodwin et al., 1991). This approach also makes broad assumptions about the mobility requirements of older people. Therefore it is not suitable to base policy solely on age given that lifestyles and activity patterns of older people are diverse. Policy needs to be flexible to adapt to the changing mobility of each successive cohort as they age, rather than a reliance on the seemingly static assumptions, and resulting grouping, of older people. Population groups are not so easily categorised as they perhaps were in the past, as a result of the various structural effects influencing mobility outcomes of cohorts identified in Figure 7.2. These changes need to be taken into account in the development of more fluid policy responses to be able to cater for future change.

There is potential for bus services to offer a viable alternative mode of transport to the car for the majority of older people, where there is adequate service provision. However, there are other barriers to use aside from cost (Hamilton and Jenkins, 2000, Hine and Mitchell, 2001, Lucas, 2004, Dobbie et al., 2010). Bus service provision also varies geographically, rendering

the policy unsuitable for some if there are no adequate services to use. This raises questions about the suitability and appropriateness of the policy. It could be said to be inducing travel amongst more mobile older people, with existing access to transport (Mellor, 2002, Rye and Mykura, 2009, Baker and White, 2010). It may not be tackling the mobility issues faced by those transport deprived in outer suburban and rural areas where there have been contractions of services due to low bus patronage and reduced bus subsidies (Transport Committee, 2011). Therefore public transport needs to be a viable alternative for older people to use for the concessionary scheme to be effective. Additional subsidies would assist in maintaining and perhaps extending services to peripheral areas where bus services have declined. However, given current austerity measures, it is highly unlikely that such subsidies would be provided.

In relation to providing subsidies for older people in the form of concessionary travel, where the costs of the scheme are rising there is a question of equity as to whether this is fair in a society during an era of austerity. Providing this subsidy may be at the expense of providing transport for other population groups facing similar transport issues, who may benefit from subsidies. However, it may be that the subsidy is also helping to provide bus services in some area types (Shaw et al., 2009); and that without it bus service provision may further decline.

Existing budgets used to provide the concessionary scheme could be diverted into providing greater levels of DRT 'dial-a-ride' services. This would assist in enabling older people who are unable to use conventional forms of public transport and those living in outer suburban and rural areas, to be more mobile as well as improve their accessibility to services and amenities. However, this approach would likely only serve a minority of older people, with greater mobility needs, than perhaps a larger proportion of the older population as the current concessionary scheme does.

Should the scheme be scrapped, older people may not be able to afford travel, in addition to reduced bus service provision through a loss of subsidies, leaving no viable alternative modes of transport to use. Without alternatives to the car there is likely to be a loss of mobility and issues of social exclusion may become more pertinent in the longer term future. Scrapping the scheme may make it difficult to bring it back for subsequent cohorts who, growing up in a period similar to the 'silent generation', who grew up during the Great Depression in the 1930s (Strauss and Howe, 1991 in Lehto et al., 2008), may also suffer from low mobility and therefore need it more than what appears to be a relatively wealthy cohort of older people becoming eligible to claim this. It would not be prudent to immediately take away the benefit as a result of this finding, as current cohorts of older people are less likely to be able to drive and there would be reduced options for travel, however, these findings highlight the need to start considering benefits of the scheme and the possible alternatives. Bus patronage remains

low, so the scheme may only be benefiting a small (but loud) minority who are resisting scrapping of the free bus pass scheme. Also boomers due to become eligible to claim the bus pass may impose further resistance to cuts as they have come to expect it soon.

Structural effects impact on cohorts differently and it was suggested that younger cohorts may not have the same opportunities to car access compared to former cohorts and are more likely to be reliant on public transport. Policy should be based on other circumstances rather than just age. State regulation could be used to improve access to public transport to support older people to overcome some of the barriers they currently face. For example, physical barriers could be reduced by tailoring vehicles and outdoor spaces as well as increasing service provision offered by bus companies through additional subsidies. Additional investment into services would also enhance opportunities for younger cohorts. Governments may also be able to introduce policies that foster new mobility cultures akin to the implementation of congestion charging in London and subsequent reinvestment into public transport as well as that of the smoking ban introduced in recent years. Policy incentives could encourage migratory moves into urban centres at younger age, in order to promote the opposite of mobility cultures produced by those moving to rural areas (Findlay et al., 2001).

A summary of the policy recommendations outlined in this section, pertaining mainly to the concessionary travel scheme, is presented in Table 7.1.

Table 7.1: Summary of policy recommendations

Recommendation	Pros	Cons	Likelihood
Increasing the eligibility age for claiming concessionary fares.	If this approach was adopted in Scotland, Audit Scotland (2010) calculates that this would save approximately £40 million each year.	Savings achieved immediately, however, postpones the costs of the scheme to the future.	In England eligibility for the scheme has started to increase in line with the pensionable age for women. The eligible age is currently 62, rising to 66 by 2020. No plans for this in other UK countries.
Better targeting of older people who require the concession through means testing and/or use of smartcard technology.	Audit Scotland estimates that removing older people who were still in employment could save around £34 million a year. Wealthier older people would not be eligible.	Will increase the costs and complexity of administering the scheme – some older people in greatest need may not claim. Some employed older people may rely on the concession.	No government has yet committed to such a policy.
Older people to contribute towards the costs of the scheme (by paying a flat fare for each journey or flat fee for a concessionary card).	Audit Scotland estimate that if a 20p rate per journey was adopted by the Scottish Government, this would generate £30m per year thereby reducing the cost of the scheme.	This would affect older people on the lowest incomes, particularly those making lots of bus journeys.	Under most previous local schemes, concessionary passengers paid a standard flat rate, however, no plans to reintroduce this in the UK. Some concessionary passengers would pay a small fare (Scottish Executive 2004 in Audit Scotland 2010).
Changes to the way bus companies are reimbursed.	Bus operators are reimbursed for a discounted day ticket rather than a proportion of numerous adult single fares if older concessionary passengers are making multiple journeys on the buses of a single operator on the same day. It is unknown how much this would save.	Technology is required to calculate journeys, particularly if multiple operators are used by a passenger. This may be expensive to install and complex to calculate.	Likely to be resisted by bus operators as other subsidies and grants have been reduced. This measure would also likely result in money received for concessionary passengers to be reduced. Also possibly expensive to install new equipment.

Table 7.1: Contd.../.

Recommendation	Pros	Cons	Likelihood
Investment into public bus services (infrastructure and/or additional services) by providing additional subsidies	<p>Improving public transport infrastructure would help to remove some of the barriers to using buses that some older people can face.</p> <p>Increase service provision and</p> <p>The benefits of the scheme would be distributed more evenly</p> <p>The concessionary scheme could be removed if investment led to more services and reduced fares.</p>	Requires additional funding, which is likely to be expensive	Unlikely as public budgets are being cut leading to reductions in bus service provision, particularly on low patronage routes which are largely in peripheral and rural areas.
Divert the concessionary budget into DRT 'dial-a-ride' services for older people	<p>Increase provision and quality of DRT services to reach older people in greatest need of transport.</p> <p>Improve transport services for older people particularly in outer suburban and rural areas</p>	<p>DRT not always suitable for older people due to long waiting times on services.</p> <p>Targets fewer older people compared to the existing concessionary scheme.</p>	No plans for this recommendation.
Scrapping the scheme	Savings of over £1bn per year for the UK	<p>Loss of mobility and increased issues of social exclusion amongst older people if they cannot afford bus services. Also less able to make 'discretionary trips'.</p> <p>Can be difficult for older people to find alternative modes of transport to the private car.</p>	<p>Current governments have stated that they remain committed to providing the scheme.</p> <p>Politically difficult as the scheme is very popular.</p> <p>Would be difficult to reinstate the scheme for subsequent cohorts when they reach older age if they require it.</p>

7.5. Conclusion

In conclusion, the increasing mobility of older people over time is challenging the assumption of older people inevitably having low mobility. This observed increase in mobility is also changing the concept of what constitutes older age. This is particularly true of the 'younger' older population (aged 60-69) who tend to have similar mobility levels to those of 'middle-age' (aged 30-59). There appears to have been an extension of this 'peak mobility' observed at 'middle-age' into 'younger older' age. Therefore, as the population continues to age, the mobility of older people should not be conceived in this way.

Increasing mobility amongst older people has been brought about by the ageing of the Boomer cohort due to its relatively large size and associated mobility characteristics. The Boomer cohort are more likely to be car-drivers resulting in higher mobility. The increase in the age of retirement is also likely to contribute to higher mobility as older people continue to commute. As a result of having higher levels of car use, the Boomer cohort may also be at a lower risk from social exclusion. Dannefer and Shura (2009, p.750) highlight that the Boomer cohort will: "not tolerate the negative and constricting role definitions that appeared almost normative for elders through the 20th century". This suggests that the Boomer cohort in particular will continue to challenge the social norms of what constitutes being 'older' as they continue to age, suggesting that they are a unique cohort, particularly in terms of mobility.

Current younger cohorts have lower mobility and it is thought that these will be affected by structural forces, potentially lowering mobility in later life compared to the Boomer cohort. With the ageing of successive cohorts this suggests that the mobility of older people will become increasingly diverse. The concessionary policy, in part designed to promote social inclusion, makes broad assumptions about the mobility of older people. There is a lack of appropriate policy to cater for changing mobility amongst older people including a mismatch between the eligibility age for claiming concession and retirement age in Scotland. The findings suggest there is little effective impact from the concessionary policy. As the policy is also based on an outdated assumption of older people's mobility, a simple downward approach in the form of free bus provision on the basis of age alone may not be appropriate.

Due to the influence of structural effects on the mobility of cohorts at different and same stages of the life-course at moments in time, it is not right to consider older people as a single homogenous group. The influence of cohort membership is important in explaining the varied and changing mobility of older people. Further consideration should also be given to the mobility patterns associated with cohorts as they age, in particular those related to life-course stages and events as these will evolve with each successive cohort. This will foster greater understanding about the future implications for the mobility of older people and is required to develop dynamic policy that adapts with the ageing of subsequent cohorts.

Assumptions and mobility trends associated with the Boomer cohort, should not skew policy in their favour at the expense of others, nor mask the potential low mobility of subsequent cohorts in older age. Lucas (2012) argues that high mobility of overall population leads to social exclusion for others. Assessing and focusing on life-course stages and events associated with cohorts may help explain and predict instances of social exclusion as a result of transport, such as not learning to drive; residential migration; retirement; and driving cessation (Hine, 2009).

Due to changing residential mobility over the life-course, the emphasis on the concept of 'ageing in place' raises concerns about whether this is suitable for the mobility needs and desires of the future older population. It raises issues of housing mismatches at different life-course stages, which could have implications for current and future mobility. An unintended consequence of emphasis on this concept may be inadvertently producing mobility cultures that are unsustainable into older age. Whilst residential locations are decided upon in 'younger' older age, usually towards peripheral suburban, rural and coastal area, this may render older people immobile in later life as driving cessation occurs. The bus is being offered as the main alternative to the car, however, due to reduced bus service provision in line with spending cuts and increased scrutiny on the costs of providing concessionary travel, this is not likely to be a viable alternative to the car in the future.

Should there be continued emphasis on 'ageing in place', mobility cultures need to be fostered earlier and residential decisions of those in 'mid-life' stage prior to retirement should be encouraged to incorporate decisions that people make in order to maintain mobility in later life if they are to migrate. With the Boomer cohort having increased expectations of mobility, and increased double pressures on the younger 'sandwich generation' in relation to providing assistance for both (grand) children and parents, residential migration decisions may become more complex. As alluded to earlier there may be evidence of this as people consider urban centres as future retirement locations due to the amenities and transport options they provide and therefore some of the potential mobility issues due to ageing in place in rural areas as a result of driving cessation and lack of viable alternative transport options may be mitigated.

The conceptual implications need to be discussed in light of the approach that transport geography and population studies take in the study of ageing and older people. It has become evident that there is a need for greater connections between these disciplines to add to the story of ageing and mobility, on which conclusions will be drawn in the following and final chapter of this thesis.

8. Conclusion

8.1. Introduction

Despite the increasing prominence of the issues surrounding an ageing population, the changing mobility of the older population has not been given much consideration. Previous research has found that mobility patterns differ between younger people and older people, with older people having lower mobility as a result of lowered income and reduced physical mobility (Tacken, 1998, Noble, 2000, Metz, 2003) as mobility changes over the life-course (Oppermann, 1995, Pooley et al., 2005a, Ryley, 2006). Mobility is an important prerequisite for quality of life for older people in particular (Metz, 2000, Banister and Bowling, 2004, Spinney et al., 2009, Ziegler and Schwanen, 2011) and should therefore be given greater consideration in the context of an ageing population.

The influence of cohort membership on mobility has been neglected in transport studies, although this approach is widely used in population studies. Therefore cohort analysis was adopted to examine the changing mobility of the older population, which has been the main focus of the thesis. Age, period and cohort effects were found to be having an influence on the changing mobility of older people. Using this approach also identified varying convergence in gender differences in mobility between cohorts. As a result there are implications for the disciplines of population studies and transport geography that are worthy of exploration.

The chapter begins with an examination of how adopting cohort analysis has enhanced knowledge in this area of study. In light of the key findings, the original contribution to knowledge that this study makes is discussed and the relevance and implications of the research for policy and the disciplines are considered. The limitations of the study are noted before turning attention to the possible avenues for further research and the implications for each of the disciplines.

8.2. Key Research Findings

This thesis has shown the ways in which the mobility of the older population in Britain has increased from 1995-2008. This has been analysed in relation to trip frequency and distance travelled. The increase in mobility has been attributed to increasing use of the car amongst older people. Gender differences in mobility were still observed. However, these have converged over time.

Results from the cohort analysis found that cohort membership is important in explaining changing mobility. Age effects were observed as mobility declined as older cohorts aged over

time. Cohort effects were also present as the mobility of cohorts differed between them, as well as when mobility was compared when they were of the same age. The Post-War Boomer cohort (b.1946-1955) was found to be more mobile compared to former cohorts when they were of the same age. Women belonging to the Boomer cohort have higher mobility levels compared to former cohorts of older women, in line with higher rates of driving licence holding. Higher mobility amongst women of the Boomer cohort is likely to be contributing to this increase in mobility identified amongst older people more generally, and gender convergence.

The youngest cohorts, Generation X and Y (b.1966-1985) had lower mobility compared to the Boomers. Structural forces including reduced wealth as a result of unemployment associated with the current recession, increased use of telecommunications technology and reduced rate of driving licence holding could explain this trend.

Period effects identified found that there was a genuine trend effect of declining mobility, in line with current trends of traffic growth flattening out (ITC, 2010). However, this decline in mobility has been exacerbated by the current recession (Metz, 2012). As the mobility of the Boomer cohort is increasing over time they may be a unique cohort in terms of their mobility in older age as they are more mobile than former and subsequent cohorts. Changing demographic trends are thought to be contributing to this increase as some of the Boomer cohort will be part of the 'sandwich generation' (Demey et al., 2011) providing dual caring roles to younger (grand) children and older parents as life expectancies increase, which will be changing activity patterns, and due to family dispersal likely to lead to increasing mobility.

The uniqueness of the Boomer cohort is further reinforced by the characteristics of subsequent cohorts who have lower mobility. The current recession is having a greater adverse impact on current younger cohorts. This is affecting their ability to enter the labour market, acquire wealth and driving licence and car ownership. People often acquire resources earlier in the life-course, which influence mobility outcomes in later life (Bailey, 2009, Rosenbloom and Herbel, 2009). Given that distance travelled is actually decreasing over time, it may be that once the Boomer cohorts pass away, the mobility of older people will begin to decline. It should be noted that the Boomers are a diverse group in relation to socioeconomic factors, which contributed to varied mobility patterns.

The extent of gender differences in mobility differed between cohorts. Gender convergence in mobility was observed among current cohorts of younger adults. Most notably, women belonging to Generation Y (b.1976-1985) are more mobile than their male counterparts. This finding has not been seen previously in studies of travel behaviour. It is widely accepted that men travel further than women (Pooley et al., 2005b, Rosenbloom, 2006, Crane, 2007, Su

and Bell, 2012). This has important implications for future mobility patterns as these women could be more mobile than, or as immobile as, men of older ages.

The policy of providing the concessionary bus scheme at the national level in Scotland is very blunt. The findings suggest that this policy is not very effective in terms of promoting social inclusion and modal shift. The influence of extending the scheme, which removed peak hour and local area boundary restrictions, appears to have had little significant impact up to 2008. The only significant result observed was amongst older women with a concessionary pass as bus trip frequency increased after the extension was introduced; however, this could be a reflection of higher bus use by women generally as they are more likely to give up driving voluntarily earlier than men (Ragland et al., 2004; Siren and Hakamies-Blomqvist, 2005, 2006; Davey, 2007).

Car use also increased (although this finding was not significant) after the policy was rolled out nationally. This was alongside increasing mobility by bus, suggesting that the policy change may be producing some environmental benefits as the policy may be suppressing car use. The findings suggest that the policy change induces bus travel amongst higher income and car ownership older people, rather than providing an essential alternative mode of travel for older people. The benefits of the scheme are unevenly distributed due to varying bus provision geographically and barriers to use remain for some older people. Reductions in bus subsidies are leading to contractions in service (Transport Committee, 2011), further rendering the policy ineffective for some. Bus service provision needs to be a viable alternative for the scheme to be effective.

8.3. Contribution to Knowledge

Transport geography has tended to consider the travel behaviour and mobility characteristics of population silos at cross-sections in time and the problems or benefits they face as a result. Cohort analysis used in this study has allowed for the consideration of wider societal and structural factors that underpin the development of characteristics associated with different cohort groups which influence how they are mobile as they age over time. Deeper insight into the changing mobility patterns of older people can be developed as this approach considers the driving mechanisms behind the mobility of cohorts, which are related to different period and structural effects. As such, the study has enabled exploration of the likely aggregate impacts of trends in older people's mobility by recognising that there is a temporal dynamic to the mobility trends of the older population due to the ageing of cohorts.

Cohort analysis has been used in this thesis to further understand the changing mobility of older people in Britain. Whilst this approach is commonly used in demography, it has not been used widely within transport geography. This thesis has brought together and highlighted the

need for greater links between these disciplines as this approach has also emphasised the differing influence of changing demographic trends, including migration decisions, on birth cohorts which have implications for mobility outcomes.

Cohort membership is an important factor in explaining mobility, as the findings demonstrate that there are significant differences between the mobility of cohorts; each birth cohort is affected by structural forces at the same point in time differently; that in turn affects the ability to acquire resources and thus will have implications for future mobility outcomes in later life.

As this study encompassed younger birth cohorts in addition to the Boomers on the cusp of retirement, rather than just focusing on existing older cohorts and Boomers prior to retirement (as other studies have done), this has enabled better predictions to be made about the future mobility of older people and resulting implications.

The high mobility patterns displayed by the Boomers have led to the conclusion that they are likely to be a unique cohort in terms of their mobility, particularly as they have higher mobility than younger cohorts. As cohorts differ due to growing up and experience of different social contexts, the Boomers grew up with economic wealth and the development of cars, differing broadly from former older cohorts and subsequent younger cohorts, who are growing up with lower wealth and lower access to cars.

The use of cohort analysis also provided greater insight into gender differences and produced results that have not been observed previously in studies of mobility. Although there have been some suggestions in other studies that gender differences in mobility are converging at the aggregate level at least (Noble, 2005, Rosenbloom, 2006, Frändberg and Vilhelmson, 2011, McQuaid and Chen, 2012), by encompassing all adult birth cohorts into this study, a more nuanced observation was found. Younger cohorts, most notably women of the Generation Y (b.1976-1985) cohort have higher mobility above than their male counterparts, which is a fundamental break from the past and specific to this generation. There has been no previous study which has found this. In addition, the mobility of females' belonging to the Boomer cohort was found to be converging with males' belonging to the Boomers. Greater detailed explanations for this were offered up by linking to wider demographic trends and structural factors.

The higher and increasing mobility of the Boomer cohort, compared to lower levels of mobility amongst younger cohorts adds to the debate regarding the appropriateness of the provision of concessionary travel to all older people based solely upon age. The findings in this thesis highlights the potential unfairness of the concessionary fare scheme as the older population are beginning to increase travel by car, set to increase further as the Boomer cohort ages, particularly as younger cohorts have lower levels of mobility.

This study has also highlighted the fluidity of life-course stages, and the activities these entail, that have evolved with the ageing of cohorts over time as a result of various forces. These stages and resulting activities influence the mobility of different populations in different ways. Of most relevance to the mobility of the ageing Boomer cohort is the evolving definition of 'mid-life' stage in the life-course and the increase in the number of people belonging to the 'sandwich generation', which has resulted in dual caring responsibilities for younger (grand) children and older parents (Agree et al., 2003, Evandrou and Glaser, 2004, Pierret, 2006, Demey et al., 2011).

There are indications that residential migration and travel are possible substitutes for each other (Pooley et al., 2005b) which highlights the need for greater links between transport geography and population studies. As the mobility of cohorts is influenced differently by structural forces including the current recession and changing demographic trends, there is a possibility of a mobility hysteresis effect (as with a migration hysteresis effect). These are inertia effects that may influence the mobility of cohorts. If people have been migratory in the past, they are also more likely to be migratory in the future (Newbold and Bell, 2001). As migration and travel behaviour are both part of the mobility continuum (Pooley et al., 2005b), this inertia effect could also apply to travel behaviour; if people are used to travelling longer distances, they will continue to do so thereby continuing to engage in high mobility in older age. In relation to the Boomer cohort specifically, this effect could partly explain why Boomers may have higher mobility in older age; as they had higher mobility in earlier life and grew up with the car. In addition, due to the dispersal of family networks, relatives have to engage in travel to reconnect. The current recession is having an influence on the housing market cycle, influencing migration decisions. People may be reluctant to move due to the effect of housing market conditions and are therefore engaging in higher travel behaviour, and higher mobility may be compensating for remaining in place (Cooke, 2011).

The research has given great consideration to how mobility patterns have changed over time amongst the older population and has identified that there is a need for greater connections to be developed between transport geography and population studies into how ageing and mobility of older people is approached. Within transport geography there should be a move away from analysing population groups in silos towards an integrated approach based on the links between mobility of cohort groups to aggregate populations that are based on chronological age.

8.4. Relevance of the Research

The research has demonstrated how cohort analysis and related methodologies can contribute to transport geography research. The study has highlighted that mobility

differences between cohorts is a key element in explaining the changing mobility behaviour of populations. As cohorts experience different forces and structural impacts over time, these will influence expectations of mobility and impact on behaviour, as illustrated in Figure 7.2.

Differences in mobility amongst the population are considered in terms of structural factors that frequently include age, income, location and gender. The influence of cohort membership on mobility has been largely ignored in this discipline. Alignment with a cohort also gives a set of characteristics that differentiate from others and influences individual socioeconomic characteristics, such as the level of education. Mobility cultures are learnt from being part of a particular cohort that has implications for mobility now and in the future and should be given greater consideration. As the proportion of older people increases in society, there will be a greater number of different cohorts making up this population group in the future, with differing mobility characteristics.

The changing mobility of cohorts regarding the longer term shifts in the mobility of the older population is profoundly significant for policy development. Policy development needs to recognise that cohorts are influenced by different effects over time which impact on current mobility patterns as well as future mobility. Whilst consideration needs to be given to the environmental and social exclusion issues that arise from increased mobility by the private car displayed by the upcoming Boomer cohort, there are other longer term implications that also need to be taken into account. Increasing car use amongst the older population as identified by (Rosenbloom, 2001, Hakamies-Blomqvist, 2003, Rosenbloom and Herbel, 2009) may not continue as subsequent cohorts age.

Given current structural processes illustrated in Figure 7.2, there is potential for younger cohorts to have reduced mobility when they are older as a result of a combination of factors which may have a deep scarring impact on the mobility of these cohorts. These may include reduced rates of driving licence holding and an inability to access the labour market in the current economic climate, both of which are linked to lower levels of mobility. The future manifestation of lower mobility amongst older people requires thorough examination of the wider structural effects in order to understand the future implications of changes in mobility in relation to policy development. Whilst current trends suggest that car use is increasing amongst the older population this is largely due to the different nature of the Boomer cohort in comparison to former cohorts. This highlights the need for consideration of different forces to be incorporated into policies to ensure that not only are they appropriate for current populations, but are dynamic and flexible enough to adjust to behavioural changes of other cohorts in the future.

By adopting a cohort approach, this thesis has highlighted that existing 'universal' approaches to the development of policy targeted specifically for older people are not effective.

Concessionary schemes are universal benefits provided to all older people, regardless of income and other factors, with the aim of improving access and social inclusion. This approach to classifying people in an essentialist fashion in relation to their age is no longer tenable, given the more fluid nature of society. Demography remains important, particularly in relation to cohort characteristics but policy needs to adapt to changing lifestyle trends and the increasing diversity of people included in any given cohort. It is no longer appropriate to consider mobility of older people in a homogenous fashion.

The use of cohort analysis also has wider applications in terms of transport planning. Transport planning tends to draw forecasts of travel demand, largely based on projections focused on the costs and time of travel. This economic approach of predicting travel demand neglects the impact population growth and changes in structure are likely to have on travel demand. Transport planning projects are usually long term, taking into account demand projected for 30 years into the future. Forecasts of changing population structures need to be incorporated into these projects to ensure their long term suitability for future populations.

8.5. Limitations of the Study

As a solely quantitative study, the research aimed to analyse the mobility trends of older people at a broad aggregate level. Whilst use has been made of various large secondary datasets to ensure the trends examined represent the British and Scottish populations, there are insights that may have been generated through the use of qualitative research methods, such as focus groups and interviews. Such methods are able to uncover more about people's experiences and therefore provide richer insights as responses are more meaningful to the participant. For example, when considering the effectiveness of policies, such as concessionary travel, qualitative research could have revealed how the concession is used amongst older people in relation to their experienced lives.

There are some limitations of the datasets used in this study. At the time of the study data from the National Travel Survey and Scottish Household Survey was available to 2008. Five years have passed since and mobility patterns may have been greatly affected by the deep, double dip recession currently being experienced in Britain and other countries. Pre-recessionary effects have been established but the full effects of the recession on mobility have the potential to be explored further as more recent data becomes available. These are not just short-term effects on mobility but have a lasting scarring effect on younger cohorts, the consequences of which have not yet been fully established.

It is also recognised that the control groups used to assess the impact of the concessionary policy are limited. Whilst the study has focused on those with and without a concessionary pass, this analysis would benefit from further segmentation to understand the impact of the

scheme on different users. For example, the analysis could segment further by driving licence holding and household car access. This would help identify whether the scheme has changed the mobility of older people with different characteristics. Further analysis could be carried out to assess whether the impact of the scheme has affected travel behaviour. Comparisons could be made between those who are: bus users and hold a concessionary pass; non-bus users, yet have a concessionary pass; and older people who do not hold a concessionary pass. This would help further assess the impact on the effectiveness of the policy, and whether the policy has actually influenced behaviour, particularly in relation to modal shift. Also the nature of trips being undertaken by those with a free bus pass needs to be considered more fully to identify the proportion of older people who are using it to commute to work and therefore assess the extent to which the scheme is addressing issues of social inclusion. Social inclusion is not only about having a job - indeed even not necessarily about having a job. However, there is some evidence to indicate that the use of this scheme for this purpose is relatively low. In Scotland it was found that 7.2% of respondents reported travelling to work using the concessionary pass (Transport Scotland, 2009).

8.6. Future Research Agenda

This research has illustrated how cohort analysis, a methodological approach used widely in population studies, can be applied to analyse change observed in travel trends amongst the older population. This has highlighted the importance of the need to consider the changing mobility of cohorts in an ageing population. This section discusses the implications for the sub-disciplines of transport geography and population studies as a result of this study and what the future research agenda might be.

In the *Journal of Transport Geography*, Schwanen and Páez (2010) consider two important questions that emerge in relation to demographic ageing and transport. The first is how the increase in the number of those aged 65 and over (and new specific mobility traits) affect transport and land use systems, whilst the second is how these systems will affect the mobility of older people. Valuable as are these questions, they fail to examine structural effects that have influenced cohorts over time. Future research should examine travel behaviour trends of specific cohorts over a longer time span and how these relate to specific life events and at different life-stages.

The discipline of transport geography should move away from analysing population groups in isolation from one another, for example from just focusing on older people or younger people, towards an approach that reflects the wider demographic factors that can provide further understanding about mobility change. As cohorts age, their characteristics, needs, desires and expectations will evolve over time. As such, when they reach a particular age, their mobility patterns are likely to differ from earlier cohorts and the assumptions about particular

age groups may no longer hold.

As has been argued in the thesis, there appears to be a need to move towards considering mobility related to life-course stages in the context of analysing cohort groups over time. Given the complexity of changing demographic structure, people may have more in common in terms of their mobility based on life-course stages rather than on age groups. Taking the example of 'mid-life' (Agree et al., 2003, Evandrou and Glaser, 2004, Demey et al., 2011), this encompasses a broad age range. If these are considered as silos (e.g. aged 40-49, 50-59 and 60-69) it produces erroneous understandings of mobility. Comparing cohorts from a life-course perspective would by contrast highlight the mobility implications of features such as caring for older parents or younger (grand) children.

There is also a need for population studies to consider mobility in more detail in the context of household decisions about migratory moves, with particular attention to the mobility behaviour and expectations of different cohorts. As housing market conditions affect migratory decisions, greater recognition of migration and mobility as substitutes for one another will help explain such decisions. The study has emphasised the influence of changing demographic trends on mobility. Due to the dispersal of families people have had to engage in longer journeys to see relatives, a feature that may have been exacerbated by the current housing market climate, with family carers finding it harder to move house to care for the older generations.

The influence of evolving life-course stages has been used to consider migration decisions, but less so for mobility patterns. Mobility can bring to the field of population studies increasingly nuanced observations of the nature of life-course events as these movements happen more frequently and are more repetitive (also have particular, perhaps habitual, patterns) compared to residential migration. Population studies have tended to base such life-course stages and events on migration patterns. However, everyday mobility may be a more useful way of characterising life-course stages and it would be valuable to research travel mobility regimes between major life events.

For example, obtaining a first car may represent or contribute to a particular life-course stage, such as entering employment. Changing vehicle types may reflect changing circumstances, such as having children. Selling a car may suggest that a person has given up driving. These examples add to the life-course story. Everyday mobility may reveal associations with particular life-course stages and events. As travel mobility occurs more frequently than irregular processes such as residential location, it should be given more focus and weight in population studies.

Finally, given that data sources for two different geographical scales (Britain and Scotland) have been used in this study, and have been shown to produce rather different insights, it is

important that research is undertaken to establish how generalisable the findings are for other countries, and indeed other cultures, with an ageing population. For example, mobility cultures differ by location in relation to geographical variations in family ties affecting whether older people assist with caring for grandchildren and in relation to attitudes of younger generations to caring for older parents. Comparisons with datasets from other countries will assist in understanding the impact of different cohorts on mobility elsewhere.

9. References

- ADLER, G. & ROTTUNDA, S. 2006. Older adults' perspectives on driving cessation. *Journal of Aging Studies*, 20, 227-235.
- AGREE, E., BISSETT, B. & RENDALL, M. 2003. Simultaneous care for parents and care for children among mid-life British men and women. *Population Trends 112 Summer 2003*. Office for National Statistics.
- AHERN, A. & HINE, J. 2012. Rural transport – Valuing the mobility of older people. *Research in Transportation Economics*, 34, 27-34.
- ALSNIH, R. & HENSHER, D. A. 2003. The mobility and accessibility expectations of seniors in an aging population. *Transportation Research Part A: Policy and Practice*, 37, 903-916.
- ALWIN, D. F. 2012. Integrating Varieties of Life Course Concepts. *The Journals of Gerontology Series B: Psychological Sciences and Social Sciences*, 67B, 206-220.
- AMBROSI, M. 2011. Where would you like to retire? *The Guardian*, 18 August 2011.
- ANABLE, J. 2005. 'Complacent Car Addicts' or 'Aspiring Environmentalists'? Identifying travel behaviour segments using attitude theory. *Transport Policy*, 12, 65-78.
- ANCHOR. 2010. *Retirees swapping the seaside for the bright lights* [Online]. Available: <http://www.anchor.org.uk/about-anchor/anchor-news/anchor-and-sector-news-305> [Accessed 17 10 12].
- ANDERSON, T., CHRISTOPHERSEN, O., PICKERING, K., SOUTHWOOD, H. & TIPPING, S. 2009. *National Travel Survey 2008: Technical Report Prepared for the Department for Transport*. National Centre for Social Research.
- ANDREWS, G. 2011. *Just the ticket? Exploring the contribution of free bus fares policy to quality of later life*. Doctoral dissertation, Faculty of Environment & Technology, University of the West of England, Bristol
- ANDREWS, G., PARKHURST, G., SUSILO, Y. O. & SHAW, J. 2011. The grey escape: investigating older people's use of the free bus pass. *Transportation Planning and Technology*, 35, 3-15.
- ANON. 2006. The wheels on the bus. *The Economist*.
- ASENSIO, J. 2002. Transport Mode Choice by Commuters to Barcelona's CBD. *Urban Studies*, 39, 1881-1895.
- ATTERTON, J. 2006. *Ageing and coastal communities*. Report for the Coastal Action Zone Partnership Newcastle-upon-Tyne, Centre for Rural Economy. Newcastle University.
- AUDIT SCOTLAND. 2010. *National Concessionary Travel*. Edinburgh: Audit Scotland.
- BAILEY, A. 2005. *Making Population Geography*, London: Hodder Arnold.
- BAILEY, A. J. 2009. Population geography: lifecourse matters. *Progress in Human Geography*, 33, 407-418.
- BAKER, S. & WHITE, P. 2010. Impacts of free concessionary travel: Case study of an English rural region. *Transport Policy*, 17, 20-26.

- BANISTER, D. 1999. Planning More to Travel Less: Land Use and Transport. *The Town Planning Review*, 70, 313-338.
- BANISTER, D. & BOWLING, A. 2004. Quality of life for the elderly: the transport dimension. *Transport Policy*, 11, 105-115.
- BASHIR, S. A., EST, EGRAVE & VE, J. 2001. Projecting cancer incidence and mortality using Bayesian age-period-cohort models. *Journal of Epidemiology and Biostatistics*, 6, 287-296.
- BATES, A. 2010. *Office for National Statistics RTPI presentation* [Online]. Available: <http://www.rtpi.org.uk/download/8492/11-FEB-2010-A-BATES.pdf> [Accessed 28 01 11].
- BAYLISS, J. & SLY, F. 2010. Ageing across the UK. *Regional Trends*, 42, 2-28. Office for National Statistics.
- BBC. 2005. *How bad is the UK's pension crisis?* [Online]. BBC News. Available: <http://news.bbc.co.uk/1/hi/business/2082800.stm> [Accessed 16 10 12].
- BBC. 2010. *Cuts threaten new roads, says transport secretary* [Online]. BBC News. Available: <http://www.bbc.co.uk/news/10502953>
- BBC. 2012a. *Government postpones planned 3p fuel duty increase* [Online]. BBC News. Available: <http://www.bbc.co.uk/news/uk-politics-18588855> [Accessed 16 10 12].
- BBC. 2012b. *Rail fares will rise by 6.2% in January* [Online]. BBC News. Available: <http://www.bbc.co.uk/news/business-19251068> [Accessed 16 10 12].
- BEINHOCKER, E. D., FARRELL, D. & GREENBERG, E. 2008. Why baby boomers will need to work longer. *Economic Studies*. McKinsey & Company.
- BEST, H. & LANZENDORF, M. 2005. Division of labour and gender differences in metropolitan car use: An empirical study in Cologne, Germany. *Journal of Transport Geography*, 13, 109-121.
- BINGHAM, J. 2012. Delaying bus passes could help tackle elderly care crisis – report. *The Telegraph*, 12 10 12.
- BOND, J. & CORNER, L. 2004. *Quality of Life and Older People*, Berkshire: Open University Press, McGraw-Hill Education.
- BOTTAZZI, R., CROSSLEY, T. F. & WAKEFIELD, M. 2011. House Prices and Home Ownership: A Cohort Analysis *Quaderni DSE Working Paper No. 790*.
- BOULTON, G. 2010. *Digital Scotland*. Edinburgh: The Royal Society of Edinburgh.
- BOURN, R. 2013. *No Entry! Transport Barriers Facing Young People: government policy hits young hardest*. The Intergenerational Foundation.
- BOWLING, A. P., EDELMANN, R. J., LEAVER, J. & HOEKEL, T. 1989. Loneliness, mobility, well-being and social support in a sample of over 85 year olds. *Personality and Individual Differences*, 10, 1189-1192.
- BROWNING, C. & SIMS, J. 2007. Ageing without driving: Keeping older people connected. In: CURRIE, G. & STANLEY, J. (eds.) *No way to go: Transport and social disadvantage in Australian communities.*: Monash University Publishing.

- BURKE, S. 2012. *Ten Dilnot Flaws - Time for an Alternative for Funding Better Care*. United for All Ages.
- BURKHARDT, J., BERGER, A. M. & MCGAVOCK, A. T. 1996. The mobility consequences of the reduction or cessation of driving by older women. *In: ROSENBLOOM, S. (ed.) Proceedings from the Second National Conference on Women's Travel Issues*. Washington, DC: Federal Highway Administration, U.S. Dept. of Transportation.
- BURNETT, P. & LUCAS, S. 2010. Talking, walking, riding and driving: The mobilities of older adults. *Journal of Transport Geography*, 18, 596-602.
- BÜSCHER, M. & URRY, J. 2009. Mobile Methods and the Empirical. *European Journal of Social Theory*, 12, 99-116.
- BUTCHER, L. 2011. Buses: concessionary fares Commons Library Standard Note SN/BT/1499.
- CANN, P. & DEAN, M. (eds.) 2009. *Unequal Ageing: The Untold Story of Exclusion in Old Age*. Bristol: The Policy Press.
- CASS, N., SHOVE, E. & URRY, J. 2005. Social exclusion, mobility and access. *The sociological review*, 53, 539-555.
- CHAMPION, T. & SHEPHERD, J. 2006. Demographic change in rural England. *In: LOWE, P. & SPEAKMAN, L. (eds.) The ageing countryside: The growing older population of rural England*. London: Age Concern England.
- CHRISTENSEN, K., DOBLHAMMER, G., RAU, R. & VAUPEL, J. W. 2009. Ageing populations: the challenges ahead. *Lancet*, 1196–208.
- CHURCH, A., FROST, M. & SULLIVAN, K. 2000. Transport and social exclusion in London. *Transport Policy*, 7, 195-205.
- CLIFTON, K. & LUCAS, K. 2004. Examining the empirical evidence of transport inequality in the US and UK. *In: LUCAS, K. (ed.) Running on Empty: Transport, Social Exclusion and Environmental Justice*. Bristol: The Policy Press, pp15-39.
- COBB, R. & COUGHLIN, J. 2004. Transportation Policy for an Aging Society: Keeping Older Americans on the Move. *Transportation for an Aging Society Conference Proceedings 27*. Washington, DC Transportation Research Board, National Academies Press.
- COOKE, T. J. 2011. It is not Just the Economy: Declining Migration and the Rise of Secular Rootedness. *Population, Space and Place*, 17, 193-203.
- CORONINI-CRONBERG, S., MILLETT, C., LAVERTY, A. A. & WEBB, E. 2012. The Impact of Free Older Persons' Bus Pass on Active Travel and Regular Walking in England. *American Journal of Public Health*, 1-8.
- COUGHLIN, J. F. 2009. Longevity, Lifestyle, and Anticipating the New Demands of Aging on the Transportation System. *Public Works Management & Policy*.
- COUGHLIN, J. F. & REIMER, B. New demands from an older population: An integrated approach to defining the future of older driver safety. Proceedings of the Society of Automotive Engineers Convergence Conference, 2006.

- COUGHLIN, J. F. & TOMPKINS, C. J. 2009. Demographics, Destiny, and Anticipating the Future of the Transportation System. *Public Works Management & Policy*, 13, 284-287.
- CRANE, R. 2007. Is There a Quiet Revolution in Women's Travel? Revisiting the Gender Gap in Commuting. *Journal of the American Planning Association*, 73, 298-316.
- CURRIE, G. & DELBOSC, A. 2010. Modelling the social and psychological impacts of transport disadvantage. *Transportation*, 37, 953-966.
- DAHMEN, N. & COZMA, R. 2009. Media Takes: On Aging. *STYLEGUIDE for Journalism, Entertainment and Advertising*. International Longevity Center - USA Aging Services of California.
- DALE, A. & DAVIES, R. B. 1994. *Analyzing social and political change: a casebook of methods*, Sage Publications.
- DANNEFER, D. & SHURA, R. 2009. Experience, Social Structure and Later Life: Meaning and Old Age in an Aging Society. 747-755.
- DARGAY, J. & LIU, R. 2010. Concessionary Fares Project Report 6: Analysis of the National Travel Survey Data. In: TRANSPORT, D. F. (ed.). London.
- DAVEY, J. A. 2007. Older people and transport: coping without a car. *Ageing & Society*, 27, 49-65.
- DAVY, M. 2007. Socio-economic inequalities in smoking: an examination of generational trends in Great Britain. *Health Statistics Quarterly*, 34, 26-34.
- DELBOSC, A. & CURRIE, G. 2011a. Exploring the relative influences of transport disadvantage and social exclusion on well-being. *Transport Policy*, 18, 555-562.
- DELBOSC, A. & CURRIE, G. 2011b. The spatial context of transport disadvantage, social exclusion and well-being. *Journal of Transport Geography*, 19, 1130-1137.
- DEMAKAKOS, P., NUNN, S. & NAZROO, J. 2006. Loneliness, relative deprivation and life satisfaction In: BANKS, J., BREEZE, E., LESSOF, C. & NAZROO, J. (eds.) *Retirement, health and relationships of the older population in England: The 2004 English Longitudinal Study of Ageing (Wave 2)*. London: The Institute for Fiscal Studies.
- DEMEY, D., BERRINGTON, A., EVANDROU, M. & FALKINGHAM, J. 2011. The Changing Demography of Mid-life, from the 1980s to the 2000s. *Population Trends nr 145 Autumn 2011*. Office for National Statistics.
- DENNETT, A. & STILLWELL, J. 2010. Internal migration in Britain, 2000–01, examined through an area classification framework. *Population, Space and Place*, 16, 517-538.
- DEPARTMENT OF HEALTH 2004. *At Least Five Days a Week: Evidence on the Impact of Physical Activity and Its Relationship to Health*. London, England.
- DFT 2009. National Travel Survey: 2008. *Transport Statistics Bulletin*. Department for Transport.
- DFT 2010a. National Travel Survey: 2010 Driving licence holding and vehicle availability. In: TRANSPORT, D. F. (ed.). National Travel Survey.

- DFT 2010b. Transport Trends: 2009 Edition. *In*: TRANSPORT, D. F. (ed.). Transport Statistics Publications.
- DFT 2012. National Travel Survey: 2011. *In*: TRANSPORT, D. F. (ed.). National Travel Survey.
- DFT 2013. Quarterly Bus Statistics: Great Britain Q1 2013 *In*: TRANSPORT, D. F. (ed.).
- DIGITAL BRITAIN. 2009. *Final Report*. Department for Culture, Media and Sport and Department for Business, Innovation and Skills. London: The Stationery Office.
- DIRECTGOV. 2012. *Calculating your State Pension age* [Online]. Available: http://www.direct.gov.uk/en/Pensionsandretirementplanning/StatePension/DG_4017919 [Accessed 05 04 12].
- DOBBIE, F., MCCONVILLE, S. & ORMSTON, R. 2010. *Understanding Why Some People Do Not Use Buses*. Transport Research Series, Scottish Government Social Research. Edinburgh: Scottish Government.
- DOCHERTY, I. & SHAW, J. 2011. The transformation of transport policy in Great Britain? 'New Realism' and New Labour's decade of displacement activity. *Environment and Planning A*, 43, 224-251.
- DWYER, P. & HARDILL, I. 2011. Promoting social inclusion? The impact of village services on the lives of older people living in rural England. *Ageing and Society*, 31, 243.
- EBY, D. W. & MOLNAR, L. J. 2009. Older Adult Safety and Mobility: Issues and Research Needs. *Public Works Management & Policy*.
- ECMT 2000. *Transport and Ageing of the Population: Report of the 112th Round Table on Transport Economics* Paris: European Conference of Ministers of Transport.
- EDDINGTON, R. 2006. *The Eddington Transport Study. Main Report: Transport's Role in Sustaining the UK's Productivity and Competitiveness*. London: The Stationary Office
- EINOLF, C. J. 2009. Will the boomers volunteer during retirement? Comparing the baby boom, silent, and long civic cohorts. *Nonprofit and Voluntary Sector Quarterly*, 38, 181-199.
- ELLIOTT, A. & URRY, J. 2010. *Mobile lives*, Oxon: Routledge.
- EMMERSON, C. 2012. In-Vehicle Navigation: The Perspective of Older Drivers *44th Annual Universities' Transport Study Group conference*. University of Aberdeen.
- ESDS 2010. *Scottish Household Survey Travel Diary User Guide 2007/2008*. Economic and Social Data Service.
- ESDS 2012. *National Travel Survey (NTS data), 2002-2008: User guidance*. Economic and Social Data Service.
- ESDS. 2013. *National Travel Survey* [Online]. Economic and Social Data Service. Available: <http://www.esds.ac.uk/government/nts/> [Accessed 27 02 13].
- EUROFOUND 2012. *NEETs - Young people not in employment, education or training: Characteristics, costs and policy responses in Europe*. Luxembourg: Publications Office of the European Union.
- EVANDROU, M. 1997. *Baby Boomers: Ageing in the 21st Century*, Age Concern.

- EVANDROU, M. & GLASER, K. 2004. Family, work and quality of life: changing economic and social roles through the lifecourse. *Ageing and Society*, 24, 771-791.
- FALKINGHAM, J. 1997. Who are the baby boomers? A demographic profile. In: EVANDROU, M. (ed.) *Baby Boomers: Ageing in the 21st Century*. London: Age Concern.
- FARQUHAR, M. 1995. Elderly people's definitions of quality of life. *Social Science & Medicine*, 41, 1439-1446.
- FARRINGTON, J. & FARRINGTON, C. 2005. Rural accessibility, social inclusion and social justice: towards conceptualisation. *Journal of Transport Geography*, 13, 1-12.
- FARRINGTON, J. H. 2007. The new narrative of accessibility: its potential contribution to discourses in (transport) geography. *Journal of Transport Geography*, 15, 319-330.
- FELDSTEIN, M. S. 2006. The Effects of the Ageing European Population on Economic Growth and Budgets: Implications for Immigration and Other Policies. *National Bureau of Economic Research Working Paper Series*, No. 12736.
- FIELDING, A. 1993. Mass migration and economic restructuring. In: KING, R. (ed.) *Mass migrations in Europe: the legacy and the future*. London: Belhaven Press.
- FIELDING, T. 2010. Migration in a Time of Crisis: A Simple Conceptual Framework Applied to East Asian Migrations. *Sussex Centre for Migration Research Working Paper*, 63.
- FIELDING, T. 2012. *Migration in Britain: Paradoxes of the Present, Prospects for the Future*, Cheltenham, Edward Elgar.
- FINDLAY, A. M., STOCKDALE, A., FINDLAY, A. & SHORT, D. 2001. Mobility as a driver of change in rural Britain: an analysis of the links between migration, commuting and travel to shop patterns. *International Journal of Population Geography*, 7, 1-15.
- FOOT, D. K. & STOFFMAN, D. 2000. *Boom bust & echo: profiting from the demographic shift in the 21st century*. Toronto: Macfarlane, Walter & Ross.
- FRÄNDBERG, L. & VILHELMSON, B. 2011. More or less travel: personal mobility trends in the Swedish population focusing gender and cohort. *Journal of Transport Geography*, 19, 1235-1244.
- FREY, W. 2010. *Investigating Change: Web-Based Analyses of US Census and American Community Survey Data*. Belmont, CA: Wadsworth, Cengage Learning
- GABRIEL, Z. & BOWLING, A. 2004. Quality of life from the perspectives of older people. *Ageing and Society*, 24, 675-691.
- GÄRLING, T. & AXHAUSEN, K. W. 2003. Introduction: Habitual travel choice. *Transportation*, 30, 1-11.
- GÄRLING, T., GÄRLING, A. & LOUKOPOULOS, P. 2002. Forecasting Psychological Consequences of Car Use Reduction: A Challenge to an Environmental Psychology of Transportation. *Applied Psychology*, 51, 90-106.
- GILHOOLY, M., HAMILTON, K., O'NEILL, M., GOW, J., WEBSTER, N., PIKE, F. & BAINBRIDGE, D. 2002. *Transport and ageing: extending quality of life for older people via public and private transport. End of Reward Report*. ESRC Award Reference Number L480 25 40 25

- GIULIANO, G. 2004. Land use and travel patterns among the elderly. *Transportation in an Aging Society: A Decade of Experience, Conference proceedings 27*. Washington DC: Transportation Research Board.
- GIULIANO, G., HU, H. & LEE, K. 2003. *Travel patterns of the elderly: The role for land use*. Final Report for METRANS PROJECT 00-8.
- GLASER, K. 1997. The living arrangements of elderly people. *Reviews in Clinical Gerontology*, 7, 63-72.
- GLASGOW, N. & BLAKELY, R. M. 2000. Older Nonmetropolitan Residents' Evaluations of Their Transportation Arrangements. *Journal of Applied Gerontology*, 19, 95-116.
- GLENN, N. D. 2005. *Cohort Analysis*, Thousand Oaks, CA: Sage Publications Ltd.
- GOODWIN, P. 2012. *Peak Travel, Peak Car and the Future of Mobility: Evidence, Unresolved Issues, Policy Implications, and A Research Agenda*, International Transport Forum.
- GOODWIN, P., HALLETT, S., KENNY, F. & STOKES, G. 1991. Transport: The New Realism report to the Rees Jefferys Road Fund, Transport Studies Unit, University of Oxford. Oxford.
- GOODWIN, P. B. 1990. Demographic Impacts, Social Consequences, and the Transport Policy Debate. *Oxford Review of Economic Policy*, 6, 76-90.
- GRAY, D., FARRINGTON, J., SHAW, J., MARTIN, S. & ROBERTS, D. 2001. Car dependence in rural Scotland: transport policy, devolution and the impact of the fuel duty escalator. *Journal of Rural Studies*, 17, 113-125.
- GRAY, D., FARRINGTON, J. H. & KAGERMEIER, A. I., EDS BLACKWELL 2008. Geographies of Rural Transport. In: KNOWLES, R., SHAW, J. & DOCHERTY, I. (eds.) *Transport Geographies: Mobilities, Flows and Spaces*. Oxford: Blackwell Publishing, pp.102-119.
- GRAY, D., SHAW, J. & FARRINGTON, J. 2006. Community transport, social capital and social exclusion in rural areas. *Area*, 38, 89-98.
- GREENWOOD, J., SESHADRI, A. & VANDENBROUCKE, G. 2005. The Baby Boom and Baby Bust. *American Economic Review*, 95, 183-207.
- GREGORY, D. 1978. *Ideology, science and human geography*, London: Hutchinson.
- GROUS, A. 2012. *The 'Olympic Cycling Effect' A Report Prepared for Sky and British Cycling*. London School of Economics.
- GUIVER, J. W. 2007. Modal talk: Discourse analysis of how people talk about bus and car travel. *Transportation Research Part A: Policy and Practice*, 41, 233-248.
- GUO, A., BRAKE, J., EDWARDS, S., BLYTHE, P. & FAIRCHILD, R. 2010. The application of in-vehicle systems for elderly drivers. *European Transport Research Review*, 2, 165-174.
- GUTIÉRREZ, J. 2009. Transport and Accessibility. In: ROB, K. & NIGEL, T. (eds.) *International Encyclopedia of Human Geography*. Oxford: Elsevier, pp.410-417
- HAKAMIES-BLOMQUIST, L. 2003. *Ageing Europe: The challenges and opportunities for transport safety*. Brussels: European Transport Safety Council.

- HAKAMIES-BLOMQUIST, L. & HENRIKSSON, P. 1999. Cohort effects in older drivers' accident type distribution: are older drivers as old as they used to be? *Transportation Research Part F: Traffic Psychology and Behaviour*, 2, 131-138.
- HAKAMIES-BLOMQUIST, L. & SIREN, A. 2003. Deconstructing a gender difference: Driving cessation and personal driving history of older women. *Journal of Safety Research*, 34, 383-388.
- HALL, D. 2004. Towards a gendered transport geography. *Journal of Transport Geography*, 12, 245-247.
- HALL, J. 2012. Petrol prices rise again, the AA warns. *The Telegraph*, 17 08 12.
- HAMILTON, K. & JENKINS, L. 2000. A Gender Audit for Public Transport: A New Policy Tool in the Tackling of Social Exclusion. *Urban Studies*, 37, 1793-1800.
- HAMILTON, M. & HAMILTON, C. 2006. Baby Boomers and Retirement: Dreams, fears and anxieties. *Discussion paper 89*. The Australia Institute.
- HANDY, S. 2005. Planning for accessibility: in theory and in practice. In: LEVINSON, D. M. & KRIZEK, K. J. (eds.) *Access to destinations*. Amsterdam; Boston: Elsevier, pp.131-148
- HANSON, S. 2010. Gender and mobility: new approaches for informing sustainability. *Gender, Place & Culture*, 17, 5-23.
- HAZER, O. & BOYLU, A. A. 2010. The examination of the factors affecting the feeling of loneliness of the elderly. *Procedia - Social and Behavioral Sciences*, 9, 2083-2089.
- HEADICAR, P. 2009. *Transport Policy and Planning in Great Britain*, Oxon: Routledge.
- HELP THE AGED. 2008. Isolation and Loneliness: Policy Statement 2008. Help the Aged.
- HENSHER, D. 2007. Social Exclusion: Informed Reality Thinking On Accessibility And Mobility In An Ageing Population In: CURRIE, G. V. & STANLEY, J. (eds.) *No Way to Go: Transport and Social Disadvantage in Australian Communities*. Monash University Publishing.
- HENSHER, D. A. 2001. Measurement of the Valuation of Travel Time Savings. *Journal of Transport Economics and Policy*, 35, 71-98.
- HESS, D. 2012. Walking to the bus: perceived versus actual walking distance to bus stops for older adults. *Transportation*, 39, 247-266.
- HIGGS, P. & GILLEARD, C. 2010. Generational conflict, consumption and the ageing welfare state in the United Kingdom. *Ageing & Society*, 30, 1439-1451.
- HILDEBRAND, E. 2003. Dimensions in elderly travel behaviour: A simplified activity-based model using lifestyle clusters. *Transportation*, 30, 285-306.
- HILL, D. 2011. London transport fares to rise 7% next year, says Boris Johnson. *The Guardian*, 14 09 11.
- HINE, J. 2004. Transport Disadvantage and Social Exclusion in Urban Scotland. *Built Environment*, 30, 161-171.

- HINE, J. 2008. Transport and social justice. In: KNOWLES, R. D., SHAW, J. & DOCHERTY, I. (eds.) *Transport geographies : mobilities, flows, and spaces*. Oxford: Blackwell Publishing, pp.49-61.
- HINE, J. 2009. Transport and Social Exclusion. ROB, K. & NIGEL, T. (eds.) *International Encyclopedia of Human Geography*. Oxford: Elsevier, pp.429-434.
- HINE, J. & MITCHELL, F. 2001. Better for Everyone? Travel Experiences and Transport Exclusion. *Urban Studies*, 38, 319-332.
- HINE, J. & MITCHELL, F. 2003. *Transport disadvantage and social exclusion: Exclusionary mechanisms in transport in urban Scotland*, Aldershot: Ashgate Pub Limited.
- HIRST, E. & HARROP, B. 2011. *Getting out and about: Investigating the impact of concessionary fares on older people's lives*. Manchester: Transport Action Group.
- HJORTHOL, R. J., LEVIN, L. & SIRÉN, A. 2010. Mobility in different generations of older persons: The development of daily travel in different cohorts in Denmark, Norway and Sweden. *Journal of Transport Geography*, 18, 624-633.
- HOLLAND, C., KELLAHER, L., PEACE, S., SCHARF, T., BREEZE, E., GOW, J. & GILHOOLY, M. 2005. Getting out and about In: WALKER, A. (ed.) *Understanding Quality of Life in Old Age*. McGraw-Hill Companies Incorporated.
- HOLLOWAY, L. & HUBBARD, P. 2001. *People and Place: The Extraordinary Geography of Everyday Life*, Essex: Prentice Hall.
- HOPE, S. & BURNETT, J. 2010. *Scottish Household Survey: Methodology and Fieldwork Outcomes 2007/2008*. A National Statistics Publication for Scotland
- HOPKINS, P. & PAIN, R. 2007. Geographies of age: thinking relationally. *Area*, 39, 287-294.
- HOPKINSON, L. 2012. *The War on Motoring Myth or Reality?* Institute for Public Policy Research.
- HUMPHREY, A. & SCOTT, A. 2012. *Older people's use of concessionary bus travel*. London: NatCen Social Research
- IEA 2009. *Transport, Energy and CO2: Moving toward Sustainability*. International Energy Agency.
- IMBENS & WOOLDRIDGE. 2007. *Difference-in-Differences Estimation* [Online]. Available: http://www.nber.org/WNE/lect_10_diffindiifs.pdf [Accessed 15 05 12].
- ITC 2010. *Long Distance Travel in Britain: Prospects in a time of uncertainty*. Independent Transport Commission.
- JAIN, J. & LYONS, G. 2008. The gift of travel time. *Journal of Transport Geography*, 16, 81-89.
- JANG, S. & HAM, S. 2009. A double-hurdle analysis of travel expenditure: Baby boomer seniors versus older seniors. *Tourism Management*, 30, 372-380.
- JARVIS, H., PAIN, R. & POOLEY, C. 2011. Multiple scales of time - space and lifecourse. *Environment and Planning A*, 43, 519-524.
- JOHNSON, M. 2005. The social construction of old age as a problem. In: MALCOLM LEWIS JOHNSON, V. L. B., PETER G. COLEMAN, T. B. L. KIRKWOOD (ed.) *The*

- Cambridge Handbook of Age and Ageing*. Cambridge, New York: Cambridge University Press, pp.563-571
- JONES, A., GOODMAN, A., ROBERTS, H., STEINBACH, R. & GREEN, J. 2013. Entitlement to concessionary public transport and wellbeing: A qualitative study of young people and older citizens in London, UK. *Social Science & Medicine*, 91, 202-209.
- KAISER, H. J. 2009. Mobility in Old Age: Beyond the Transportation Perspective. *Journal of Applied Gerontology*, 28, 411-418.
- KALACHE, A., BARRETO, S. & KELLER, I. 2005. Global ageing: The demographic revolution in all cultures and societies. In: MALCOLM LEWIS JOHNSON, V. L. B., PETER G. COLEMAN, T. B. L. KIRKWOOD (ed.) *The Cambridge Handbook Of Age And Ageing*. Cambridge, New York: Cambridge University Press, pp.30-46
- KASEN, S., COHEN, P., CHEN, H. & CASTILLE, D. 2003. Depression in adult women: age changes and cohort effects. *American journal of public health*, 93, 2061-2066.
- KENYON, S., LYONS, G. & RAFFERTY, J. 2002. Transport and social exclusion: investigating the possibility of promoting inclusion through virtual mobility. *Journal of Transport Geography*, 10, 207-219.
- KENYON, S., RAFFERTY, J. & LYONS, G. 2003. Social Exclusion and Transport in the UK: A Role for Virtual Accessibility in the Alleviation of Mobility-Related Social Exclusion? *Journal of Social Policy*, 32, 317-338.
- KIRKUP, J. 2011. Nick Clegg: pensioners' benefits should be means tested. *The Telegraph*, 04 12 11.
- KNOWLES, R. D. 2006. Transport shaping space: differential collapse in time–space. *Journal of Transport Geography*, 14, 407-425.
- KNOWLES, R. D., SHAW, J. & DOCHERTY, I. 2008. *Transport geographies : mobilities, flows, and spaces*, Oxford: Blackwell Publishing.
- KOSKELA, H. 1999. 'Gendered Exclusions': women's fear of violence and changing relations to space. *Geografiska Annaler: Series B, Human Geography*, 81, 111-124.
- KOSKELA, H. & PAIN, R. 2000. Revisiting fear and place: women's fear of attack and the built environment. *Geoforum*, 31, 269-280.
- KUHNIMHOF, T., BUEHLER, R., WIRTZ, M. & KALINOWSKA, D. 2012. Travel trends among young adults in Germany: increasing multimodality and declining car use for men. *Journal of Transport Geography*, 24, 443-450.
- KWAN, M.-P. 2006. Transport geography in the age of mobile communications. *Journal of Transport Geography*, 14, 384-385.
- LAST, A. 2013. *Scotland-wide Older and Disabled Persons Concessionary Bus Scheme – Further Reimbursement Research Final Report for Transport Scotland In Association With Minnerva Ltd.*
- LAW, R. 1999. Beyond 'women and transport': towards new geographies of gender and daily mobility. *Progress in Human Geography*, 23, 567-588.

- LE VINE, S. & JONES, P. 2012. *On the move: making sense of car and train travel trends in Britain*. London: RAC Foundation.
- LEACH, J. 2013. *Fare Concessions for Older People: Identifying the numbers*. The Intergenerational Foundation.
- LEE, Y., HICKMAN, M. & WASHINGTON, S. 2007. Household type and structure, time-use pattern, and trip-chaining behavior. *Transportation Research Part A: Policy and Practice*, 41, 1004-1020.
- LEHTO, X. Y., JANG, S., ACHANA, F. T. & O'LEARY, J. T. 2008. Exploring tourism experience sought: A cohort comparison of Baby Boomers and the Silent Generation. *Journal of Vacation Marketing*, 14, 237-252.
- LESTHAEGHE, R. 2000. *Europe's demographic Issues: Fertility, household formation and replacement migration*. United Nations Department of Economic and Social Affairs Population Division. New York: United Nations.
- LESTHAEGHE, R. n.d. *Second Demographic Transition* [Online]. Available: http://dmo.econ.msu.ru/teaching/L2/TrDemo/final_textSDTBasilBlackwellEncyclop.pdf [Accessed 29.07.13].
- LEVITAS, R., PANTAZIS, C., FAHMY, E., GORDON, D., LLOYD, E. & PATSIOS, D. 2007. *The multi-dimensional analysis of social exclusion*. Department of Sociology and School for Social Policy, Townsend Centre for the International Study of Poverty and Bristol Institute for Public Affairs, University of Bristol.
- LI, H., RAESIDE, R., CHEN, T. & MCQUAID, R. W. 2012. Population ageing, gender and the transportation system. *Research in Transportation Economics*, 34, 39-47.
- LUCAS, K. (ed.) 2004. *Running on Empty: Transport, Social Exclusion and Environmental Justice*, Bristol: The Policy Press.
- LUCAS, K. 2006. Providing transport for social inclusion within a framework for environmental justice in the UK. *Transportation Research Part A: Policy and Practice*, 40, 801-809.
- LUCAS, K. 2012. Transport and social exclusion: Where are we now? *Transport Policy*, 20, 105-113.
- LUCAS, K., GROSVENOR, T. & SIMPSON, R. 2001. *Transport, the environment and social exclusion*, York Publishing Services Limited.
- LUCAS, K. & JONES, P. 2009. *The car in British society*. London: RAC Foundation.
- LYONS, G. 2003. The introduction of social exclusion into the field of travel behaviour. *Transport Policy*, 10, 339-342.
- LYONS, G., CHATTERJEE, K., BEECROFT, M. & MARSDEN, G. 2002. Determinants of travel demand—exploring the future of society and lifestyles in the UK. *Transport Policy*, 9, 17-27.
- LYONS, G., JAIN, J. & HOLLEY, D. 2007. The use of travel time by rail passengers in Great Britain. *Transportation Research Part A: Policy and Practice*, 41, 107-120.

- LYONS, G. & KENYON, S. 2003. Social Participation, Personal Travel and Internet Use. *Moving through nets: The physical and social dimensions of travel 10th International Conference on Travel Behaviour Research*. Lucerne.
- LYONS, G. & URRY, J. 2005. Travel time use in the information age. *Transportation Research Part A: Policy and Practice*, 39, 257-276.
- MACKETT, R. L. 2001. Policies to attract drivers out of their cars for short trips. *Transport Policy*, 8, 295-306.
- MACUNOVICH, D. J. 2002. The baby boomers. In: EKERDT, D. (ed.) *Macmillan encyclopedia of aging*. New York: Macmillan.
- MAROTTOLI, R. A., DE LEON, C. F. M., GLASS, T. A., WILLIAMS, C. S., COONEY, L. M. & BERKMAN, L. F. 2000. Consequences of Driving Cessation: Decreased Out-of-Home Activity Levels. *The Journals of Gerontology Series B: Psychological Sciences and Social Sciences*, 55, S334-S340.
- MAROTTOLI, R. A., MENDES DE LEON, C. F., GLASS, T. A., WILLIAMS, C. S., COONEY, L. M., BERKMAN, L. F. & TINETTI, M. E. 1997. Driving cessation and increased depressive symptoms: prospective evidence from the New Haven EPESE. Established Populations for Epidemiologic Studies of the Elderly. *Journal of the American Geriatrics Society*, 45, 202-206.
- MARSDEN, G., CATTAN, M., JOPSON, A. & WOODWARD, J. 2010. Do transport planning tools reflect the needs of the older traveller? *Quality in Ageing and Older Adults*, 11, 16 - 24.
- MARSDEN, G., JOPSON, A., CATTAN, M. & WOODWARD, J. 2008. *Older People and Transport: integrating transport planning tools and user needs*. Strategic Promotion of Ageing Research Capacity (SPARC) Executive Summary.
- MARVIN, S. & GUY, S. 1997. Creating myths rather than sustainability: The transition fallacies of the new localism. *Local Environment*, 2, 311-318.
- MASON, K. O., MASON, W. M., WINSBOROUGH, H. H. & POOLE, W. K. 1973. Some methodological issues in cohort analysis of archival data. *American Sociological Review*, 242-258.
- MASSEY, D. B. 1994. *Space, Place, and Gender*. Minneapolis: University of Minnesota Press.
- MATHESON, J. 2010. The UK population: how does it compare? *Population Trends nr 142*. Office for National Statistics.
- MCDOUGALL, L. 1998. Aging baby boomers and what it means for domestic travel in the 21st century. *Travel-log*, 17, 1-8.
- MCINTOSH-ELKINS, J., MCRITCHIE, K. & SCOONES, M. 2007. From the silent generation to generation x, y and z: strategies for managing the generation mix. *Proceedings of the 35th annual ACM SIGUCCS fall conference*. Orlando, Florida, USA: ACM.

- MCINTOSH, S. 2005. *Using pseudo cohorts to track changes in the qualifications of national populations*. Centre for Economic Performance, London School of Economics. *Research Report No 621*.
- MCQUAID, R. W. & CHEN, T. 2012. Commuting times – The role of gender, children and part-time work. *Research in Transportation Economics*, 34, 66-73.
- MEANS, R. 2007. Safe as Houses? Ageing in Place and Vulnerable Older People in the UK. *Social Policy & Administration*, 41, 65-85.
- MELLOR, C. 2002. Concessionary fares policy: Political gimmick or tackling social need? *Local Transport Today* 348, 29.8.02, pp10-11.
- MERCADO, R., PÁEZ, A. & NEWBOLD, K. B. 2010. Transport policy and the provision of mobility options in an aging society: a case study of Ontario, Canada. *Journal of Transport Geography*, 18, 649-661.
- MERCADO, R., PAEZ, A., SCOTT, D., NEWBOLD, K. & KANAROGLOU, P. 2007. Transport policy in aging societies: An international comparison and implications for Canada. *The Open Transportation Journal*, 1-13.
- METZ, D. 2003. Transport policy for an ageing population. *Transport Reviews*, 23, 375-386.
- METZ, D. 2010. Saturation of Demand for Daily Travel. *Transport Reviews*, 30, 659-674.
- METZ, D. 2012. Demographic determinants of daily travel demand. *Transport Policy*, 21, 20-25.
- METZ, D. H. 2000. Mobility of older people and their quality of life. *Transport Policy*, 7, 149-152.
- MICKLEWRIGHT, J. 1994. The analysis of pooled cross-sectional data. In: DALE, A. & DAVIES, R. B. (eds.) *Analyzing social and political change: a casebook of methods*. London: Sage Publications, pp.75-97.
- MILLWARD, D. 2011. Pensioners being asked to pay for 'free' bus travel. *The Telegraph*, 16 08 11.
- MIRANDA-MORENO, L. F. & LEE-GOSSELIN, M. 2008. A week in the life of baby boomers: how do they see the spatial-temporal organization of their activities and travel? *Transportation*, 35, 629-653.
- MOLLENKOPF, H., HIEBER, A. & WAHL, H.-W. 2011. Continuity and change in older adults' perceptions of out-of-home mobility over ten years: a qualitative-quantitative approach. *Ageing and Society*, 31, 782-802.
- MOLLENKOPF, H., MARCELLINI, F., RUOPPILA, I., FLASCHENTRÄGER, P., GAGLIARDI, C. & SPAZZAFUMO, L. 1997. Outdoor mobility and social relationships of elderly people. *Archives of Gerontology and Geriatrics*, 24, 295-310.
- MOLLENKOPF, H., MARCELLINI, F., RUOPPILA, I., SZÉMAN, Z., TACKEN, M., KASPAR, R. & WAHL, H. W. 2002. *The Role of Driving in Maintaining Mobility in Later Life: A European View*.
- MORRIS, J., PATTINSON, W., FELL, E. & SLATTERY, M. 2006. Aging, towards a transport policy response. *presented at the Australasian Transport Research Forum*.

- MORROW-JONES, H. A. & KIM, M. J. 2009. Determinants of Residential Location Decisions among the Pre-Elderly in Central Ohio. *Journal of Transport and Land Use*, Vol 2, No 1
- MULHEIRN, I. 2012. Osborne's Choice: Combining fiscal credibility and growth. *SMF Analysis*. Social Market Foundation.
- NATIONAL AUDIT OFFICE. 2011. *Means Testing*. National Audit Office. London: The Stationery Office
- NEWBOLD, K. B. & BELL, M. 2001. Return and Onwards Migration in Canada and Australia: Evidence From Fixed Interval Data. *International Migration Review*, 35, 1157-1184.
- NEWBOLD, K. B., SCOTT, D. M., SPINNEY, J. E. L., KANAROGLOU, P. & PÁEZ, A. 2005. Travel behavior within Canada's older population: a cohort analysis. *Journal of Transport Geography*, 13, 340-351.
- NOACK, E. 2011. Are Rural Women Mobility Deprived? – A Case Study from Scotland. *Sociologia Ruralis*, 51, 79-97.
- NOBLE, B. 2000. Travel characteristics of older people. *Transport Trends 2000 Edition*. Department for Transport
- NOBLE, B. Women's Travel: Can the Circle Be Squared? Transportation Research Board Conference Proceedings, 2005.
- NUTLEY, S. & THOMAS, C. 1995. Spatial mobility and social change: the mobile and the immobile. *Sociologia Ruralis*, 35, 24-39.
- O'BRIEN, R. M. 2000. Age Period Cohort Characteristic Models. *Social Science Research*, 29, 123-139.
- O'RAND, A. M. & KRECKER, M. L. 1990. Concepts of the Life Cycle: Their History, Meanings, and Uses in the Social Sciences. *Annual Review of Sociology*, 16, 241-262.
- O'FALLON, C. & SULLIVAN, C. 2009. Trends in older people's travel patterns: Analysing changes in older New Zealanders' travel patterns using the Ongoing New Zealand Household Travel Survey. *NZ Transport Agency Research Report 369*.
- OECD 2012. *OECD Pensions Outlook 2012*. Organisation for Economic Co-operation and Development.
- OHNMACHT, T., MAKSIM, H. & BERGMAN, M. M. 2009. Mobilities and inequality - making connections. In: OHNMACHT, T., MAKSIM, H. & BERGMAN, M. M. (eds.) *Mobilities and inequality*. Surrey: Ashgate Publishing Ltd, pp. 7-26
- ONS. 2011. *The interactive population pyramid* [Online]. Office for National Statistics. Available: http://www.statistics.gov.uk/populationestimates/flash_pyramid/default.htm [Accessed 28 01 11].
- ONS 2012a. 2011 Census - Population and Household Estimates for England and Wales, March 2011. *Statistical Bulletin*. Office for National Statistics.
- ONS 2012b. *Pension Trends - Chapter 4: The labour market and retirement*. Office for National Statistics

- OPPERMANN, M. 1995. Travel life cycle. *Annals of Tourism Research*, 22, 535-552.
- OSBORNE, H. 2012. Bus fare rises outstrip inflation. *The Guardian*, 03 01 12.
- OWRAM, D. 1997. *Born at the Right Time: A History of the Baby Boom Generation*, Toronto: University of Toronto Press.
- OXLEY, J., LANGFORD, J. & CHARLTON, J. 2010. The safe mobility of older drivers: a challenge for urban road designers. *Journal of Transport Geography*, 18, 642-648.
- PÁEZ, A., SCOTT, D., POTOGLU, D., KANAROGLOU, P. & NEWBOLD, K. B. 2007. Elderly Mobility: Demographic and Spatial Analysis of Trip Making in the Hamilton CMA, Canada. *Urban Studies*, 44, 123-146.
- PAGE, E. A. 2007. Intergenerational justice of what: Welfare, resources or capabilities? *Environmental Politics*, 16, 453-469.
- PAIN, R. 1995. Elderly Women and Fear of Violent Crime: The Least Likely Victims?: A Reconsideration of the Extent and Nature of Risk. *British Journal of Criminology*, 35, 584-598.
- PAIN, R., MOWL, G. & TALBOT, C. 2000. Difference and the negotiation of 'old age'. *Environment and Planning D: Society and Space*, 18, 377-393.
- PAIN, R. & TOWNSHEND, T. 2002. A safer city centre for all? Senses of 'community safety' in Newcastle upon Tyne. *Geoforum*, 33, 105-119.
- PAIN, R. H. 1997a. 'Old age' and Ageism in Urban Research: The Case of Fear of Crime. *International Journal of Urban and Regional Research*, 21, 117-128.
- PAIN, R. H. 1997b. Social Geographies of Women's Fear of Crime. *Transactions of the Institute of British Geographers*, 22, 231-244.
- PALMORE, E. 1978. When Can Age, Period, and Cohort be Separated? *Social Forces*, 57, 282-295.
- PANNELL, J. & BLOOD, I. 2012. *Supported Housing for Older People in the UK: An Evidence Review*. Joseph Rowntree Foundation.
- PENNINGTON-GRAY, L. & LANE, C. W. 2002. Profiling the Silent Generation. *Journal of Hospitality & Leisure Marketing*, 9, 73-95.
- PHILLIPSON, C., LEACH, R., MONEY, A. & BIGGS, S. 2008. Social and Cultural Constructions of Ageing: the Case of the Baby Boomers. *Sociological Research Online*, 13, 5.
- PIERRET, C. R. 2006. The 'Sandwich Generation': Women Caring for Parents and Children. *Monthly Labor Review*, 129, 3.
- POLK, M. 2004. The influence of gender on daily car use and on willingness to reduce car use in Sweden. *Journal of Transport Geography*, 12, 185-195.
- POOLEY, C., TURNBULL, J. & ADAMS, M. 2006. The impact of new transport technologies on intraurban mobility: a view from the past. *Environment and Planning A*, 38, 253-267.
- POOLEY, C. G. 2009. Mobility, History of Everyday. In ROB, K. & NIGEL, T. (eds.) *International Encyclopedia of Human Geography*. Oxford: Elsevier, pp. 144-149.

- POOLEY, C. G., TURNBULL, J. & ADAMS, M. 2005a. "...everywhere she went I had to tag along beside her": Family, life course, and everyday mobility in England since the 1940s. *The History of the Family*, 10, 119-136.
- POOLEY, C. G., TURNBULL, J. & ADAMS, M. 2005b. *A Mobile Century?: Changes in Everyday Mobility in Britain in the Twentieth Century*, Aldershot: Ashgate.
- POWELL, J. L. 2010. The Power of Global Aging. *Ageing International*, 35, 1-14.
- POWER, A. 2012. Social inequality, disadvantaged neighbourhoods and transport deprivation: an assessment of the historical influence of housing policies. *Journal of Transport Geography*, 21, 39-48.
- PRESTON, J. & RAJÉ, F. 2007. Accessibility, mobility and transport-related social exclusion. *Journal of Transport Geography*, 15, 151-160.
- PRIMERANO, F., TAYLOR, M. A. P., PITAKSRINGKARN, L. & TISATO, P. 2007. Defining and understanding trip chaining behaviour. *Transportation*, 35, 55-72.
- PRODUCTIVITY COMMISSION, P. 2005. Economic Implications of an Ageing Australia. *Technical Papers*. Canberra.
- QUINE, S. & CARTER, S. 2006. Australian baby boomers' expectations and plans for their old age. *Australasian Journal on Ageing*, 25, 3-8.
- RAFFERTY, A. & KING-HELE, S. 2010. *Analysing Change Over Time: A guide to ESDS microdata resources*. ESDS Government.
- RAGLAND, D. R., SATARIANO, W. A. & MACLEOD, K. E. 2004. Reasons Given by Older People for Limitation or Avoidance of Driving. *The Gerontologist*, 44, 237-244.
- RAGLAND, D. R., SATARIANO, W. A. & MACLEOD, K. E. 2005. Driving Cessation and Increased Depressive Symptoms. *The Journals of Gerontology Series A: Biological Sciences and Medical Sciences*, 60, 399-403.
- RENTZ, J. O. & REYNOLDS, F. D. 1981. Separating age, cohort and period effects in consumer behavior. *Advances in Consumer Research*, 8, 596-601.
- RISSE, R., HAINDL, G. & STÅHL, A. 2010. Barriers to senior citizens' outdoor mobility in Europe. *European Journal of Ageing*, 7, 69-80.
- ROBERTSON, C., GANDINI, S. & BOYLE, P. 1999. Age-Period-Cohort Models: A Comparative Study of Available Methodologies. *Journal of Clinical Epidemiology*, 52, 569-583.
- ROGERS, C. C. 2002. The Older Population in 21st Century Rural America. *Rural America*, 17, 2-10.
- ROSENBLOOM, S. 1993. Women's travel patterns at various stages of their lives. *Full Circles; Geographies of Women over the Life Course*, 208-242.
- ROSENBLOOM, S. *Trends in women's travel patterns*. Women's Travel Issues Second National Conference, 2000.
- ROSENBLOOM, S. 2001. Sustainability and automobility among the elderly: An international assessment. *Transportation*, 28, 375-408.

- ROSENBLOOM, S. Mobility of the Elderly: Good News and Bad News. *Transportation in an Aging Society, A Decade of Experience*, Conference Proceedings 27., 2004
Transportation Research Board, Washington, D.C., 3–21.
- ROSENBLOOM, S. Understanding Women's and Men's Travel Patterns. *Research on Women's Issues in Transportation: Report of a Conference*. Transportation Research Board: Washington, DC, 2006. 7-28.
- ROSENBLOOM, S. 2010. How adult children in the UK and the US view the driving cessation of their parents: Is a policy window opening? *Journal of Transport Geography*, 18, 634-641.
- ROSENBLOOM, S. & HERBEL, S. 2009. The Safety and Mobility Patterns of Older Women Do Current Patterns Foretell the Future? *Public Works Management & Policy*, 13, 338-353.
- ROSENBLOOM, S. & STÅHL, A. 2002. Automobility among the Elderly. *European Journal of Transport and Infrastructure Research*, 2, 197-213.
- ROYAL MAIL. 2013. *Postcode Address File (PAF®)* [Online]. Available: http://www.royalmail.com/marketing-services/address-management-unit/address-data-products/postcode-address-file-paf?campaignid=paf_redirect# [Accessed 18 03 13].
- RYDER, N. B. 1965. The Cohort as a Concept in the Study of Social Change. *American Sociological Review*, 30, 843-861.
- RYE, T. & CARRENO, M. 2008a. Concessionary Bus Fares in Scotland: Is the Scottish Government Paying Too Much? *Scottish Transport Applications Research (STAR) Conference*. Glasgow.
- RYE, T. & CARRENO, M. 2008b. Concessionary fares and bus operator reimbursement in Scotland and Wales: No better or no worse off? *Transport Policy*, 15, 242-250.
- RYE, T. & MYKURA, W. 2009. Concessionary bus fares for older people in Scotland – are they achieving their objectives? *Journal of Transport Geography*, 17, 451-456.
- RYE, T. & SCOTNEY, D. 2004. The factors influencing future concessionary bus patronage in Scotland and their implications for elsewhere. *Transport Policy*, 11, 133-140.
- RYE, T., SEAMAN, D., MCGUIGAN, D. & SIDDLE, D. 2002. Concessionary travel in the UK: what we need to know. *World Transport Policy and Practice*, 9, 36-41.
- RYLEY, T. 2006. Use of non-motorised modes and life stage in Edinburgh. *Journal of Transport Geography*, 14, 367-375.
- RYLEY, T. 2008. The propensity for motorists to walk for short trips: Evidence from West Edinburgh. *Transportation Research Part A: Policy and Practice*, 42, 620-628.
- SARMIENTO, S. Household, gender, and travel. *Women's Travel Issues* Second National Conference, 2000.
- SCHARF, T. 2009. Too tight to mention: unequal income in older age *In: CANN, P. & DEAN, M. (eds.) Unequal Ageing: The Untold Story of Exclusion in Old Age*. The Policy Press.

- SCHEWE, C. D., MEREDITH, G. & NOBLE, S. 2000. Defining Moments: Segmenting by Cohorts. *Marketing Management*, 9, 48-53.
- SCHLICH, R. & AXHAUSEN, K. 2003. Habitual travel behaviour: Evidence from a six-week travel diary. *Transportation*, 30, 13-36.
- SCHMÖCKER, J.-D., SU, F. & NOLAND, R. B. 2009. An analysis of trip chaining among older London residents. *Transportation*, 37, 105-123.
- SCHWANEN, T., BANISTER, D. & BOWLING, A. 2012a. Independence and mobility in later life. *Geoforum*, 43, 1313-1322
- SCHWANEN, T., DIJST, M. & DIELEMAN, F. M. 2001. Leisure trips of senior citizens: determinants of modal choice. *Tijdschrift voor economische en sociale geografie*, 92, 347-360.
- SCHWANEN, T., HARDILL, I. & LUCAS, S. 2012b. Spatialities of ageing: The co-construction and co-evolution of old age and space. *Geoforum*, 43, 1291-1295.
- SCHWANEN, T. & PÁEZ, A. 2010. The mobility of older people – an introduction. *Journal of Transport Geography*, 18, 591-595.
- SCHWANEN, T. I. M., DIJST, M. & KWAN, M.-P. 2008. ICTs and the Decoupling of Everyday Activities, Space and Time: Introduction. *Tijdschrift voor economische en sociale geografie*, 99, 519-527.
- SCHWANEN, T. I. M. & ZIEGLER, F. 2011. Wellbeing, independence and mobility: an introduction. *Ageing and Society*, 31, 719-733.
- SCOTT, D., NEWBOLD, K., SPINNEY, J., MERCADO, R., PAEZ, A. & KANAROGLOU, P. 2005. *Changing mobility of elderly urban Canadians, 1992-1998*. Centre for Spatial Analysis WP 007
- SCOTT, D. M., NEWBOLD, K. B., SPINNEY, J. E. L., MERCADO, R., PÁEZ, A. & KANAROGLOU, P. S. 2009. New Insights into Senior Travel Behavior: The Canadian Experience. *Growth and Change*, 40, 140-168.
- SCOTTISH GOVERNMENT. 2009. *Review of the Scotland Wide Free Bus Travel Scheme for Older and Disabled People*. Edinburgh: Scottish Government.
- SEU 2003. *Making the connections: final report on transport and social exclusion: summary*. Social Exclusion Unit.
- SHAW, J. & HESSE, M. 2010. Transport, geography and the 'new' mobilities. *Transactions of the Institute of British Geographers*, 35, 305-312.
- SHAW, J., MACKINNON, D. & DOCHERTY, I. 2009. Divergence or convergence? Devolution and transport policy in the United Kingdom. *Environment and Planning C: Government and Policy*, 27, 546-567.
- SHELLER, M. & URRY, J. 2006. The new mobilities paradigm. *Environment and Planning A*, 38, 207-226.
- SHERGOLD, I. & PARKHURST, G. 2012. Transport-related social exclusion amongst older people in rural Southwest England and Wales. *Journal of Rural Studies*, 28, 412-421.

- SIMON, E. 2012. Pensions crisis: one in 10 forced to delay retirement. *The Telegraph* 15 02 12.
- SIREN, A. & HAKAMIES-BLOMQUIST, L. 2005. Sense and sensibility. A narrative study of older women's car driving. *Transportation Research Part F: Traffic Psychology and Behaviour*, 8, 213-228.
- SIREN, A. & HAKAMIES-BLOMQUIST, L. 2006. Does gendered driving create gendered mobility? Community-related mobility in Finnish women and men aged 65+. *Transportation Research Part F: Traffic Psychology and Behaviour*, 9, 374-382.
- SIXSMITH, A. & SIXSMITH, J. 2008. Ageing in Place in the United Kingdom. *Ageing International*, 32, 219-235.
- SPAIN, D. 1997. *Societal Trends: The Aging Baby Boom and Women's Increased Independence*. Final report prepared for the Federal Highway Administration, U.S. Department of Transportation
- SPINNEY, J. E. L., SCOTT, D. M. & NEWBOLD, K. B. 2009. Transport mobility benefits and quality of life: A time-use perspective of elderly Canadians. *Transport Policy*, 16, 1-11.
- STANBRIDGE, K., LYONS, G. & FARTHING, S. 2004. Travel behaviour change and residential relocation. *rd International Conference of Traffic and Transport Psychology*. Nottingham, UK.
- STANLEY, J. & LUCAS, K. 2008. Social exclusion: What can public transport offer? *Research in Transportation Economics*, 22, 36-40.
- STANLEY, J. K., HENSHER, D. A., STANLEY, J. R. & VELLA-BRODRICK, D. 2011. Mobility, social exclusion and well-being: Exploring the links. *Transportation Research Part A: Policy and Practice*, 45, 789-801.
- STOCKDALE, A., MACLEOD, M. & PHILIP, L. 2012. Connected Life Courses: Influences on and Experiences of 'Midlife' In-Migration to Rural Areas. *Population, Space and Place*, n/a-n/a.
- STRADLING, S., CARRENO, M., RYE, T. & NOBLE, A. 2007. Passenger perceptions and the ideal urban bus journey experience. *Transport Policy*, 14, 283-292.
- STRADLING, S. G. & ANABLE, J. 2008. Individual transport patterns. In: KNOWLES, R., SHAW, J. & DOCHERTY, I. (eds.) *Transport Geographies: Mobilities, Flows and Spaces*. Oxford: Blackwell Publishing, pp.179-195.
- SU, F. & BELL, M. G. H. 2009. Transport for older people: Characteristics and solutions. *Research in Transportation Economics*, 25, 46-55.
- SU, F. & BELL, M. G. H. 2012. Travel differences by gender for older people in London. *Research in Transportation Economics*, 34, 35-38.
- TACKEN, M. 1998. Mobility of the elderly in time and space in the Netherlands: An analysis of the Dutch National Travel Survey. *Transportation*, 25, 379-393.
- TARRANT, A. 2010. Constructing a social geography of grandparenthood: a new focus for intergenerationality. *Area*, 42, 190-197.

- TFL 2008. *Central London congestion charging—impacts monitoring. Sixth Annual Report*. London: Transport for London.
- TFL 2010. *Travel in London. Report 3*. London: Transport for London.
- THRUN, S. 2010. *What we're driving at* [Online]. Available: <http://googleblog.blogspot.co.uk/2010/10/what-were-driving-at.html> [Accessed 06 03 13].
- TINKER, A. 2002. The social implications of an ageing population. *Mechanisms of Ageing and Development*, 123, 729-735.
- TITHERIDGE, H., ACHUTHAN, K., MACKETT, R. L. & SOLOMON, J. 2009. Assessing the extent of transport social exclusion among the elderly. *Journal of Transport and Land Use*, Vol 2, No 2.
- TRAFFICMASTER PLC, THE AA. 2009. *Congestion – Commuting :An Economic Barometer*.
- TRANSPORT COMMITTEE. 2011. *Bus Services after the Spending Review: Eighth Report of Session 2010–12*. In: COMMONS, H. O. (ed.). London: The Stationary Office.
- TRANSPORT SCOTLAND. 2009. *Evaluation of National Concessionary Travel in Scotland, carried out by the Halcrow Group Limited. Transport Research Series*. Transport Scotland.
- TRANSPORT SCOTLAND. 2012. *Concessionary travel scheme is here to stay* [Online]. Available: <http://www.transportscotland.gov.uk/news/Concessionary-Travel-Scheme-funding> [Accessed 17 10 12].
- TREMMELE, J. C. (ed.) 2006. *Handbook of Intergenerational Justice*, Cheltenham: Edward Elgar Publishing Incorporated.
- TURNER, T. & NIEMEIER, D. 1997. Travel to work and household responsibility: new evidence. *Transportation*, 24, 397-419.
- UN 2005. *Living Arrangements of Older Persons Around the World*. United Nations Department of Economic and Social Affairs Population Division. New York: United Nations.
- UN 2010. *World Population Ageing 2009*. United Nations Department of Economic and Social Affairs Population Division. New York: United Nations.
- UREN, Z. 2006. The GHS Pseudo Cohort Dataset (GHSPCD): Introduction and Methodology. In: WAGSTAFF, H. & UNDERWOOD, C. (eds.) *Survey Methodology Bulletin No.59 September 2006*. UK Office for National Statistics.
- UREN, Z. & GOLDRING, S. 2007. Migration trends at older ages in England and Wales. *Population Trends* 130, 31-40. Office for National Statistics
- URRY, J. 2002a. Mobility and Proximity. *Sociology*, 36, 255-274.
- URRY, J. 2002b. *Sociology Beyond Societies: Mobilities for the Twenty-First Century*, London: Routledge.
- URRY, J. 2007. *Mobilities*, Cambridge: Polity Press.
- VAN DE KAA, D. J. 1987. Europe's second demographic transition. *Population bulletin*, 42, 1-59.

- VAN DEN BERG, P., ARENTZE, T. & TIMMERMANS, H. 2011. Estimating social travel demand of senior citizens in the Netherlands. *Journal of Transport Geography*, 19, 323-331.
- VELAGA, N. R., NELSON, J. D., WRIGHT, S. D. & FARRINGTON, J. H. 2012. The Potential Role of Flexible Transport Services in Enhancing Rural Public Transport Provision. *Journal of Public Transportation*, 15.
- WARDMAN, M. 1998. The Value of Travel Time, A Review of British Evidence. *Journal of Transport Economics and Policy*, 32, 285-316.
- WARNES, A. M. 2009. Ageing and Mobility. In: EDITORS-IN-CHIEF: ROB, K. & NIGEL, T. (eds.) *International Encyclopedia of Human Geography*. Oxford: Elsevier.
- WEBB, E., NETUVELI, G. & MILLETT, C. 2012. Free bus passes, use of public transport and obesity among older people in England. *Journal of epidemiology and community health*, 66, 176-180.
- WEERASEKERA, D. R. *Longitudinal Vs. Cross-sectional Analysis* [Online]. Stat Circle: University of Colombo. Available: <http://www.cmb.ac.lk/academic/Science/Departments/Statistics/statcircle/articles.php> [Accessed 14 03 13].
- WEISSMAN, J. 2012. Why Are Young People Ditching Cars for Smartphones? [Online]. *The Atlantic*. Available: <http://www.theatlantic.com/business/archive/2012/08/why-are-young-people-ditching-cars-for-smartphones/260801/> [Accessed 16 10 12].
- WELSH ASSEMBLY GOVERNMENT. 2008. Bus usage and concessionary fares in Wales, 2005-2006. *Statistical Bulletin*, 26/2008.
- WENGER, G. C. 2001. Myths and realities of ageing in rural Britain. *Ageing & Society*, 21, 117-130.
- WENNBERG, H., STÅHL, A. & HYDÉN, C. 2009. Older pedestrians' perceptions of the outdoor environment in a year-round perspective. *European Journal of Ageing*, 6, 277-290.
- WILES, J. L., LEIBING, A., GUBERMAN, N., REEVE, J. & ALLEN, R. E. S. 2011. The Meaning of "Ageing in Place" to Older People. *The Gerontologist*.
- WILLETTS, D. 2010. *The Pinch: How the Baby Boomers Took Their Children's Future-and why They Should Give it Back*, London: Atlantic Books.
- WILLSON, R. & SHOUP, D. 1990. Parking subsidies and travel choices: Assessing the evidence. *Transportation*, 17, 141-157.
- YANG, Y. 2007. Age-Period-Cohort Distinctions. In: MARKIDES, K. S. (ed.) *Encyclopedia of Health and Aging*. Thousand Oaks, CA: Sage Publications, pp.21-33.
- YANG, Y. 2008. Social Inequalities in Happiness in the United States, 1972 to 2004: An Age-Period-Cohort Analysis. *American Sociological Review*, 73, 204-226.
- YANG, Y., FU, W. J. & LAND, K. C. 2004. A Methodological Comparison of Age-Period-Cohort Models: The Intrinsic Estimator and Conventional Generalized Linear Models. *Sociological Methodology*, 34, 75-110.

- YANG, Y. & LAND, K. C. 2008. Age–Period–Cohort Analysis of Repeated Cross-Section Surveys: Fixed or Random Effects? *Sociological Methods & Research*, 36, 297-326.
- YEE, J. L. & NIEMEIER, D. 1996. Advantages and disadvantages: Longitudinal vs. repeated cross-section surveys. *Project Battelle*, 94, 16.
- ZAIDI, A., GASIOR, K. & SIDORENKO, A. 2010. Intergenerational solidarity: policy challenges and societal responses. *Policy Brief, European Centre Vienna*.
- ZEGRAS, P. C., BEN-JOSEPH, E., HEBBERT, F. & COUGHLIN, J. F. *Comparative Study of Baby Boomers' Travel Behavior and Residential Preferences in Age-Restricted and Typical Suburban Neighborhoods*. Transportation Research Board 87th Annual Meeting, 2008.
- ZELINSKY, W. 1971. The Hypothesis of the Mobility Transition. *Geographical Review*, 61, 219-249.
- ZIEGLER, F. & SCHWANEN, T. I. M. 2011. 'I like to go out to be energised by different people': an exploratory analysis of mobility and wellbeing in later life. *Ageing and Society*, 31, 758-781.
- ZIMMERMAN, C. A. 1982. The life cycle concept as a tool for travel research. *Transportation*, 11, 51-69.