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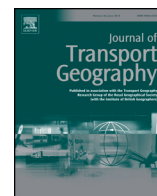
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The gender turnaround: Young women now travelling more than young men



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ABSTRACT

Daily travel mobility is on a downward trend in several developed economies, including the UK. This paper examines how mobility trends are differentiated by gender and birth cohort. Over the last decade, young adult women in Britain have come to have greater weekly mobility than their male counterparts. Until recently, women have consistently had lower mobility than men - suggesting that this finding could be a significant break with the past. This gender turnaround is driven mainly by young men travelling substantially less today than previous generations of young men. We find that younger cohorts of women travel are travelling further as they age, whilst younger cohorts of men are no longer becoming more mobile as they approach early mid-life, traditionally a life course peak in travel mobility. Possible reasons for the greater mobility of young women than young men are discussed and areas for future research identified.

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1. Introduction

Recent studies have observed declining mobility in developed economies, including the UK, which has been termed ‘peak car’ (Goodwin, 2012a, Metz, 2013). Existing explanations for this decline are still emerging but are currently focused on economic factors, the reversal of population decline in cities (where trips are shorter), rise of IT use, and falling rates of driving licence holdership amongst younger people, particularly men (Goodwin, 2012a).

Demographic and social change may be having a profound influence on mobility trends – yet socio-demographics have been somewhat under-emphasised, and often overlooked, in transport and mobility studies. Few studies of declining mobility differentiate between socio-economic and socio-spatial groups, and none by gender and birth cohort or age.

This paper has three main aims. First, to examine travel mobility trends by gender and age. Second, to examine travel mobility trends by gender and birth cohort. Third, to examine how cohort effects vary across the settlement hierarchy, by gender.

There has been great social change since the middle of the twentieth century amongst women as they have become economically and socially more equal to men. More recently, young women have overtaken men on some indicators, most notably educational attainment. It would

be surprising if these important demographic and social changes were not influencing mobility (and, vice-versa, declining mobility influencing some of these social outcomes, for example increasing ability to access further and higher education). Adopting a wider demographic approach will add to the current debates on declining mobility, particularly peak car, by highlighting the wider impact of social factors involved in mobility.

The remainder of the paper is structured as follows. Section 2 reviews the existing explanations of declining mobility as well as the gender differences that have been found in mobility. Section 3 explores how birth cohort analysis can add to the debate on declining mobility. We then present the data analysis in Section 4 exploring mobility trends, focusing on birth cohort effects and gender differences, controlling for period effects and a range of social, spatial, economic and demographic factors. Sections 5 and 6 of the paper discuss the implications of the results and considerations for further research.

2. Background

2.1. Peak car and explanations for downward trend in travel mobility

Between 1978/9 and 2008 average distance travelled in Britain per person rose by >2000 miles a year, from 4800 to 6900 miles¹ particularly by car (Independent Transport Commission (ITC), 2010). However,

¹ 1 international mile = 1.6 km

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in recent years, Metz (2010) finds that average distance travelled has stabilised at around 7000 miles per person, per year, across all modes and suggests that demand for travel has 'saturated'; daily personal travel has ceased to grow as the need for routine access and choice has been met. Lucas and Jones (2009) also find that car travel per capita has ceased to grow in Britain. They suggest that car use has reached a level which is in equilibrium with current transport provision and land use patterns.

'Peak car' is the idea that car use may not just 'saturate' but decline (Goodwin, 2012b). There are trends in advanced economies including Germany, Australia, France, UK, USA and Japan, whereby car use per capita, and sometimes total car traffic has shown low growth and in some countries (and especially cities) it has declined. Explanations for this decline have been attributed to economic variables by various governments, such as changes in fuel prices, income, GDP and unemployment (Goodwin, 2012a). However, both Goodwin (2012b) and Metz (2010) find that the plateau, and subsequent decline in mobility in some cases, appeared before the economic downturn, although the recession may have exaggerated the trend. As the decline also occurs after the recession, this decline is considered to be a real structural rather than temporary cyclical effect (Goodwin, 2012a).

As this decline is occurring across different countries, Goodwin (2012a) highlights some common features as possible explanations. The propensity to learn to drive and buy a car has reduced, particularly amongst young men, which has been observed in the UK (Noble, 2005a, DfT, 2010a), and elsewhere, such as Germany (Kuhnimhof et al., 2012). Explanations for this include the increasing costs of motoring (DfT, 2010a) and greater value placed on the use of purchasing new mobile technology (such as smartphones and tablets) and having internet access amongst younger people (Hopkins and Stephenson, 2014).

The growth in online activities e.g. social networking, online retail and mobile computing is also thought to explain a reduced need to travel (Metz, 2010, Goodwin, 2012a). The relationship between telecommunications and transport is complex, with evidence suggesting both substitution and stimulation of travel, as well as the enhancement of the travel experience (Lyons, 2009). Lastly, other factors to explain the decline in mobility could be the weakening of the relationship between income and traffic growth and new land use trends, particularly in cities, that focus on promoting greater use of public transport, walking and cycling (Goodwin, 2012a).

The debates surrounding 'peak car' should also be attentive to the changes in socio-demographic factors as this is currently missing from the debate. Whilst declining car use has been identified amongst younger men, the reasoning behind this decline amongst a traditionally high-mobility population group has not been explored in great depth. Given that this gender difference is noted amongst younger adults, birth cohort membership is also likely to be an important consideration. This has also been neglected in existing research. Using such an approach will help understand mobility requirements over the life course and the influence of socio-demographic changes and gender on mobility patterns.

2.2. Existing explanations for gender differences in travel patterns

Gender differences in mobility have been well documented, with women travelling shorter distances compared to men (Turner and Niemeier, 1997, Law, 1999, Pooley et al., 2005b, Rosenbloom, 2006). These differences have largely been explained by the roles that men and women have in society, leading to different activity patterns. In particular, 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 close to the home (Sarmiento, 2000, Lyons et al., 2002, McQuaid and Chen, 2012).

Women's demands from transport and their experiences differ from men's, as women tend to have multiple roles as workers/in employment and carers of children leading to complex trip-chains (Turner and Niemeier, 1997, Sarmiento, 2000, Pooley et al., 2005b, Rosenbloom, 2006). Women also tend to make a greater number of trips (Lee et al., 2007). However, men tend to travel further than women due to greater access to cars, less constrained domestic activity schedules, and higher pay and employment rates. In 2008 men travelled 7560 miles on average per year, whilst women travelled about 1250 miles less (DfT, 2010b).

Gender differences in mode use have also been observed, with women more reliant on slower modes such as walking and buses (Polk, 2004, Best and Lanzendorf, 2005, Pooley et al., 2006). Whilst men are more likely to have a driving licence compared to women, the proportion of women having a licence has been increasing at a faster rate (DfT, 2010b). Other studies have also found that gender differences in mobility have been converging at the aggregate level (Noble, 2005b, 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. Grandparents are having an increasing role in caring for grandchildren (Geurts et al., 2015), incurring higher mobility in order to do so (Cooke, 2011).

There has been a wealth of literature on the impact of fear of crime on mobility behaviour with studies finding that women are disproportionately affected (Pain, 1997, Koskela, 1999, Koskela and Pain, 2000), although Pooley et al. (2005a) observe that older men may have similar concerns. Due to such differences in travel behaviour by men and women there have been calls for greater consideration of how mobility is gendered (Law, 1999, Hanson, 2010). Therefore, there is a need to disaggregate mobility by gender to understand how social and structural factors affect men and women differently.

2.3. A demographic perspective: birth cohort influences on mobility trends

Travel patterns differ between age groups as travel purposes change during the life course, due to different roles associated with various life stages (Zimmerman, 1982, Rosenbloom, 1993, Oppermann, 1995, Pooley et al., 2005a, Ryley, 2006, Su and Bell, 2009). Mobility tends to be lower amongst both younger and older people, compared to other age groups (Pooley et al., 2005b, DfT, 2012).

People often acquire resources earlier in the life course, which influence mobility outcomes in later life (Bailey, 2009, Rosenbloom and Herbel, 2009). A lack of adequate resources may lead to issues of social exclusion (Lucas, 2012).

Likewise, mobility patterns may be caused by experiences over time, such as the effects of socialisation in childhood and adolescence on adult travel behaviour (Haustein et al., 2009).

Differences between older people and younger people are explained primarily by age itself and by differences in socio-economic and demographic characteristics (Giuliano, 2004). For example, residential locations have been found to differ between age groups. Older people tend to 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), whilst younger people often migrate from rural to urban areas (Dennett and Stillwell, 2010, ONS, 2012). Residential location impacts on mobility as people travel to engage in commuting and leisure activities (Gray et al., 2008). There tends to be a greater need for a car given traditionally lower public transport provision in suburban and rural locations (Gray et al., 2008, Ahern and Hine, 2012, Velaga et al., 2012).

When seeking to understand trends in travel mobility, it is particularly important to include birth cohorts in analysis. Ryder (1965) argues that birth cohort membership could be as important in determining behaviour as other social structural factors such as socio-economic group.

Birth cohorts have not featured in the ‘peak car’ debate to explain declining mobility.

Cohort analysis examines cohort membership over time (Rentz and Reynolds, 1981) and has been widely used to study time-specific phenomena in demography, sociology and epidemiology (Bashir and Estève, 2001, Davy, 2007, Yang, 2008, Bottazzi et al., 2011). Cohort analysis is useful in explaining change as it can help distinguish between three types of time-related variation; age effects (variation associated with age groups), period effects (variation over time that affect everyone simultaneously), and cohort effects (changes across groups of individuals who experience an initial event together, such as birth year) (Yang, 2007).

Including birth cohorts in transport studies enables cohort-specific effects to be detected and explanations can be offered up that are associated with wider socio-demographic trends. Men and women in each birth cohort face a unique set of opportunities and constraints at different points over the life course. Cohort-specific effects vary over time (for example, the affordability of learning to drive), and may be independent from structural trends affecting everyone (for example, fuel costs). In recent years, current cohorts of younger people have been negatively affected by the economic slowdown, whilst current cohorts of people entering retirement age (the so-called ‘Baby Boomers’) tend to be wealthier, healthier, better educated and more mobile (Owram, 1997, Coughlin, 2009).

Some studies on travel behaviour have considered cohort groups (Thakuriah et al., 2010, Frändberg and Vilhelmson, 2011, Scheiner and Holz-Rau, 2013), particularly concerning older people (Hakamies-Blomqvist and Henriksson, 1999, Newbold et al., 2005, Hjorthol et al., 2010). 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 have been undertaken in a British context. There is scope to broaden this approach and include younger cohorts to understand overall mobility trends.

Mobility patterns between birth cohorts are likely to be gendered, on the basis that increasing parity between genders is more evident amongst recent generations – for example in labour market participation and social roles. In some areas, most notably educational outcomes, women have even come to surpass men in recent years. Employment, social roles and qualifications are all closely linked with mobility behaviour. Overall, existing mobility literature has overlooked the influence of being born a particular gender at a particular time. This paper has three aims. First, to examine travel mobility trends by gender and age. Second, to examine travel mobility trends by gender and birth cohort. Third, to examine how cohort effects vary across the settlement hierarchy, by gender.

3. Method

3.1. National travel survey

To develop insight into changing mobility amongst the British population, trends are examined at the aggregate level. Data from the National Travel Survey (NTS) from 1995 to 2008 is used to analyse mobility changes. The NTS is a repeated cross-sectional household survey and collects information on travel patterns. It is the primary source of data on personal travel in Britain and also collects information on social, spatial, demographic, household and individual attributes (Anderson et al., 2009), which makes the NTS extremely suitable exploring the influence of birth cohort and gender, amongst other socio-demographic factors, on changing mobility. Analysis was carried out with ‘fully co-operating’ households, with weighting applied in line with NTS user guidance (Anderson et al., 2009).

However, there are some limitations in using the NTS. The survey is the only one available in Britain that allows for analysis of mobility patterns over time. However, the sample size trebled in 2002, therefore the

preceding years may not reflect nuanced changes as well as more recent data. The redesign of the travel diary in 2007 caused a fall in recorded trip rates for the year (Anderson et al., 2009). Noting these changes, only variables present across all years were included in the analysis and categories harmonised across years.

Residential area is important in this study to identify if cohort effects are context specific, as mobility is influenced by transport service provision which differs between areas (Gray et al., 2008). Whilst the NTS allows for comparisons between different settlement types, geographical referencing is not released below the general regional level (e.g. London and other Metropolitan regions) (Moore et al., 2013). We can only assess how characteristics of different settlement types influence mobility, rather than ascertaining regional differences within Britain, such as the North-South divide (Rowthorn, 2010).

The NTS only releases income bands which can lead to model biases (Moore et al., 2013), and a high proportion of households do not provide their income (Anderson et al., 2009). Using socio-economic group (SEG) as a proxy allows for more detailed analysis, although information about skills/education is provided for the Household Reference Person only (HRP) (Moore et al., 2013).

Whilst it could be argued that panel or longitudinal data may provide better prospects to track change, aggregate level change can be analysed using repeated cross-sectional data (Yee and Niemeier, 1996). The creation of pseudo cohorts from such data allow changes associated with birth cohorts to be tracked over time. (McIntosh, 2005, Uren, 2006, Rafferty and King-Hele, 2010).

Cohorts have been defined using 10 year groups as definitions smaller than this may pose a problem in terms of fluctuations in sampling variation (Micklewright, 1994). Classifying birth cohorts into 10 year groups also allows for clear comparisons with existing 10 year age groups in the NTS. There is no consensus on the classification of birth cohorts, however, cohort names have been aligned as closely as possible to the 10 year groups (Frey, 2010). Cohorts are defined in Table 1 along with sample sizes. The samples are smaller for older cohorts due to mortality over time.

3.2. Weekly mobility

Mobility in this study is concerned with ‘everyday mobility’, measured as weekly distanced travelled (km), although trip rates and transport mode are also common indicators (Tacken, 1998, Rosenbloom, 2004, Pérez et al., 2007). This study only includes day-to-day, reoccurring journeys that people would regularly make over a week outside the residential home in order to acquire goods, services or activities (Nutley and Thomas, 1995).

Changes in weekly distance travelled are important, as identified by previous studies, when income rises, car ownership increases leading to higher car use and greater distance travelled (Lucas and Jones, 2009, Metz, 2010). Some evidence has shown that there is a reducing rate of driving licence holding amongst younger people (DfT, 2010a, Noble, 2005a) therefore only weekly mobility is analysed to reduce bias, as younger people without cars may have lower mobility in comparison

Table 1
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	8345
Cohort 7	(b.1906–1915)	Grandparents of the boomers	1671

to older age groups. Distance travelled is a less ambiguous measure of mobility as men and women have different trip rates, making them less comparable. Median distance travelled is used to avoid any extreme outliers influencing the results.

Employment rates differ between men and women, for example, women exit the labour force during pregnancy and older people are more likely to be retired, therefore commuting trips have been excluded to reduce bias. Although previous studies examining gender differences in mobility have focused on commuting, has been little research on mobility trends as a result of social and cultural change. Excluding commuting is appropriate as this study aims to capture the influence of social change on mobility trends. However, individuals in full-time employment are assumed to have less time available for other trip types. A dummy variable has therefore been used to control for full-time employment.

3.3. Analysis

Descriptive analysis examines weekly mobility trends between the mid-1990s and the mid-2000s, by gender, birth cohort and age group. Statistical confidence intervals have been calculated around the medians. Regression analysis is used to isolate the effect of birth cohort on mobility by gender for different area types. Multiple linear regression (MLR) on log transformed weekly distance travelled, excluding commuting, has the effect of transforming a skewed dependent variable into one that is more approximately normal. Those who didn't make any trips were also excluded.

The following control variables have been included as they have an impact on mobility: driving licence holdership; household car access; household structure, as larger households may have more complex mobility patterns; socio-economic group (SEG) is used as a proxy for income to allow for more detailed analysis as income influences travel choices (Goodwin, 1990, Pooley et al., 2005b, Headicar, 2009); and whether there is a commute due to full-time employment. Survey year has been used to indicate period effects and cohort group for cohort effects. Age group has not been included as multicollinearity tests demonstrated the MLR models were outside standard tolerance limits when age group was controlled for in addition to the variables listed above.

Table 2 provides the age of the cohort groups at different years for which data is available. This illustrates that exploring differences in mobility related to age can be limited, as age groups will be composed of different birth cohorts exposed to different experiences depending on the survey year. For example, when the '1960s Boomers' were aged 30–41 in 1995–97, there will be substantial socio-cultural differences in 2006–08 when 'Generation X' are the same age.

4. Results

Descriptive analysis of weekly distance travelled is plotted as line graphs, with 3-year moving averages and 95% confidence intervals. All analysis has been disaggregated by gender. Firstly, mobility by age

group and gender are presented in Figs. 1a–d, and secondly, by birth cohort group and gender in Figs. 2a–d. Finally, cohort effects, by gender and area type, are examined using multiple linear regression models in Tables 3.

4.1. How do weekly mobility trends differ between men and women by age group?

Figs. 1a–d present median weekly mobility by age group and gender to observe changes from 1995 to 97 to 2006–08. These figures demonstrate that age effects are present as weekly mobility changes over the life course, associated with different activities at various life stages. From early adulthood, weekly mobility increases, peaking at 30–39 years, before declining again in older age (60 years and over). There are significant differences between age groups, which remain over the time span, although the dynamic has changed. Overall, people aged 40 and over have seen their weekly mobility increase, whilst those aged under 40 have seen theirs decline.

Fig. 1a shows differences in weekly mobility between age groups, by gender in 1995–97. Across all age groups, men travelled significantly further than women, apart from women aged under 20 who travelled further than men, although not significantly.

Fig. 1b presents differences between age groups, by gender, for 2006–08. Gender differences have changed as women under 30 now have significantly higher weekly mobility than men of the same age. Women aged 30–39 also travel further than men of the same age, although this is not significant.

Amongst those aged 50–59, and the oldest age groups (70 and over), women still had lower weekly mobility than men of comparable age. However, the weekly mobility of women aged 60–69 has increased so that it is no longer significantly different from men of the same age.

Fig. 1c focuses on weekly mobility changes amongst men over time. Younger men aged under 40 have experienced a substantial decline in weekly mobility, travelling only half the distance in the mid-2000s compared to a decade earlier. However, older men (age 70 and over) experienced significant increases in mobility.

Fig. 1d displays the weekly mobility for women only. Mobility has not changed amongst those under 60. In contrast, following a similar trend to older men, older women aged 60 and over have higher weekly mobility in 2006–08. Women of 'mid-life' age may have more complex lives, indicative of the 'sandwich generation', with women having dual caring commitments outside of work in terms of caring for children and older parents, leading to greater weekly mobility at this point in the life course. Meanwhile, older women are adopting greater caring responsibilities for grandchildren.

There has been a significant decline in weekly mobility amongst younger men under 30, so that women of the same age now travel further for everyday trips. This reverse in the gender mobility gap amongst younger people would appear to be a break from the past as historically the 20–29 age group was highly mobile with men travelling further than women (Pooley et al., 2005b). Everyday recreational mobility is increasingly recognised as being important for quality of life.

4.2. How do weekly mobility trends differ between men and women by birth cohorts?

Figs. 2a–d present median weekly distance travelled by gender and birth cohort from 1995 to 97 to 2006–08. These figures enable mobility change to be examined as birth cohorts become older. These figures show that cohort effects are present, as there are significant differences between cohorts. These effects also differ by gender.

Women belonging to the younger cohorts, Generation X (b.1966–1975) and Generation Y (b.1976–1985), had significantly higher weekly mobility in 2006–08, whilst the weekly mobility of men of the same cohorts did not change. Generation Y women now have higher weekly mobility, compared to men, thus reversing the mobility gender gap.

Table 2
Age of cohort groups at different years^a.

Cohort group	1995–97	2006–08
0. Generation Y (b.1976–85)	10–21	21–32
1. Generation X (b.1966–75)	20–31	31–42
2. 1960s boomers (b.1956–65)	30–41	41–52
3. Post-War boomers (b. 1946–55)	40–51	51–62
4. World War II (b. 1936–45)	50–61	61–72
5. Great depression (b. 1926–35)	60–71	71–82
6. Parents of boomers (b.1916–25)	70–81	81–92
7. Grandparents of boomers (b.1906–15)	80–91	91–10

^a Only adults aged 16 and over were included. The oldest people are aged 99 years.

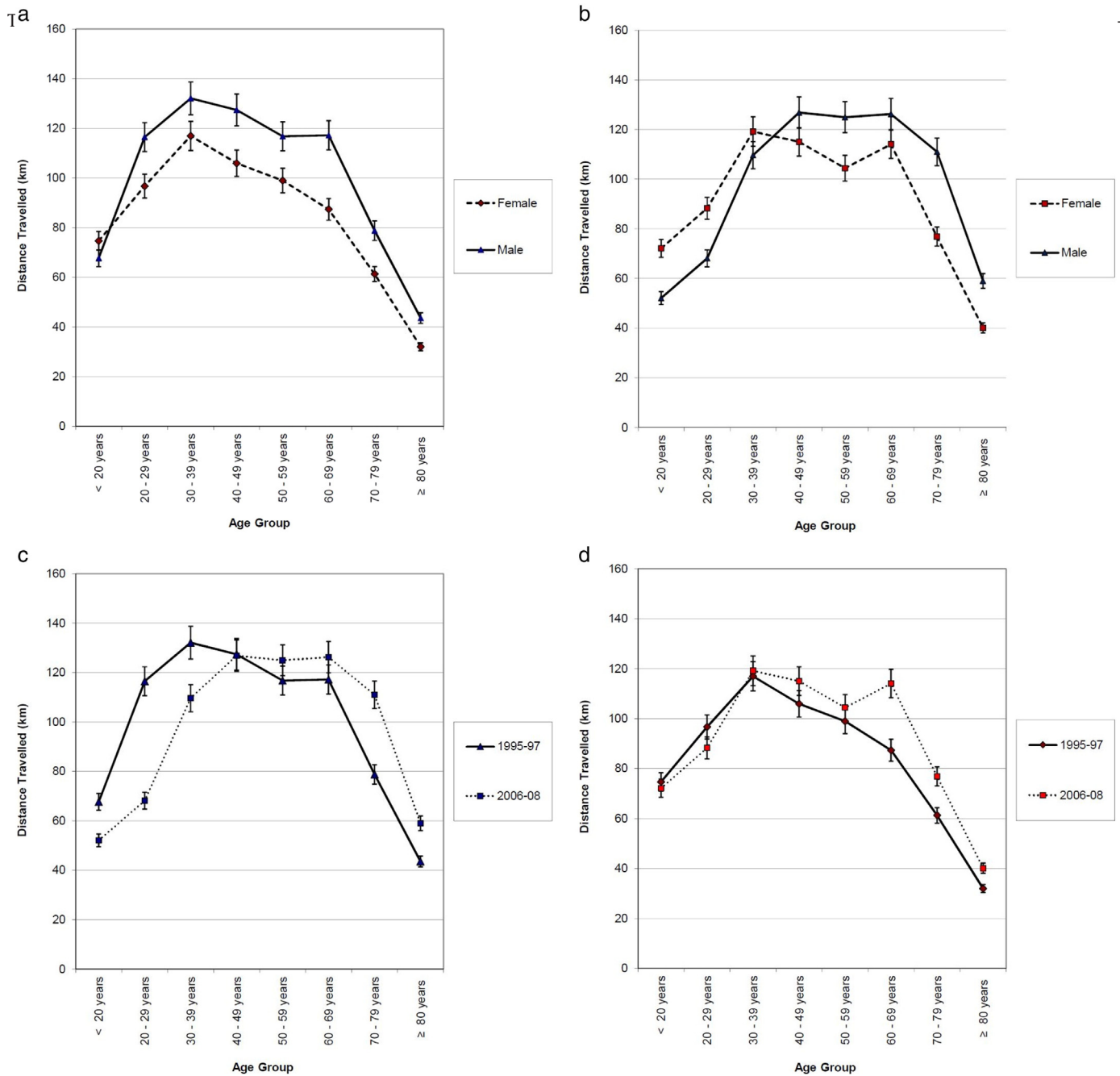


Fig. 1. a: Median weekly distance travelled (km) by gender and age group 1995–97 (3-year moving averages with 95% confidence intervals) b: Median weekly distance travelled (km) by gender and age group 2006–08 (3-year moving averages with 95% confidence intervals) c: Median weekly distance travelled (km) amongst men and age group from 1995 to 97 to 2006–08 (3-year moving averages with 95% confidence intervals) d: Median weekly distance travelled (km) amongst women and age group from 1995 to 97 to 2006–08 (3-year moving averages with 95% confidence intervals).

creasing their mobility as expected in line with life course events usually associated with leaving early adulthood and entering ‘mid-life’.

Amongst male Post-War Boomers (b.1946–1955), weekly mobility declined, however, mobility increased amongst women, of the same cohort. This suggests the gender divide is converging for this birth cohort, as men still travel further than women.

Fig. 2a shows that across all birth cohorts, except Generation Y, men had significantly higher weekly mobility in 1995–97.

Fig. 2b observes that Generation Y women have significantly higher weekly mobility in 2006–08 compared to men of the same cohort. Interestingly, women belonging to the Grandparents of the Boomers (b.1906–1915) also have significantly higher weekly compared their

peated cross-sectional survey, different interviewees are sampled in each year. Therefore, women of this oldest cohort surveyed in 2006–08 are perhaps healthier and more active compared to those interviewed in previous years.

The gender gap in mobility remains amongst all the other older birth cohorts (1960s Boomers’ (b.1956–65) and older) as men have significantly higher weekly mobility compared to women.

Fig. 2c shows the difference in mobility over time amongst male cohorts. As Generation Y men aged from 16 to 21 years in 1995–97, to 21–32 years in 2006–08 their weekly mobility was unchanged. This is reflected in the observed mobility of men aged under 30 in Fig. 1c. The same was observed for Generation X men as they aged from 20 to

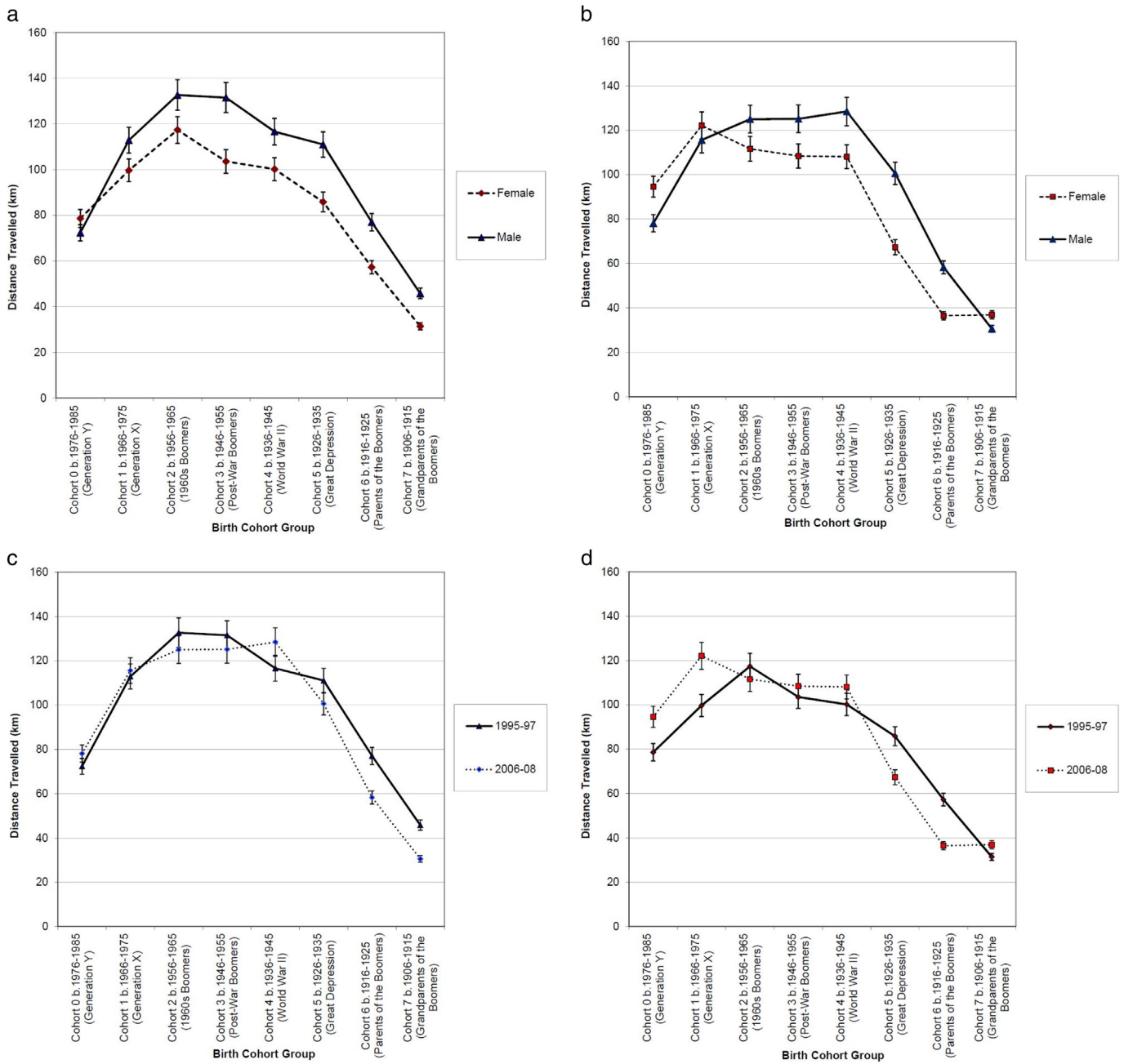


Fig. 2. a: Median weekly distance travelled (km) by gender and birth-cohort 1995–97 (3-year moving averages with 95% confidence intervals) **b:** Median weekly distance travelled (km) by gender and birth-cohort 2006–08 (3-year moving averages with 95% confidence intervals) **c:** Median weekly distance travelled (km) by men and birth-cohort from 1995 to 97 to 2006–08 (3-year moving averages with 95% confidence intervals) **d:** Median weekly distance travelled (km) by women and birth-cohort from 1995 to 97 to 2006–08 (3-year moving averages with 95% confidence intervals).

31 years to ‘early-mid-life’ of 31–42 years. Similarly, this is reflected in the mobility decline amongst men aged 30–39 years in Fig. 1c.

Both ‘Boomer’ cohorts had the highest weekly mobility of male cohorts in 1995–97, followed by Generation X, World War II (b.1936–1945) and Great Depression (b.1926–1935) cohort group. Conversely, Generation Y and the Parents of the Boomers (b.1916–1925) had comparable low mobility, with the Grandparents of the Boomers having the lowest mobility. Weekly mobility has not changed over time amongst the male birth cohorts as they have aged over the time span, with the exception of declining mobility amongst the oldest cohorts as they have aged.

Fig. 2d observes weekly mobility of Generation X and Y women increasing significantly as they become older. This is reflected in Fig. 1d

as the weekly mobility of women aged 20–39 remains similar over the time span.

In 1995–97, mobility differences between female cohorts followed a similar pattern to male cohorts. Women of the 1960s Boomers had the highest weekly mobility aged 30–41 years. However, in 2006–08, Generation X women had the highest levels of mobility aged 31–42 years. This is interesting as it shows that age effects are consistent for women over this time period, suggesting mobility increases in line with ‘mid-life’ stages.

Weekly mobility of the female Boomers and World War II female cohorts did not change, suggesting that age effects are changing dynamically amongst older cohorts, reflected in the mobility increase amongst women aged 60–79 years in Fig. 1d. However, the mobility of

Table 3

Multiple log linear regression model (MLLR) of distance travelled per week (km) for separate area types excluding commuting, business and education trips controlling for: year, cohort group; socio-economic group; driving licence; vehicle access and household (HH) structure and a commute.

	London + Metropolitan		Large – medium urban		Small urban + rural	
	Men	Women	Men	Women	Men	Women
	Coef.	Coef.	Coef.	Coef.	Coef.	Coef.
Year (1995 as reference)						
1996	0.281**	–0.088	0.158	0.032	–0.005	–0.004
1997	0.288**	–0.012	0.122	0.023	0.088	0.005
1998	0.016	–0.104	0.124	0.035	0.029	0.040
1999	0.193	0.005	0.143	0.013	0.078	0.029
2000	0.097	–0.044	0.055	0.003	0.055	–0.058
2001	0.151	–0.069	0.008	–0.062	0.103	0.026
2002	0.124	–0.003	0.088	–0.005	–0.031	0.037
2003	0.144	–0.085	0.115	–0.016	0.043	0.019
2004	0.080	–0.129	–0.025	–0.004	–0.008	0.027
2005	0.210**	0.026	0.046	–0.044	–0.058	–0.017
2006	0.103	–0.062	0.016	0.011	–0.023	0.007
2007	0.122	–0.145	0.028	–0.005	0.039	0.046
2008	0.063	–0.098	0.016	–0.015	–0.049	–0.019
Cohort (Gen Y (b.1976–85) as reference)						
Generation X (b.1966–75)	0.040	0.006	0.262***	0.021	0.109	0.037
1960s Boomers (b.1956–65)	0.045	–0.022	0.292***	–0.011	0.209**	–0.007
Post-war Boom (b.1946–55)	0.058	0.009	0.307***	–0.036	0.298***	0.013
World War II (b.1936–45)	–0.013	0.132*	0.303***	0.023	0.237***	0.003
Great Depress (b.1926–35)	–0.003	0.057	0.183*	–0.136**	0.172	–0.159**
Parents of Boom (b.1916–25)	–0.186	–0.203**	–0.147	–0.348***	–0.197	–0.524***
Grandparents (b.1906–15)	–0.667**	–0.547***	–0.132	–0.747***	–0.666***	–0.737***
Soc-econ grp (Professional as reference)						
Clerical	–0.150**	–0.209***	–0.088*	–0.121***	–0.056	–0.148***
Skilled manual	–0.505***	–0.406***	–0.490***	–0.308***	–0.512***	–0.302***
Other manual	–0.389***	–0.416***	–0.477***	–0.384***	–0.499***	–0.404***
Retired	–0.237***	–0.322***	–0.245***	–0.160***	–0.156**	–0.087*
Other econ inactive	–0.202*	–0.305***	–0.271***	–0.252***	–0.204	–0.193***
Driving licence (no licence as reference)						
Has full driving licence	0.484***	0.509***	0.626***	0.578***	0.622***	0.527***
Motor access (HH has no access as reference)						
Yes - HH has access	0.693***	0.460***	0.778***	0.610	0.727***	0.659***
HH Structure (Single adult 65+ as reference)						
Single adult 16–64	–0.030	–0.026	0.026	–0.018	0.085	0.044
Two adults, Hoh/HRP 65+	–0.089	–0.016	0.028	0.027	0.058	0.022
Two adults, Hoh/HRP 16–64	–0.198	–0.193**	–0.066	–0.126**	0.046	–0.037
Three or more adults	–0.242*	–0.251**	–0.204*	–0.198***	–0.082	–0.133*
Single parent family	0.014	0.053	0.119	0.036	0.305	0.133
2 adults, 1 child	–0.324**	–0.089	–0.073	0.005	0.120	0.070
2 adults, 2 children	–0.203	–0.050	0.006	0.002	0.144	0.066
2 adults, 3+ children	–0.288*	–0.135	–0.035	–0.082	0.066	0.082
3 adults, 1+ children	–0.268*	–0.346***	–0.148	–0.218***	0.094	–0.038
Commuter (full time) (Yes - a full-time commuter as reference)						
No – not a full-time commuter	0.020	0.002	–0.011	–0.010	–0.040	–0.024
Constant	3.722	4.081	3.405	3.890	3.654	4.072
Number of observations	12,624	14,664	21,706	24,637	16,315	18,455
R ²	0.065	0.083	0.079	0.140	0.059	0.149

*** $p < 0.001$.

** $p < 0.01$.

* $p < 0.05$.

the oldest cohorts declined, with the exception of the oldest cohort, the 'Grandparents of the Boomers'. As highlighted previously, women of this oldest cohort surveyed in 2006–08 are potentially healthier compared to those surveyed previously.

The results indicate that the striking increases in mobility of younger Generation X and Y women and the 'younger old' (i.e. aged 60–69) belonging to the Boomer cohorts are changing the dynamic of the mobility gender gap.

Our findings would appear in line with other studies that have discovered gender differences *narrowing* at the aggregate level (Noble,

2005b, Rosenbloom, 2006, Frändberg and Vilhelmson, 2011, McQuaid and Chen, 2012). However, men in these studies are still found to be travelling further than women as they tend to include commuting. Our results are particularly novel as they show that the mobility of younger women has increased above that of younger men.

4.3. Multiple log linear regression (MLLR) analysis

The multivariate model presented here does not measure change, which is the focus of the descriptive analysis; here we interest in further

unpacking the cohort effects that appear in the descriptive analysis to capture nuances between different area types. To gain insight into how gendered cohort effects are differentiated spatially, MLLR models have been produced for the following geographical area types: i) London Boroughs and Metropolitan built-up areas ii) medium and large urban areas (with a population of over 25K–250K) and iii) rural and small urban (with a population of 3K to 25K).

The MLLR models in Table 3 have weekly distance travelled as the dependent variable, with independent variables for survey year (period effects), birth cohort group, SEG, driving licence holding, motor car access, household structure and a commute. Separate models have been run for each area type listed above, as well as by gender.

When controlling for the above factors that affect mobility, we find that there is no discernible period effect. However, the model does show gender differences across area types. In relation to cohort effects we find that Generation Y men travel less than men of prime working age, and pre-1936 cohorts travel less than Generation Y men.

There are gender differences of note in the models. We find that women across all area types travel further than men when controlling for a commute, suggesting that women have more activity demands outside of employment, in comparison with men. Beuret et al. (2014) suggests that there are greater opportunities for women to socialise as driving licence holding and car access has increased amongst women. The low mobility of Generation Y only applies to men, as women of this cohort are as mobile as women of prime working age. Having access to a car increases mobility for a man more than it does for a woman. Also, being in a couple of working age reduces mobility more for women than it does for men. This indicates that activities may be gendered and reflected in socio-cultural changes.

In terms of geographical differences, the male Generation Y cohort effect is only present in cities and rural areas, not in London and the Metropolitan areas. Indeed, the cohort effects are generally less in the London and Metropolitan areas, likely due to less variation between cohort/age groups in travel distances.

As expected, across all area types for men and women, those belonging to SEGs associated with higher incomes travelled significantly further. Lower incomes may constrain the activities they are able to participate in as well as the ability to pay for transport and mobility.

Across all area types, where significant results occur for household structure, people living in single adult households aged 65 and over had higher mobility compared to other household types. This may be a reflection of people in retirement having more time to carry out activities rather than spending time at work. It may also be indicative of grandparents caring for grandchildren and travelling further distances as families have become more spatially dispersed (Cooke, 2011), with older people more likely to reside in rural areas (Champion and Shepherd, 2006).

5. Discussion

The finding of lower mobility of Generation Y men are of significant importance. The descriptive results suggest that the gender gap in mobility is converging in the context of declining population mobility, but for younger male cohorts this is dramatic over time. The MLLR models also only demonstrate low mobility amongst Generation Y men, as women of this cohort have comparable mobility to other female cohorts.

This is suggestive of the demographic shifts amongst younger generations which makes them distinctive from previous generations. Younger women have become increasingly independent, both socially and economically as they have accessed higher education and professional employment, and are therefore more equal to men. Younger cohorts are experiencing life course events e.g. childbirth, compared to former cohorts when they were of equivalent age.

The drastic decline in weekly mobility amongst younger men could be attributed to lifestyle shifts and social changes. Generation Y

women may engage in more social activities, compared to previous generations, leading to higher mobility. The activities of younger men and women may be gendered and reflected in socio-cultural changes, for example, younger men may socialise more in the home, due to less disposable income combined with greater familiarity of communicating online. Alcohol prices in UK supermarkets have fallen sharply relative to licenced premises, which is perhaps contributing to socialising at home. In addition, recent trends suggest that younger cohorts are smoking and drinking less compared with former cohorts (Measham, 2008) as well as having greater restrictions to public space (Minton, 2012).

With income being a significant predictor of mobility, younger cohorts have been affected more negatively by the UK's strong house-price inflation and the long-term rise of in-work poverty associated with the expansion of low-wage sectors in the UK economy, exacerbated by being hit harder by the recession compared to other cohort groups (Willets, 2010, Higgs and Gilleard, 2010). These forces have impacted on opportunities for employment and, along with the rising costs of living and have perhaps had a knock-on effect on the affordability of activities therefore reducing the opportunities for travel and fundamentally changing patterns of socialising culture amongst younger cohorts.

We can only discuss the characteristics of area types, rather than compare regional differences but we find that geographical differences are evident in the MLLR models, particularly in relation to household types. There is less variability between households groups in other areas, which suggests that there may be more and varied choices of destination in London and Metropolitan areas. This may lead to greater variations of lifestyles in urban areas, whilst lifestyles in rural areas may be more constrained.

The relationship between residential location and access, is mediated or exacerbated by the ability to obtain resources, such as income, a car or internet access. Younger people are perhaps less mobile as they have fewer mobility resources, such as a driving licence. These cohorts have also migrated to urban centres for higher education, where there is less need to use private cars. Accessing shops are more likely to be undertaken on foot or using public transport, thus access is limited to goods and services closer to the home.

Technology is also thought to be a contributing factor to declining mobility amongst traditionally higher mobility age groups. Generation Y have grown up around unprecedented technological developments, which Hopkins and Stephenson (2014) argue have re-shaped their mobility opportunities. Cultural shifts, then, may be developing as Generation Y may value the latest smartphone and/or computer technology, whilst the Boomers, grew up with developments around the car with obtaining a driving licence seen as 'rite of passage'. Some period effects, such as technology developments, may affect cohorts differently, across varying geographical contexts. For example, ICT may complement activities in urban settings, whilst substituting them in rural areas. In addition the distribution of internet access is both geographically and socially uneven (Knowles, 2006, Boulton, 2010).

6. Conclusion

Specific gender and cohort differences have been identified amongst changing mobility trends. We do not find a period effect therefore we are unable to generalise about declining mobility as it varies between gender, cohort groups and places. A particularly stark and surprising result is that whilst younger adults (aged under 30) still have lower mobility compared to other age groups, younger men have much lower mobility, so that women of similar age are now travelling much further – a finding not previously observed in transport studies and, is potentially, a significant break with the past. In this section, we discuss the implications for this finding and identify areas for further research.

A number of possible shifting socio-cultural and demographic factors have been identified to explain changes in mobility amongst younger cohorts. However, further understanding is required of Generation Y's current lower mobility, particularly amongst men, as there are

implications for future mobility. Further investigation is required to determine if this is a short-term cyclical effect or a long-run structural trend, and whether this will lead to positive or negative path dependencies over the life course. Lower mobility trends also need to be explored to understand if this is due to improving accessibility, for example by virtue of urbanisation, or rather represents a constraint that may produce or reflect disadvantage.

Changing in socio-cultural attitudes amongst younger generations may be important, as are the changing ability to acquire mobility resources over the life course. Younger people today are perhaps less mobile as they have fewer mobility resources, such as a driving licence. This is in contrast to the Boomer cohorts, who have obtained the resources to be mobile over their lives. However, the nature of mobility resources themselves amongst younger cohorts may be changing with developments in technology. Mobility resources that are not acquired when young, such as driving, may impact future mobility, and manifest in different ways for men and women.

The above discussion highlights issues of both choices and constraints in terms of mobility, which may also be gendered. On one hand, young women may be travelling more because they have greater freedom and choice arising from greater economic, social and leisure independence. On the other hand, mobility can arise as a strategy to overcome constraints, for example living in a less accessible location because housing is affordable but requiring more daily travel. Similarly, young men may be travelling less due to negative influences such as income constraints or restrictions on accessing public space, or due to positive choices such as greater take-up of home-based social activities.

We have only focused on 'everyday' mobility for recreation, leisure and personal business trips. This is important as it adds to the debates around peak car and unpacks the issue of declining mobility further. Non-work trips are important to consider as these are increasingly recognised as being important for quality of life therefore there may be detrimental implications from reduced mobility. However, there may have been increases in longer distance travel, which is not captured in this analysis.

We posit that being a particular gender and being born at a particular time influences mobility in inter-related, distinctive and substantial ways. Birth cohorts face unique sets of economic, social and demographic change which influence where people live and travel to. There is a need for transport studies, for example in the 'peak car' debate, to differentiate more fully between period and birth cohort effects, by gender, in order to capture longitudinal shifts in behaviour as for a more dynamic explanation of mobility trends.

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