

Long-term trends in travel behaviour:

Cross-sectional cohort analysis of London residents' trip rates, car ownership and work-related travel



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Overview

This paper forms one of a series of 'Travel in London' supplementary reports that explore the drivers of demand for travel in London. It examines the ways in which people of different ages have changed their travel, both across 'generations' (i.e. cross-sectionally) and within their own generation, i.e. as a 'cohort', over time. The paper draws on data from three large-scale surveys of personal travel in London, spanning the period 1991-2011. It focuses on changes in trip rates by mode, car ownership, driving licence holding and work related travel.

The paper exposes the often considerable dynamism of travel behaviour change and underlines the importance of looking below aggregate-level trends in seeking to understand, explain and influence the causative factors underlying them. Thus, specific aggregate changes are seen to reflect both life-stage related influences as individual's age, but also the influence of exogenous factors related to the wider evolution of urban and social structure and transport policy, as equivalent age groups behave differently over time. Gender and spatial (in terms of inner and outer London) differences are also explored.

Key aspects considered are the growth in rail-based trip rates since 2001; the analysis shows that all cross-sectional cohorts decreased rail-based trip rates between 1991 and 2001, before increasing up to 2011. Car driver trip rates, on the other hand, tell a more complex story; younger cross-sectional cohorts demonstrate the inverse pattern to rail, with increased trip rates between 1991 and 2001, followed by a decrease in trip rates from 2001 to 2011. Older cohorts, however, show a decrease in car driver trip rates as they move into old age, reflecting that elderly people travel less than younger age groups.

Also considered is the well documented increase in cycling in the 2000s; the analysis shows that almost all of the increase in cycling has occurred among younger cohorts, while cycling trip rates among older cohorts have remained stable or decreased.

The analysis shows that young people in their late teens and 20s are less likely to hold a driving licence and be the main user of a car than their predecessors. Behaviour in relation to car ownership illustrates similar generational lag effects, with people currently in older age groups tending to maintain travel patterns established in their earlier working age years, while contemporary young people have by comparison a much reduced propensity to obtain the means to drive. What these (younger) people do next, and identifying the opportunities to influence their decisions, will be a major factor influencing travel demand patterns in London in future years.

1. Introduction

Travel in London report 6 presented a ‘Spotlight’ looking at long-term trends in personal travel among London residents using compatible large-scale decennial travel surveys of Londoners, and related datasets, dating back to 1971. Over this time there have been substantial changes to the drivers of travel demand at a societal level (for example, the role of women), a geographical level (for example, population density) and in terms of transport policy (for example, increased investment in public transport following the establishment of the London Mayoralty).

This paper builds on the previous analysis by examining the ways in which people of different ages have changed their travel, both across ‘generations’ and within their own generation, as a ‘cohort’, over time. It identifies and considers trends in travel behaviour that have occurred in London, including a decline in car trips – after decades of growth – and continuing strong growth in public transport trips, even during the recent recession. Most of this analysis focuses on two themes:

- The way in which travel behaviour has changed between **age groups** over time, e.g. changes between 20-29 year olds in 2001 and 20-29 year olds in 2011.
- The way in which travel behaviour has changed within **cross-sectional cohorts** over time, e.g. people who were aged 20-29 in 1991 will have been 30-39 in 2001 and 40-49 in 2011, so it is possible to see the way in which travel behaviour changes over the course of a lifetime. Although these cross-sectional cohorts are not made up of precisely the same people at each survey year, as is the nature of travel surveys, they will provide an effective guide to how travel behaviour has changed within cohorts over time.

Structure

Beginning with a focus on trip rates for different modes, this paper applies ‘cohort analysis’ to repeated cross-sectional data to uncover what lies beneath the aggregate trends in travel behaviour that have been described in previous *Travel in London* reports and elsewhere. Most analysis described in this paper reflects travel behaviour across the years 1991, 2001 and 2011.

After considering trip rates by mode, the same method of analysis is applied to look at car ownership and use, looking specifically at driving licence holding, car availability and the ‘main users’ of cars.

The final part of this paper considers work-related travel, looking at the mode of travel to work and car driver work trips. This section builds on some of the themes previously identified, such as the substantial increase in rail-based trip rates within younger cohorts with corresponding reductions in car driver trip rates.

Data sources

Most of the analysis has been based on London Area Transport Survey (LATS) data for the years 1991 and 2001 and the similar London Travel Demand Survey (LTDS) data for the year 2011. The 1991 and 2001 LATS continued a series of large-scale travel surveys in London which were undertaken every decade and were timed to coincide with the Census of Population, data from which was required to ‘expand’ the survey

sample to represent the total population of London. These surveys were undertaken to provide an evidence base to better inform policy decisions. In 1991 LATS achieved a household sample size (within the Greater London area) of 44,700, while in 2001 it was 27,300. Since 2005/06, LTDS household-based travel surveys in London have been undertaken on a continuous rolling annual basis. These have very similar objectives and content to the previous decennial surveys, albeit with a relatively small annual (financial year) sample of households. By combining three years of surveys, it is possible to derive a synthetic dataset that is broadly representative of conditions in 2011, and also compatible with the historic large-scale LATS surveys.

2. Trip rates by mode

Background

The analysis presented in this paper is set within a context of increasing public transport supply within London. Over recent years, London has benefitted from the longest run of sustained high operational performance and service provision ever recorded. Alongside increased public transport provision, there have been continual improvements to the quality and reliability of public transport services. This progressive development of London's public transport system has supported sustained population and economic growth within the Capital; the latest projections of London's future population, based on the 2011 Census, suggest that it will continue to grow rapidly, with London growing by the size of Birmingham and Glasgow combined by 2031.

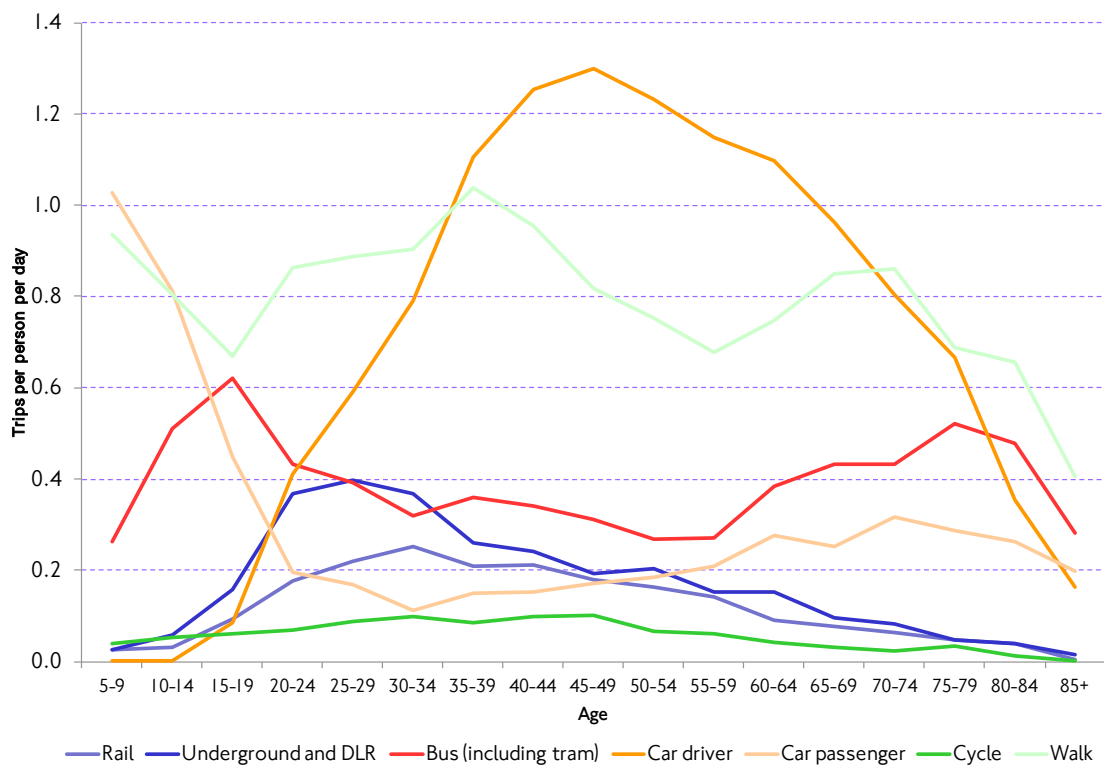
In addition to public transport improvements, an established trend has developed of a progressive shift in mode share away from private transport towards public transport, walking and cycling. *Travel in London* report 6 noted that in 2012, 44.2 per cent of journey stages in London were made by public transport, compared to 33.3 per cent made by private transport, principally the car. This means that, since 2000, there has been a 10.1 percentage point net shift (at the journey-stage level) in mode share to public transport away from private transport.

This section looks at patterns of travel behaviour by mode of transport, considering public and private modes and walking and cycling. Gender, age and geographical trends are identified. The use of trip rates normalises for population growth, thus the changes demonstrated in this paper do not reflect changes in the absolute level of population.

All modes

Figure 1 plots London residents' trip rates (average day, seven day week) by age, for each of the principal modes, for 2011. All modes show a strong relationship between age and trip rates; for car driver trip rates, this represents the form of an inverted U-shaped curve, peaking at the 45-49 age group. Bus trip rates are highest among teenagers and people of retirement age, while rail-based trip rates peak for young adults in their late 20s and early 30s before a steady decline. By looking at each mode individually it is possible to draw out more detail of these aggregate patterns and begin to explain the reasons behind them.

Figure 1 London residents' trip rates (average day, seven day week) by mode and age, 2011.



Rail-based

Context

London's rail-based modes have seen substantial increases in patronage in recent years. National Rail travel has grown strongly at the national level over the past decade, with only a brief pause during the latest recession. Passenger kilometres and passenger journeys on services defined by the Office of Rail Regulation (ORR) as 'London and the South East' (L&SE) increased for the third year in a row in 2012/13, and there has been an increase of more than 50 per cent in journeys over the last 10 years.

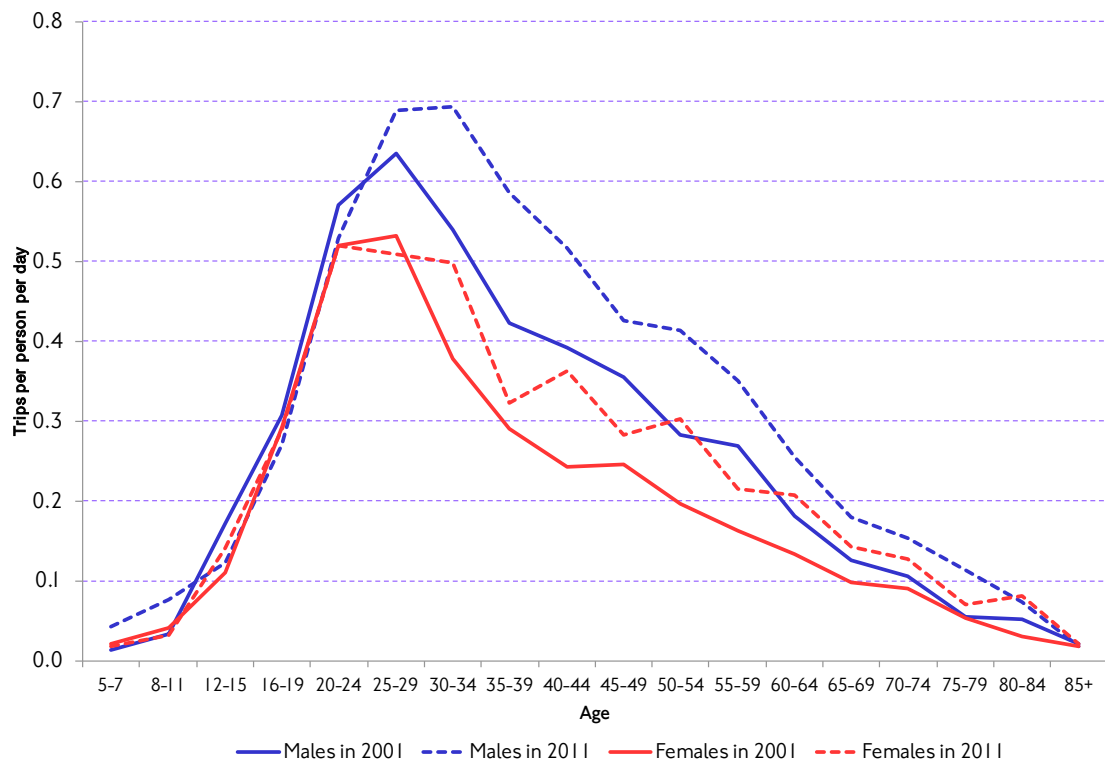
London Underground has also seen strong increases in patronage. In 2012/13, the number of people using the Underground was the highest ever, with 1,229 million passenger journeys (journey stages). Tramlink, London Overground and the DLR have also shown substantial increases.

Trip rates

Figure 2 plots rail-based trip rates for an average weekday by age and gender, comparing 2001 and 2011, to show these increases more clearly. The 'rail-based' modes in figure 2 comprise of National Rail, the Underground and the DLR. Both genders exhibit an inverse U-shaped relationship between age and rail-based trip rates, with a peak among younger adults. Men and women have both shown sharp increases in trip rates between 2001 and 2011 but with slightly different peak age groups and patterns: in 2001, 25-29 represented the peak age group among both men and women. By 2011, this had moved forward to the 20-24 age group for women and lagged to the 30-34 age group for men.

Men generally have a substantially higher rail-based trip rate than women at all ages – this is just one example of gender differences in travel behaviour that can be seen in several modes as well as aspects such as journey purpose. It may be that men have a higher propensity to use rail-based modes because they are more likely to work full time, and to travel further to work, than women – more of whom work flexible hours in closer proximity to home, which would make rail a less appropriate mode.

Figure 2 Rail-based trip rates (average weekday) for London residents, by age and gender, for the years 2001 and 2011.



It is possible to look into the changes that have occurred over time in more detail by applying cross-sectional ‘cohort analysis’.

Figures 3 and 4 show how changes in behaviour of specific cross-sectional cohort groups contribute to these overall changes in age-related behaviour. Each figure takes eight ten-year age bands, ten years apart, and traces their behaviour (in terms of trip rates) as they age over a 20 year period, from 1991 to 2011. This means that each line on figure 3 represents the same *cross-sectional cohort* as they age, and each data point represents the behaviour of an *age group* at a given time. For example, people who were aged 20-29 in 1991 will have been 30-39 in 2001 and 40-49 in 2011, so it is possible to see both the way in which travel behaviour changes over the course of a lifetime, as well as whether the travel behaviour of people in a given *age group*, i.e. 20-29, has changed between the years 1991, 2001 and 2011 (see Appendix for a guide to understanding of figure 3).

Age groups

Figure 3 shows changes in National Rail trip rates. All age groups had a higher National Rail trip rate in 2011 than either 1991 or 2001, however while National Rail

trip rates increased between 1991 and 2001 for the 20-29 age groups, they decreased for people aged 30-39, 40-49 and 50-59.

Cross-sectional cohorts

Figure 3 also shows that for all cross-sectional cohorts that include three data points, National Rail trip rates decreased between 1991 and 2001 and increased between 2001 and 2011. No cohort shows a higher National Rail trip rate in 2011 than in 1991, echoing figure 2, which shows that that rail-based trip rates peak among younger adults. However while people aged 20-29 and 30-39 and 40-49 in 1991 show substantial increases in National Rail trip rates between 2000 and 2001, people aged 50-59 in 1991 show only a modest increase between 2000 and 2001 – this reflects the fact that older people have less propensity to travel by National Rail. Likely reasons for this would be that older people are less likely to have a regular commuting journey and might find other modes, such as the bus or car, more preferable for everyday travel because of the enhanced accessibility and connectivity that they provide.

Figure 3 National Rail trip rates (average weekday) for London residents, by cross-sectional cohort, for the years 1991, 2001 and 2011.

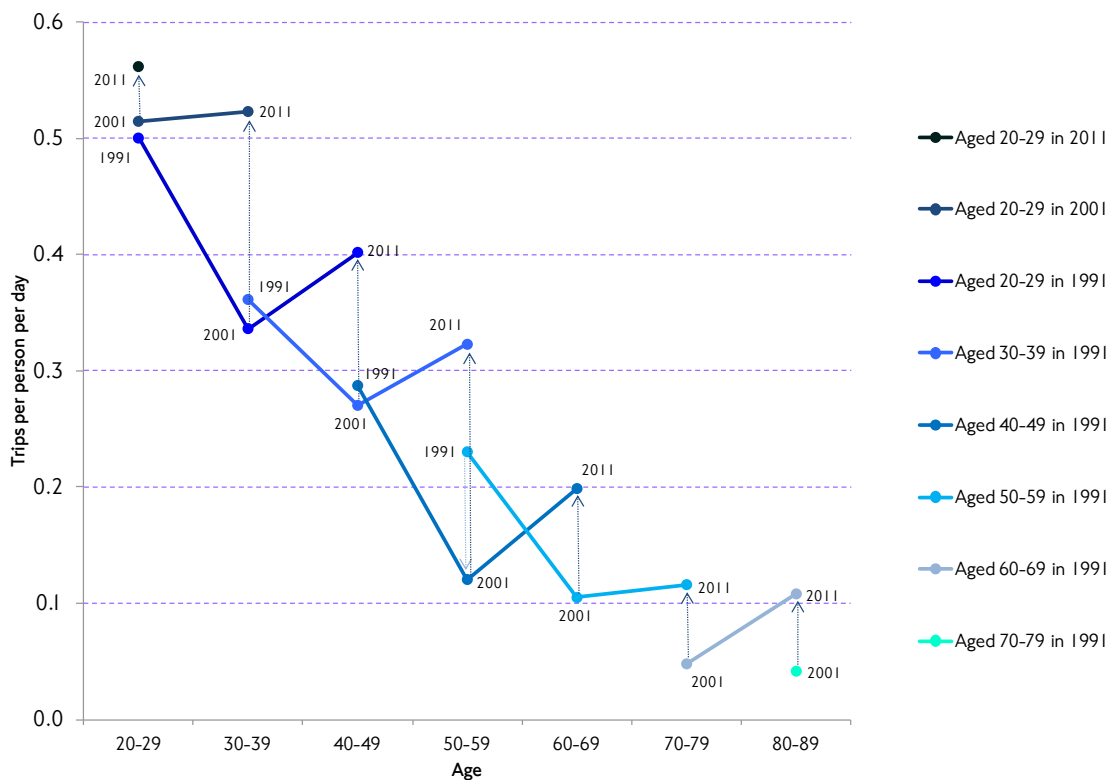
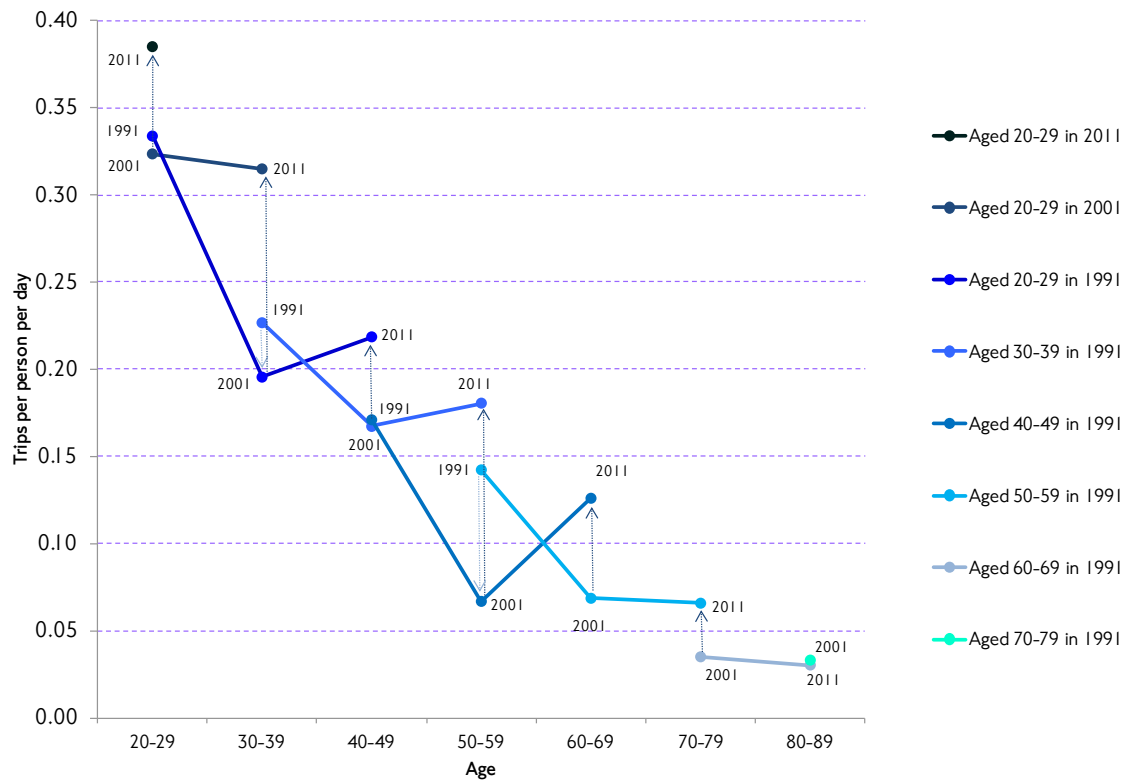


Figure 4 shows the equivalent for Underground and DLR trip rates (combined). The trend is similar to that in figure 3 but with a greater skew of higher trip rates among the 20-29 age groups. Again, all age groups had a higher trip rate in 2011 than either 1991 or 2001, and again trip rates generally decreased between 1991 and 2001 (albeit very marginally for the 40-49 age groups). Overall the profile of Underground and DLR trip rates is focussed among younger age groups – with trip rates decreasing by each 10-year age group.

Figure 4 Underground and DLR trip rates (average weekday) for London residents, by cross-sectional cohort, for the years 1991, 2001 and 2011.



Car driver

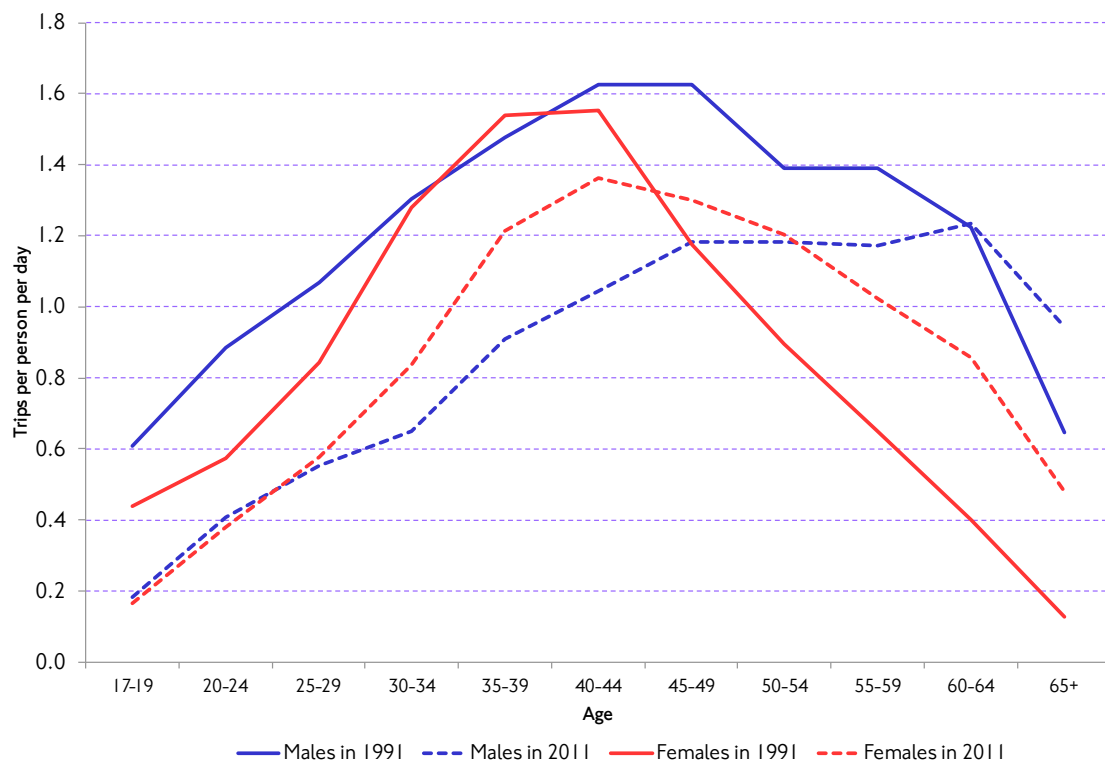
Context

The pattern that emerges for car driver trip rates is somewhat different to rail-based modes. Road vehicle traffic in London has been falling over the last decade, with vehicle kilometres 10.9 per cent lower in 2012 than in 2000, which represents the lowest level since 1993. Previous *Travel in London* reports have shown that the fall in London's road traffic has been particularly prominent in central London (an area larger than the central London Congestion Charging zone), where vehicle kilometres in 2012 were 22.8 per cent below the 2000 level. In inner London, the equivalent fall was 16.1 per cent, while vehicle kilometres in outer London fell by 8.1 per cent. Traffic in outer London only started to fall steadily from around 2007 onwards, and it started to increase again in 2012 and 2013 (although it is too early to understand if this is likely to be sustained).

Trip rates

Figure 5 shows car driver trip rates for an average weekday by age and gender, comparing 1991 and 2011. The relationship between age and car driver trip rates takes the form of an inverted U-shaped curve for both men and women. In 1991, both genders show peak car driver trip rates in their 40s, which is also the case for women in 2011. However in 2011, car driver trip rates for men peak at 60-64. This reflects a general lag effect shown in figure 5, where peak car driver trip rates are drifting towards older age groups, especially among women – women in all the age groups between 17 and 44 had a higher trip rate in 1991 than 2011, while women in the age groups above this all had higher car driver trip rates in 2011 than in 1991.

Figure 5 Car driver trip rates (average weekday) for London residents, by age and gender, for the years 1991 and 2011.



Age groups

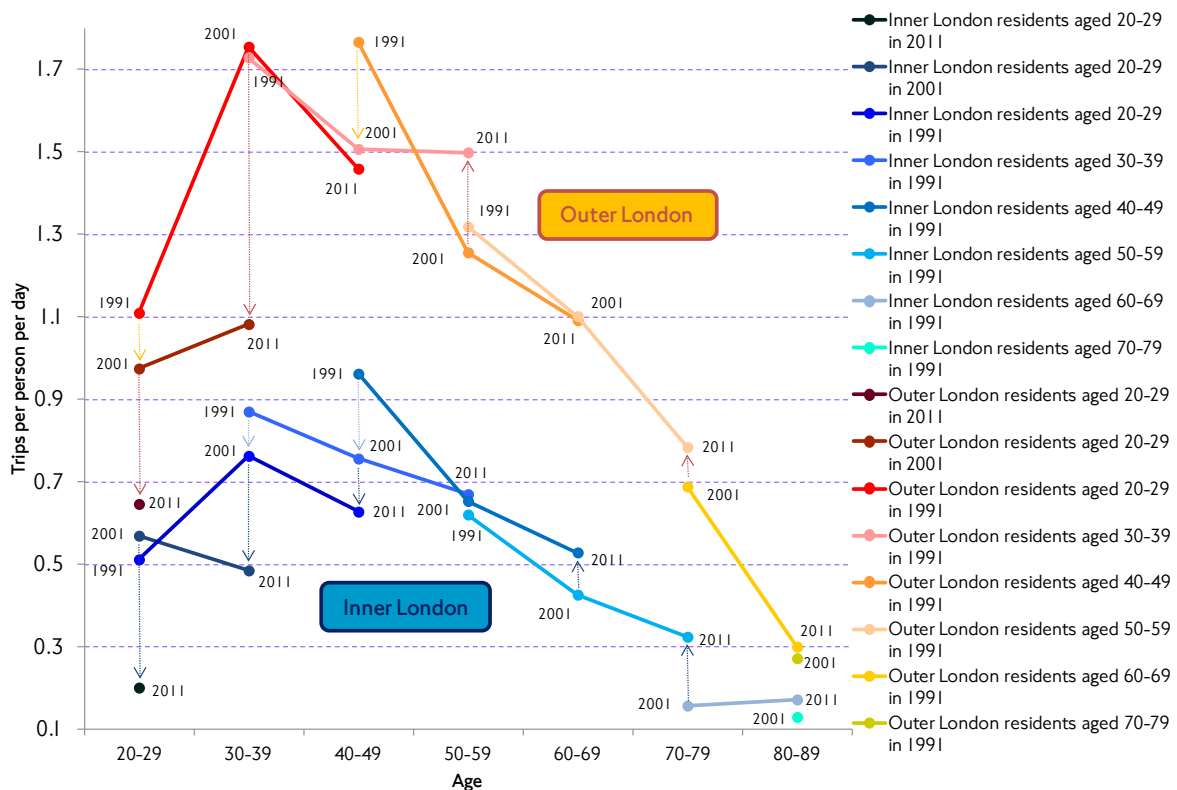
Figure 6 looks at these differences in more detail, displaying changes in car driver trip rates for residents of inner and outer London by age. For inner London residents, car driver trip rates decreased for the 20-29, 30-39 and 40-49 age groups between 1991 and 2011, while for those in older age groups (50+), trip rates increased.

The general pattern for outer London residents in figure 6 is similar, albeit with substantially higher car driver trip rates for all ages. Again, car driver trip rates for people in their 20s, 30s and 40s decreased between 1991 and 2011, while there is an increase for the 50-59 age groups and the 70-79 age groups, between 2001 and 2011.

Cross-sectional cohorts

Cohorts aged 30-39, 40-49 and 50-59 in 1991 proceeded to show reductions in car trip rates through 2001 and 2011. The only cohort to show a substantial increase between 1991 and 2011 were those aged 20-29 in 1991, though this includes a decrease between 2001 and 2011, and would not be unexpected given the increase in road traffic through the 1990s.

Figure 6 Car driver trip rates (average weekday) for London residents, by cross-sectional cohort and inner/outer London, for the years 1991, 2001 and 2011.



Car passenger

It is also worth considering car passenger trip rates, which show a different pattern altogether. Figure 7 plots changes in car passenger trip rates by men and women as they grow older, on the same figure.

Age groups

All male age groups have a relatively low car passenger trip rate of less than 0.2 trips per person per day, although men in their 30s through to their 60s have a lower trip rate than both the youngest and oldest age categories. The only male age group to show any increase in car passenger trip rate is the 50-59 age group, who increased between 1991 and 2001 before a decline in 2011 (to a lower trip rate than in 1991).

Women show a higher propensity to travel as a car passenger than men at all age groups – this might be because older females are less likely to drive than males, therefore when travelling by car they would be more likely to be a passenger. However all female age groups also showed reduced car passenger trip rates between 1991 and 2001, and again between 2001 and 2011, except for women aged 70-79, for whom there was a slight increase between 2001 and 2011.

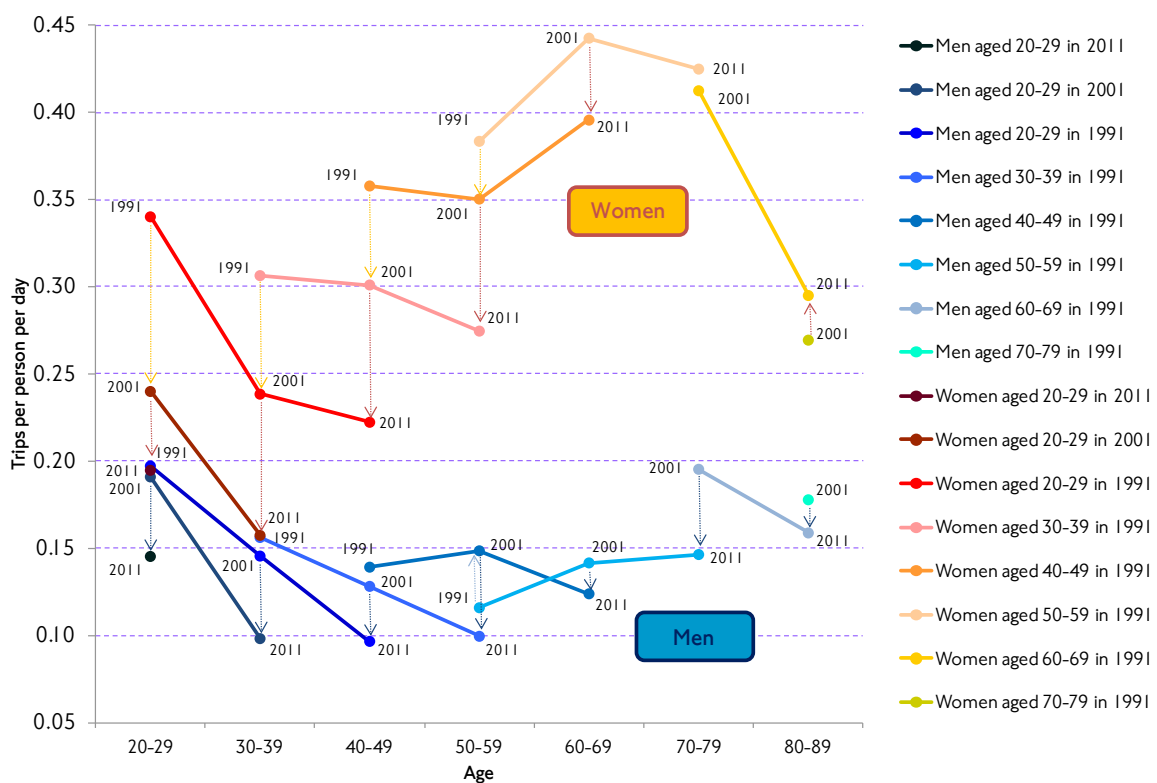
Cross-sectional cohorts

The only male cross-sectional cohorts to have a higher car passenger trip rate than their preceding cohort are men who were aged 50-59 in 1991 and 70-79 in 2001; all the younger cohorts show lower car passenger trip rates as they aged i.e. Men aged 20-29 and 30-39 in 1991, along with those aged 20-29 in 2001, proceeded to decrease car passenger trip rate in subsequent years, while those aged 50-59 in 1991 showed a slight increase as they entered their 60s and 70s.

For female car passengers, figure 7 shows a similar pattern but with a substantially higher car passenger trip rates for all ages. While women aged 20-29 and 30-39 in 1991, along with those aged 20-29 in 2001, decreased car passenger trip rate over time, women aged 40-49 and 50-59 in 1991 show increases (although women age 50-59 in 1991 then show a decrease in car passenger trip rate between 2001 and 2011).

Both genders show a decline in car passenger travel as people move from there 70s to 80s, reflecting a general reduction in mobility with old age.

Figure 7 Car passenger trip rates (average weekday) for London residents, by cross-sectional cohort and gender, for the years 1991, 2001 and 2011.



Bus

Context

The bus has been one of London's transport success stories, with the historic pattern of slowly declining patronage being reversed in the late 1990s to one of strong growth. Over the 12 years from 2000/01 to 2012/13, the number of bus journey stages in London increased by 56.8 per cent, and passenger-kilometres increased by 70.5 per cent. In contrast with the strong growth that still prevails on rail-based networks, however, the rate of growth in bus travel has levelled out in more recent years. Current

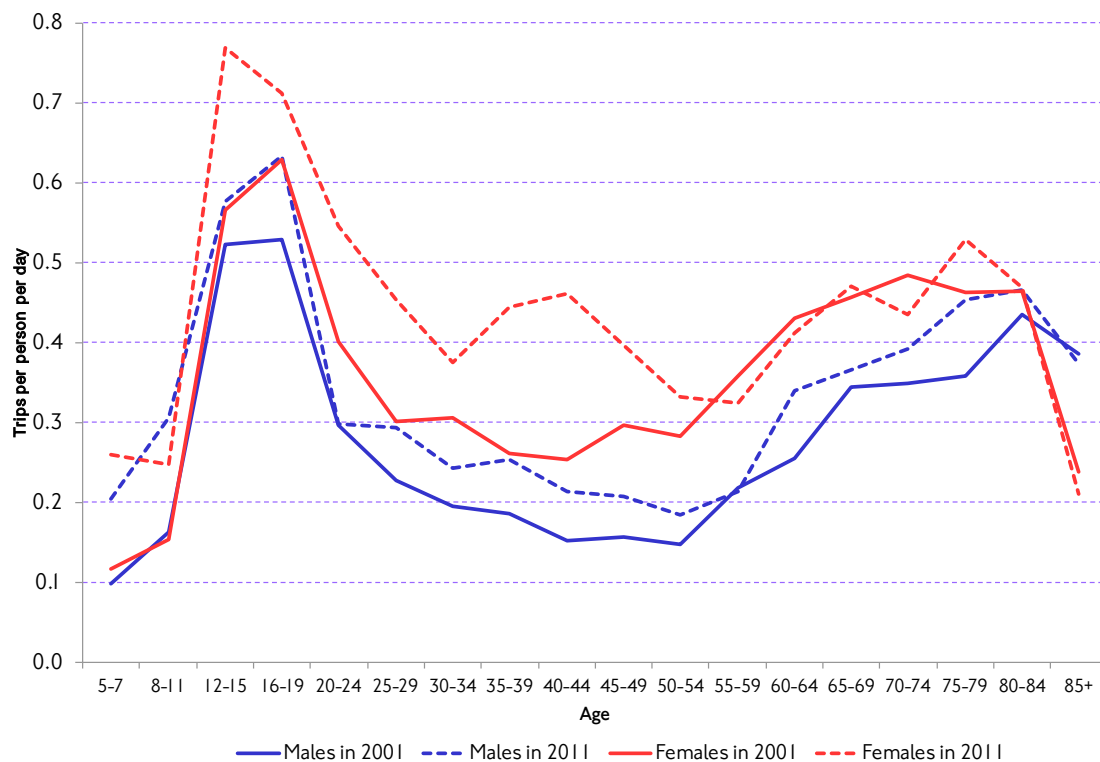
LTDS data shows that buses account for around 14 per cent of all London residents' trips, including around 18 per cent of inner London residents' trips and 12 per cent outer London residents' trips.

Trip rates

Figure 8 shows bus trip rates for an average weekday by age and gender, comparing 2001 and 2011. The figure shows that teenage children and young adults as well as people of retired age generally show higher bus trip rates than those aged between 30 and 60. Bus trip rates increased significantly for both men and women between 2001 and 2011, while women had a higher bus trip rate than men in both years. Generally women are more likely to use buses than men, unlike rail-based modes, as described previously. This is likely to be because their trips are generally more local and at less structured times – related to issues such as working status, childcare and income. Men, on the other hand, are more likely to be in fulltime employment, which in turn increases the likelihood of a longer distance commute which more likely to be undertaken by rail-based modes.

The most substantial growth in bus trip rates shown in figure 8 is among teenage children, whose travel is associated with the education peaks. Initiatives such as 'Zip' cards, which offer under 18s in London free or discounted travel along with service enhancements, have been instrumental in this.

Figure 8 Bus trip rates (average weekday) for London residents, by age and gender, for the years 2001 and 2011.



Age groups

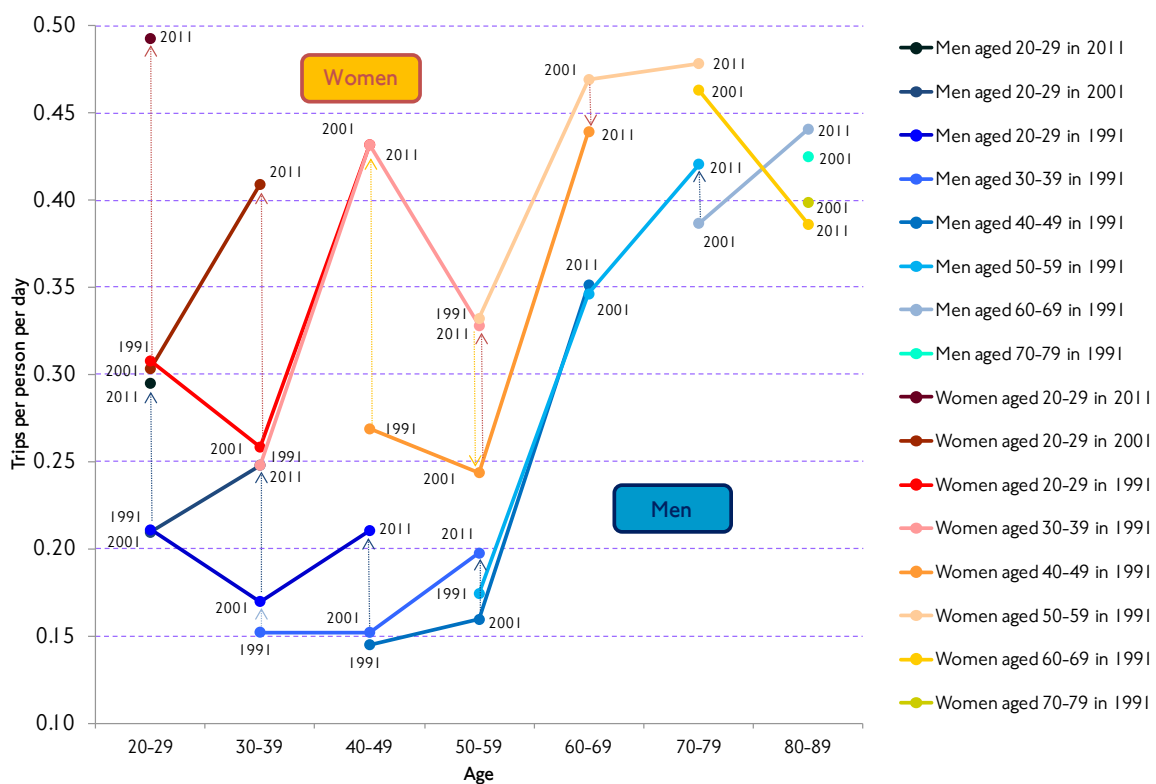
Figure 9 shows changes in bus trip rates by men and women as they get older, for the years 1991, 2001 and 2011. For men, the largest increases within age groups occurred within the 20-29, 30-39 and 40-49 age groups, while for women the

greatest increases in bus trip rates between 2001 and 2011 were among within the 20-29 and 30-39 age groups, while the 50-59 age groups showed a decrease in bus trip rate between 1991 and 2001, followed by an increase up to 2011.

Cross-sectional cohorts

For men, every cross-sectional cohort had a higher bus trip rate in 2011 than in 1991, although there was only a marginal increase for men aged 20-29 in 1991, with this cohort also showing a dip in 2001. Figure 9 shows that bus trip rates for men increase dramatically for all cohorts once they reach their 60s, reflecting concessionary travel benefits such as the Freedom Pass. For women, every cross-sectional cohort had a higher bus trip in 2011 than in 1991, although women aged 70-79 in 2001 showed a decreased trip rate by 2011.

Figure 9 Bus trip rates (average weekday) for London residents, by cross-sectional cohort and gender, for the years 1991, 2001 and 2011.



Cycling

Context

Recent years have seen an established pattern of strong growth of cycling in London. In 2012, there were 582,000 cycle stages in London on an average day, which represents an 80.1 per cent increase in cycle stages since 2002. In addition, TfL monitors levels of cycling on the TLRN (Transport for London Road Network) through data collected by automatic cycle counters. Between 2000/01 and 2012/13, the index of cycle flows on the TLRN increased by 176 per cent overall, though cycling is very seasonal with peaks and troughs corresponding with summer and winter.

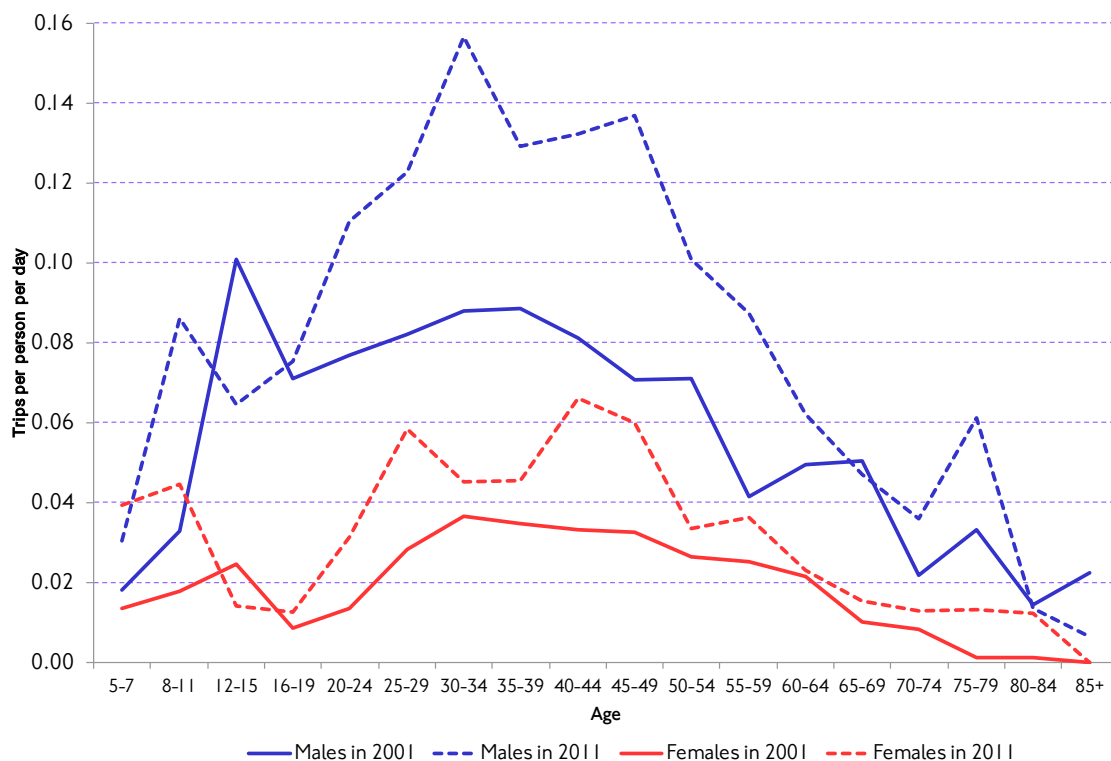
These strong increases in cycling have been boosted by sustained investment in cycling infrastructure. In March 2013, to support this growing number of cyclists, the Mayor

published his *Vision for Cycling*, in which he outlined plans to spend £913 million on cycling over the next ten years to deliver a step change in cycling provision.

Trip rates

Figure 10 shows cycle trip rates for an average weekday by age and gender, comparing 2001 and 2011. Both gender groups exhibit an inverted U-shaped relationship, with people of working age, between 20 and 60, generally showing a higher cycle trip rate than younger or older groups. Although cycle trip rates have been increasing for most age groups, figure 10 shows that people demonstrate less propensity to cycle once they reach their late 60s. Men and women of all ages show substantially increased cycle trip rates between 2001 and 2011, while men have a higher cycle trip rate than women for both years.

Figure 10 Cycle trip rates (average weekday) for London residents, by age and gender, for the years 2001 and 2011.



Age groups

Figure 11 shows changes in cycle trip rates for men and women as they get older, for the years 1991, 2001 and 2011. All male age groups, with the exception of men in their 80s, show increased cycle trip rates, with particularly strong growth between 2001 and 2011. As with men, cycle trip rates for women were higher for every age group in 2011 than either 1991 or 2001.

Cross-sectional cohorts

For men, the younger cross-sectional cohorts – aged 20-29 and 30-39 in 1991 and aged 20-29 in 2001 – increased their cycle trip rates as they aged. Older cohorts decrease their cycle trip rates as they age, although men aged 40-49 and 50-59 in 1991 did increase their cycling trip rate between 1991 and 2001. For women, cohorts aged 20-29 in 2001 and 20-29, 30-39 and 40-49 in 1991, all increased

cycle trip rates up to 2011. Older female cohorts also tended to decrease cycle trip rate with age.

Figure 11 Cycle trip rates (average weekday) for London residents, by cross-sectional cohort and gender, for the years 1991, 2001 and 2011.

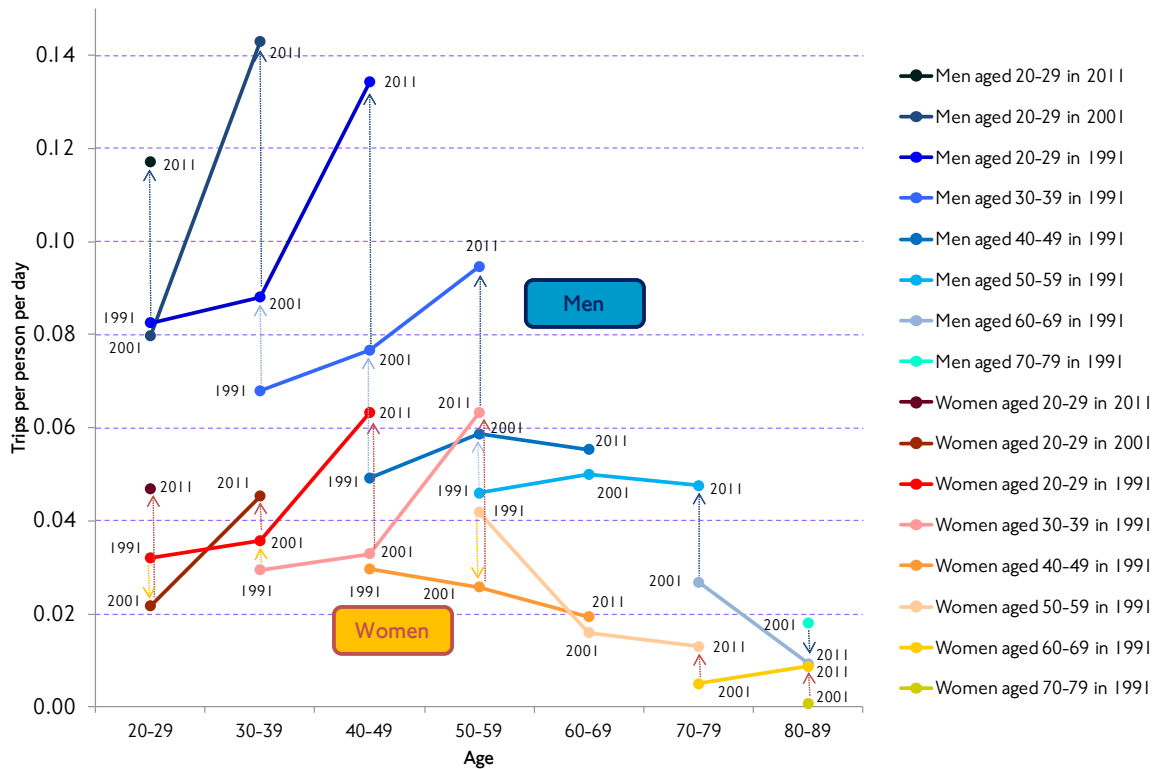
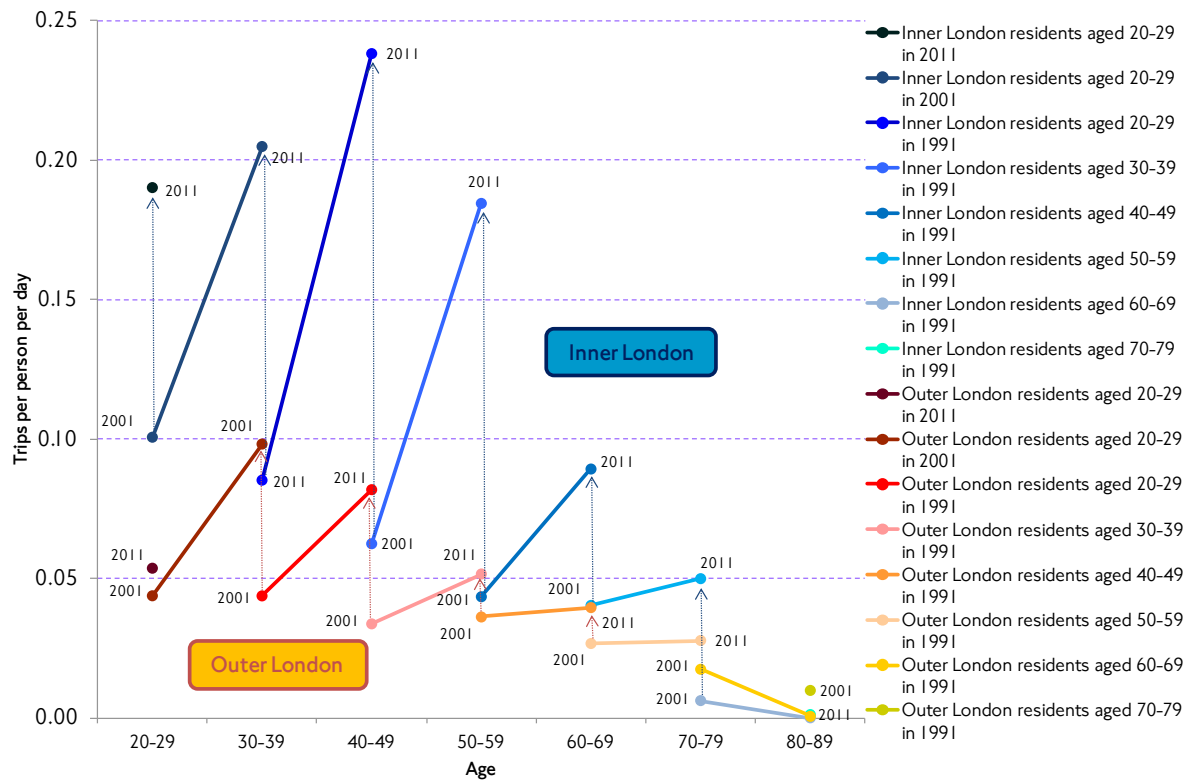


Figure 12 also shows changes in cycle trip rates, this time for residents of inner and outer London by age, for the years 2001 and 2011. Every cross-sectional cohort of both inner and outer London increased cycling between 2001 and 2011, with the exception of those aged 70-79 in 2001. The figure shows that cycle trip rates are substantially higher among inner London residents. In 2011, 40-49 represented the peak age group for inner London residents, while 30-39 was the peak for outer London residents.

Figure 12 Cycle trip rates (average weekday) for London residents, by cross-sectional cohort and inner/outer London, for the years 2001 and 2011.



Walking

Context

Despite a relative lack of good data describing pedestrian activity in London, one of the outcomes of the Roads Taskforce, the *Mayor's Vision for Roads and Streets in London*, seeks to improve conditions for pedestrians so as to encourage increased walking as a means of transport.

Walking as a means of travel includes both 'walk all the way trips', which are trips made entirely on foot, and 'walk (journey) stages', where walking is part of a trip made primarily using another mode of transport, for example, walking to a bus stop to catch a bus or Underground station to catch a train. Statistics of general travel, mode shares and trip rates, such as those in this paper, conventionally only include 'walk all the way' trips, therefore not representing the full amount of walking in London, or even the full amount of walking by London residents.

'Walk all the way' trips do, however, remain a useful measure of walking. According to LTDS, the number of 'walk all the way' trips by residents in London has been relatively stable since the introduction of the survey in 2005/06 at around 6 million trips per day. There are stark differences in walking trip rates by age, gender and geographical location, however.

Trip rates

Figure 13 shows walking trip rates for an average weekday by age and gender, comparing 2001 and 2011. Both gender groups show high walking trip rates as children, which then decrease through teenage years and early adulthood. For men,

walking trip rates then stabilise until retirement age, where there is a prominent increase among men in their 60s and 70s before a decrease for older men.

For women, walking trip rates increase through their 20s to a peak 35-39, before decreasing fairly steady through older age groups. This peak among women is likely to be associated with escort trips, accompanying children on shorter journeys. Another point of interest is that figure 13 shows a decline in walking trip rates for children and teenagers of both genders – the opposite to what has been shown with bus trip rates. TfL’s *Improving the health of Londoner’s* transport action plan explained that nationally children’s independent travel has declined over recent decades – partly due to legitimate parental concerns over road danger, with motor traffic as a primary cause of serious injuries and deaths among children. It also explained the bus concessions for children, introduced in the 2000s, offered many health and social benefits for young people and, contrary to expectations of some, resulted in children walking the same amount as they had done before (in terms of walking duration). However it does seem that there has been an element of substitution with bus trip rates increasing for children as walking trip rates decrease.

Figure 13 Walking trip rates (average weekday) for London residents, by age and gender, for the years 2001 and 2011.

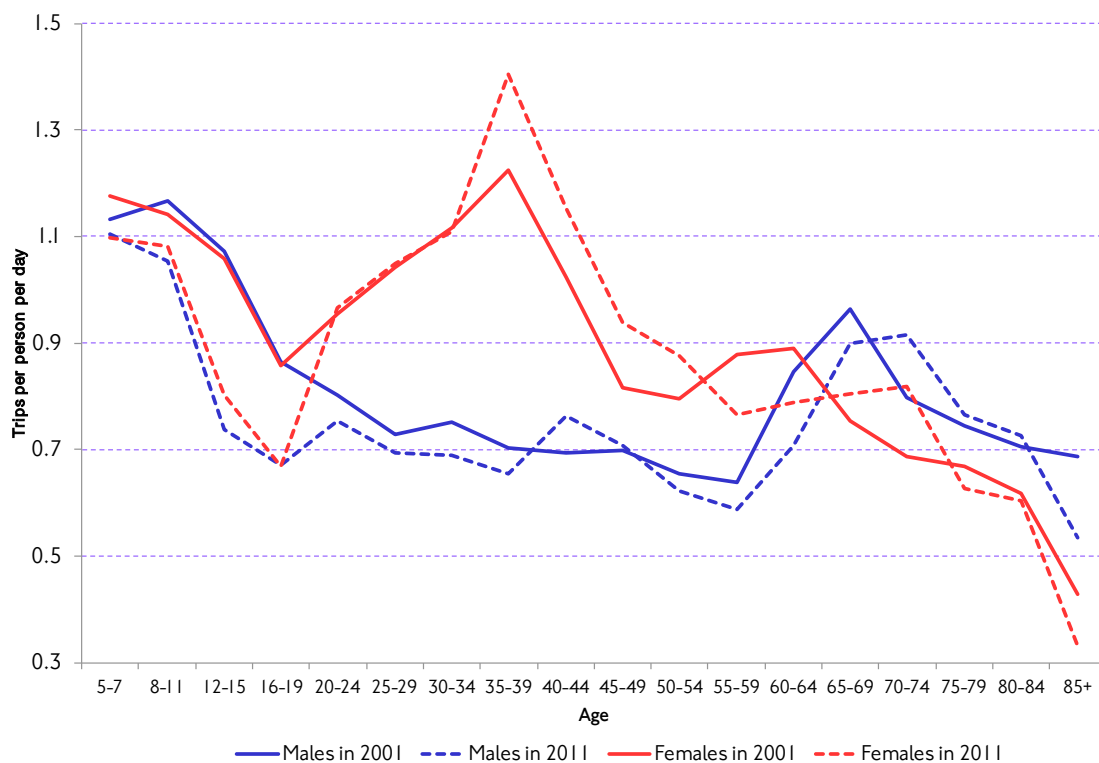
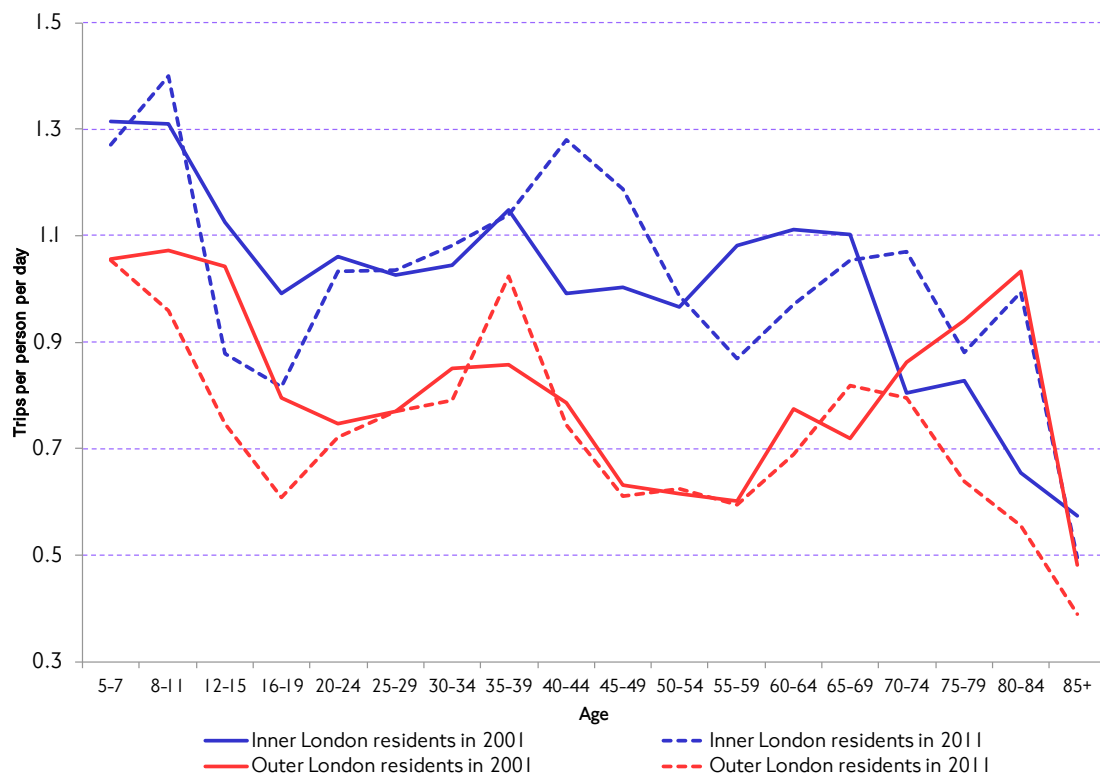


Figure 14 shows walking trip rates for an average weekday by age for inner and outer London, comparing 2001 and 2011. Again children’s trip rates are seen to have decreased between 2001 and 2011 (with the exception of 8-11 year olds in inner London); however children do, on the whole, have higher than average walking trip rates, which broadly stabilise through adulthood. Walking trip rates decrease substantially as people reach old age, particularly among the over 80s. Inner London residents generally have a higher walking trip than their outer London counterparts for all age groups – this reflects the closer proximity of attractions within inner London, which reduces the need for mechanised travel.

Figure 14 Walking trip rates (average weekday) for London residents, by age and inner/outer London, for the years 2001 and 2011.



3. Car ownership and use

Background

This next section looks at changes in car ownership and use, beginning with driving licence holding and going on to look at car availability and the main users of cars. Rather than looking solely at trip rates, as the previous section has done, the rest of this paper looks at factors that underlie trip rates.

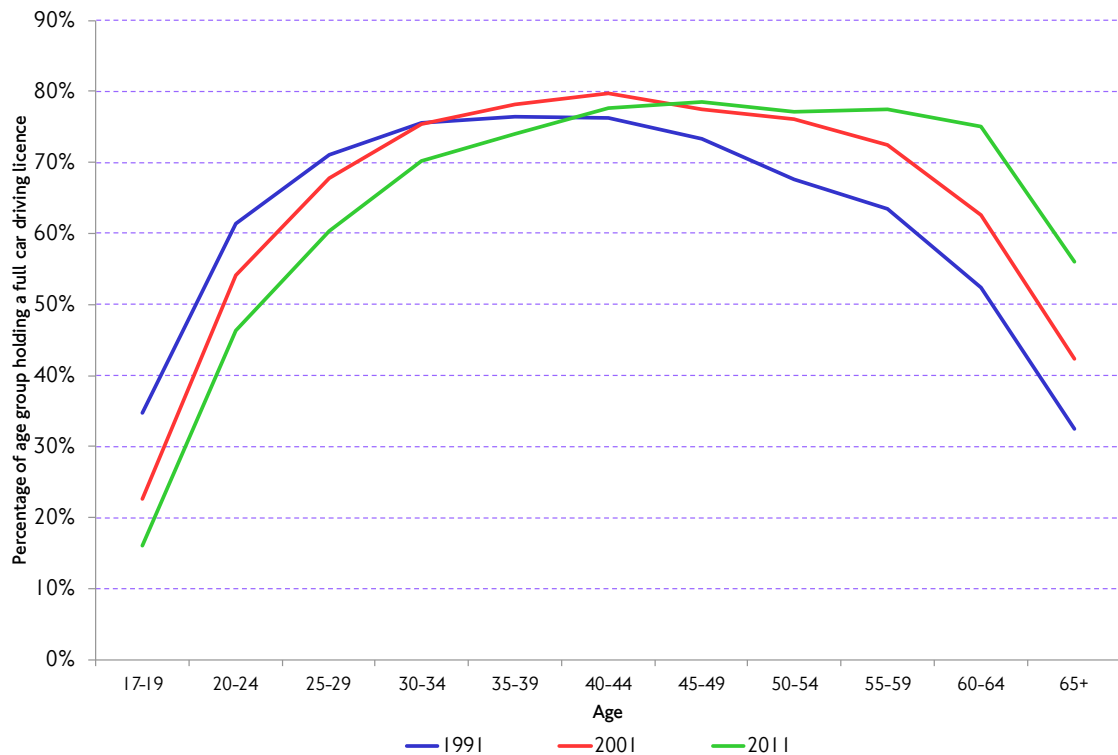
Recent analysis as part of the Roads Task Force found that there are 2.56 million cars licensed in London. This equates to an average of 0.3 cars per adult. In total, 46 per cent of households do not have a car, 40 per cent have one car and 12 per cent have two cars, with very few households owning more than two cars. The reasons people use car are (in descending order of importance): ease and convenience; travel time; comfort; encumbrance; trip chaining (where one discrete journey closely follows, and is associated with another); and cost.

However, as identified previously, recent years have seen a trend of falling road traffic in London. Roads Task Force research found the key reasons for London households to choose against owning a car to be cost, the stress of owning and driving a car in London and that the proximity of local services and public transport, which make a car unnecessary. The evidence suggests that the more convenient other modes are, and the more inconvenient the car (for example, because of parking policy, Congestion Charging or the level of congestion on the roads), the more likely London residents are to choose to live without a car.

Licence holding

Figure 15 illustrates trends in full car driving licence holding by age, for the years 1991, 2001 and 2011. It shows that the peak age for ownership is drifting to the right, as younger people in previous generations have retained their licence as they age, but current young people in their late teens and 20s are less likely to hold a driving licence than their predecessors.

Figure 15 Percentage of London residents with full car driving licences, for the years 1991, 2001 and 2011.



Figures 16 and 17 illustrate the equivalent for residents of inner and outer London, respectively. Both figures show the same pattern as figure 15, however it is clear that inner London residents have a lower propensity to hold a driving licence, with a peak of less than 70 per cent for people in their 40s in 2011, while in outer London the equivalent age group has over 80 per cent licence holding.

Figure 16 Percentage of inner London residents with full car driving licences, for the years 1991, 2001 and 2011.

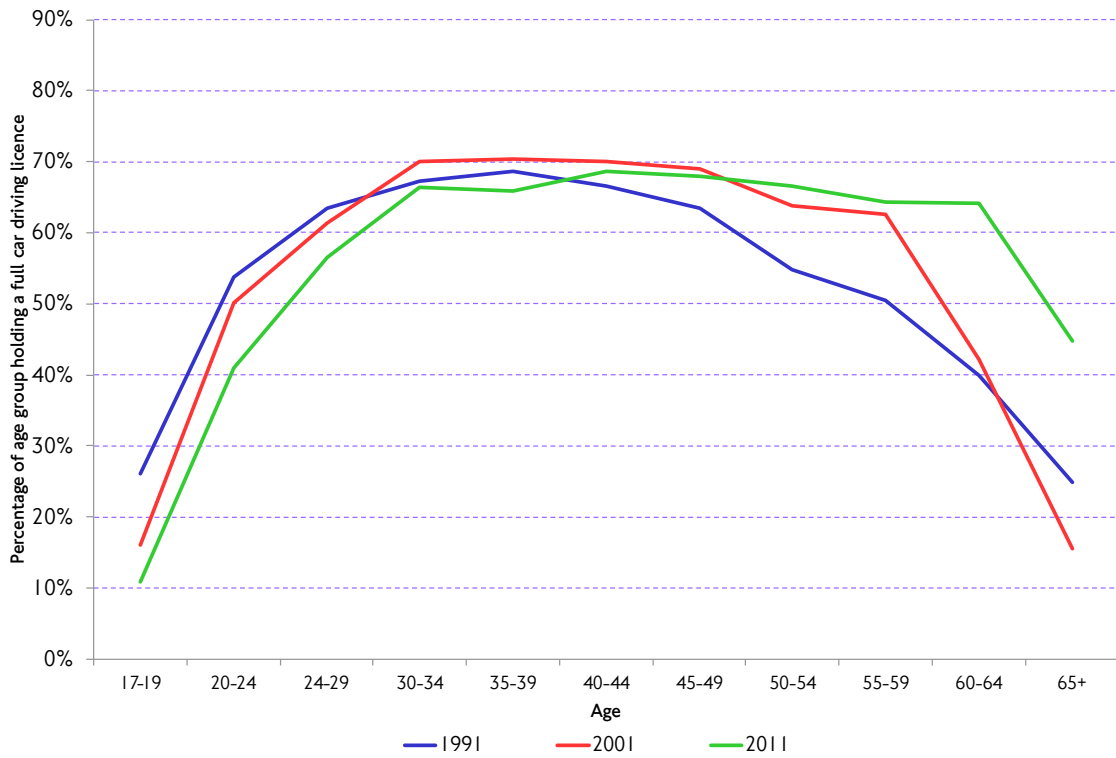
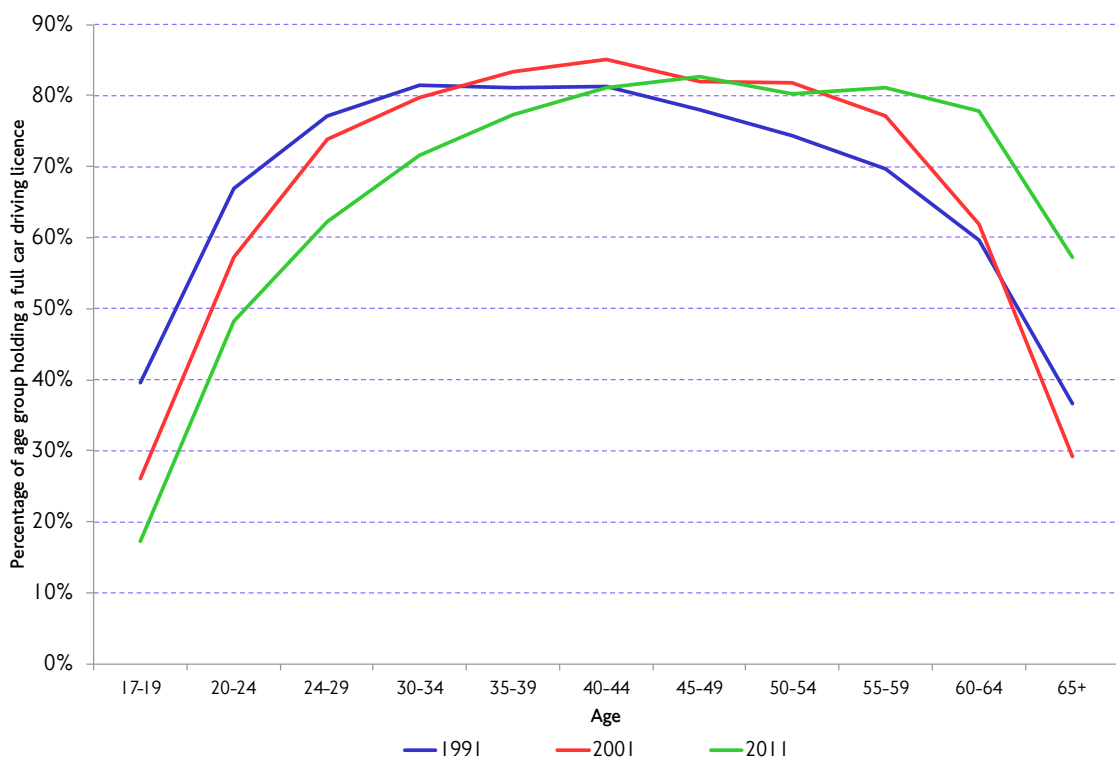


Figure 17 Percentage of outer London residents with full car driving licences, for the years 1991, 2001 and 2011.

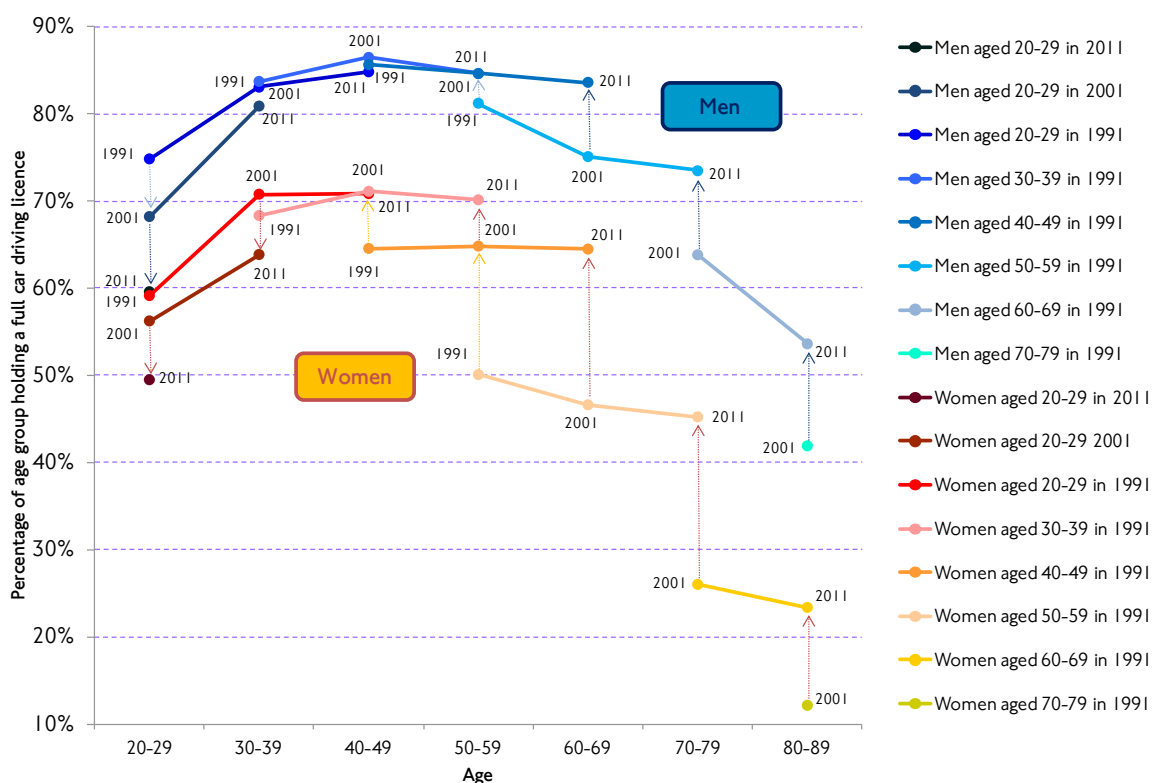


Cross-sectional cohorts

Figure 18 shows these cohort effects more clearly, by gender. For men, those aged 30-39 and 40-49 in 1991 show stable rates of around 85 per cent as they age; men aged 50-59 show declining licence holding from around 80 per cent in 1991 to around 75 per cent in 2011, while older men show greater declines. There is a strong growth for those aged 20-29 in 1991 as they get older, although licence ownership rates for the younger age groups have been decreasing.

For women, each successive cohort has higher car licence ownership rates than its predecessor, except for those aged 20-29 in 2001, where it is down – but not as much so as for men.

Figure 18 Driving licence holding, by cross-sectional cohort and gender, for the years 2001 and 2011.



Clearly it is unlikely that a substantial number of people would cease to hold a driving licence once they reach a certain age, so the decline in licence holding among older cohorts is likely to do with population churn. *Travel in London* report 6 showed that despite the population of London increasing by around a million people between 2001 and 2011, the number of people aged 65+ was relatively stable. This suggests that older people are leaving London as they retire, and it could be that older people with a driving licence are more likely to migrate away than people who rely solely on the extensive public transport provision of the Capital, thus leading to an overall decline in proportion of older Londoners with a driving licence.

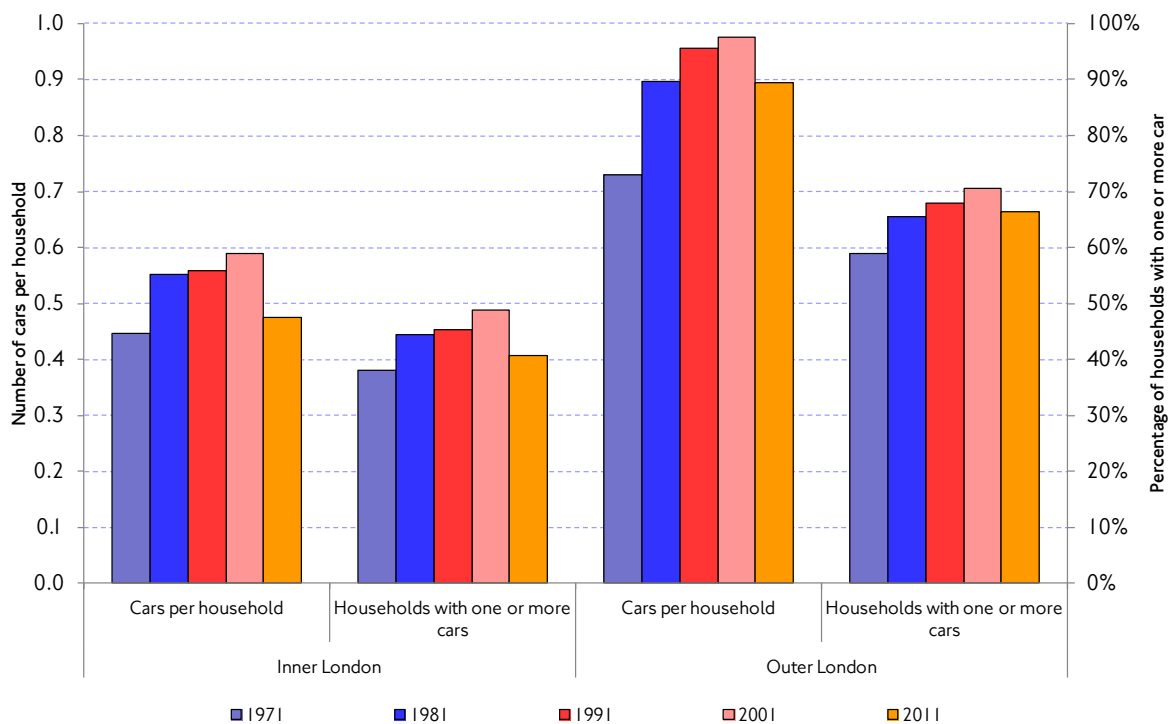
Car availability

People own a car for a combination of practical and emotional reasons. Figures from the Department for Transport showed that between 2005 and 2011, the number of

cars licensed in London has remained largely static, while at the same time there has been a slight increase in Britain as a whole in the number of cars licensed.

Changing patterns of car availability are apparent when considering the longer term. Figure 19 shows car availability, in terms of the number of cars per household and the percentage of households with one or more cars for inner and outer London, for the years 1971, 1981, 1991, 2001 and 2011. The number of cars per household and the percentage of households with one or more cars show a very similar trend, with relatively steady increases between 1971 and 2001 before a decrease to 2011 – falling to around 1981 levels in outer London and even further in inner London, to around 1971 levels. Inner London residents have substantially lower levels car availability than outer London residents for all years.

Figure 19 Car availability within inner and outer London for the years 1971, 1981, 1991, 2001 and 2011.



Main users of cars

Context

Finally, it is worth considering whom the main users of cars are, and how this has changed over time. Previous analysis has shown that whether or not a Londoner owns a car principally depends on where they live, their income, and life-stage or household composition. The most closely associated factors with higher than average car ownership are:

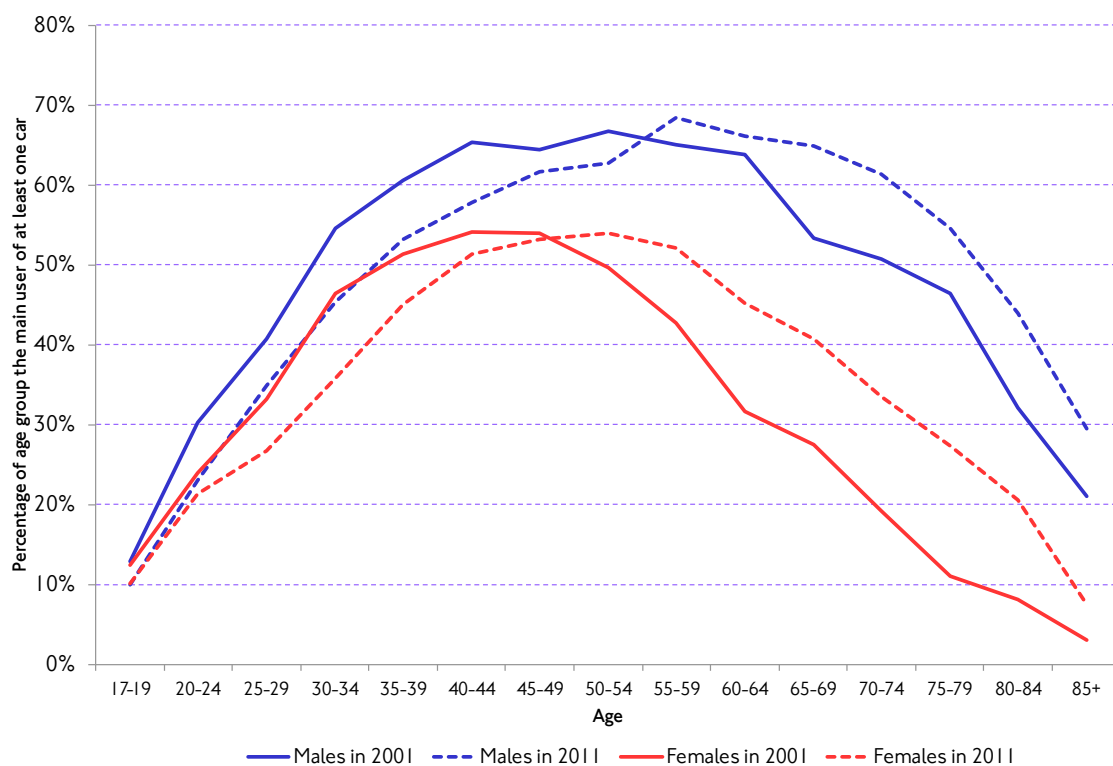
- living in outer London;
- lower levels of public transport accessibility;
- higher income;
- children in the household;

- more than one adult in the household;
- in full time employment;
- Western European nationality.

Age groups

Figure 20 shows the percentage of London residents who are the main user of at least one car, by gender, for the years 2001 and 2011. The relationship takes the shape of an inverted U-shaped curve, with a peak that drifts right between 2001 and 2011 – reflecting that younger people in previous generations have continued to be the main user of a vehicle as they age, while current young people in their late teens and 20s are less like to be the main user of a car than their predecessors.

Figure 20 Percentage of London residents as the main user of at least one car, for the years 2001 and 2011.

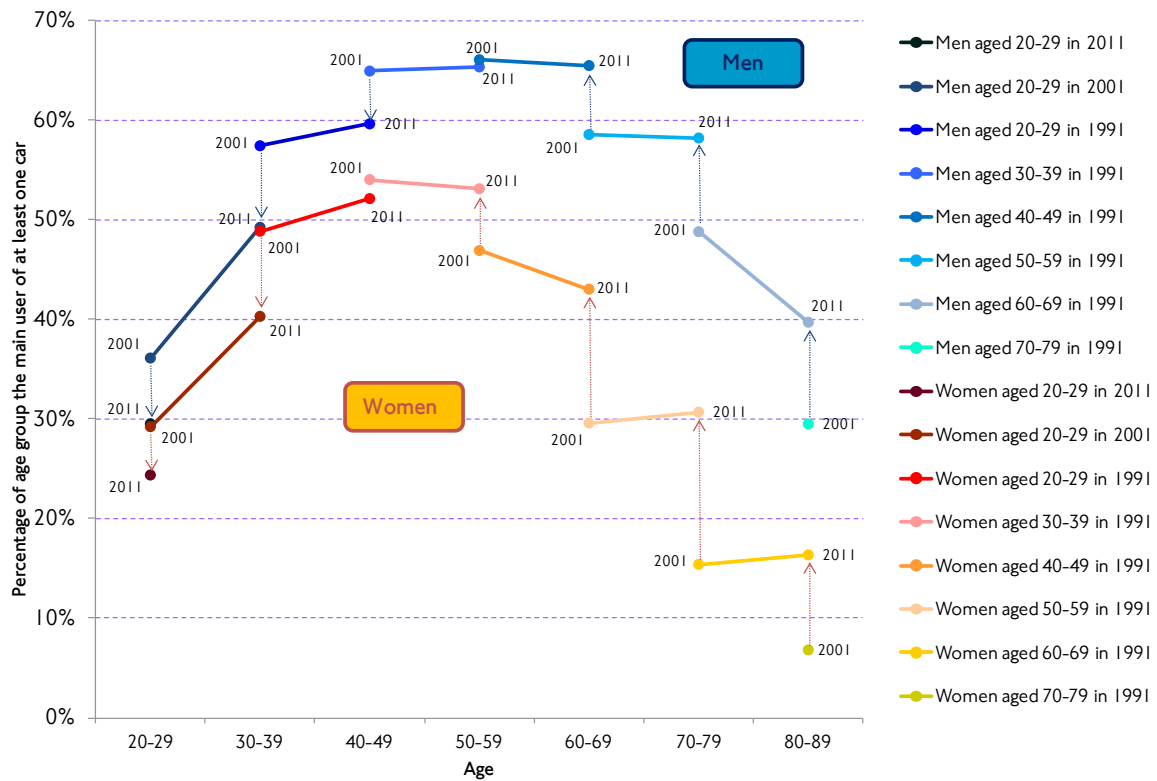


Cross-sectional cohorts

Figure 21 shows these cohort effects more clearly, by gender. For men, those aged 30-39, 40-49, 50-59 and 60-69 in 2001 show stable rates, while there is strong growth for those aged 20-29 as they get older and a reduction in the 70-79 cohort.

For women, a similar pattern is shown, although older cohorts continue to remain stable (with little change in rates as women age through their 60s and 70s), rather than decline, perhaps reflecting a desire among older women for the security and convenience that the car can provide.

Figure 21 Percentage of London residents as the main user of at least one car, by cross-sectional cohort and gender, for the years 2001 and 2011.



4. Work related travel

This next section looks at changes to work related travel that have occurred since 1991, again considering cross-sectional cohorts, gender and geographical differences. LTDS has shown that since 2005/06 around 35 per cent of Londoners' trips are for commuting or other work purposes. When looking into long-term travel trends, *Travel in London* report 6 showed that there have been substantial changes to journey purpose over time; in 1971, usual workplace trips accounted for more than half of all trips (56 per cent), but this was down to 29 per cent by 2011 (although it is important to recognise that there have been some methodological changes to travel surveys between years, particularly in relation to the recording of walking and cycle trips).

Mode of travel to work

Figure 22 shows the profile of London residents' home to work trips in 2001 by age and main mode, while figure 23 shows the equivalent for 2011. In 2001, car driver home-work trips peaked at over 100,000 trips at the 40-44 age group, while in 2011, the peak reduced to around 85,000 trips and moved to the 45-49 age group. A large increase in rail-based and bus trips is also seen, particularly among younger age groups, as touched upon previously.

Figure 22 London residents' home-work trips by age and main mode, 2001.

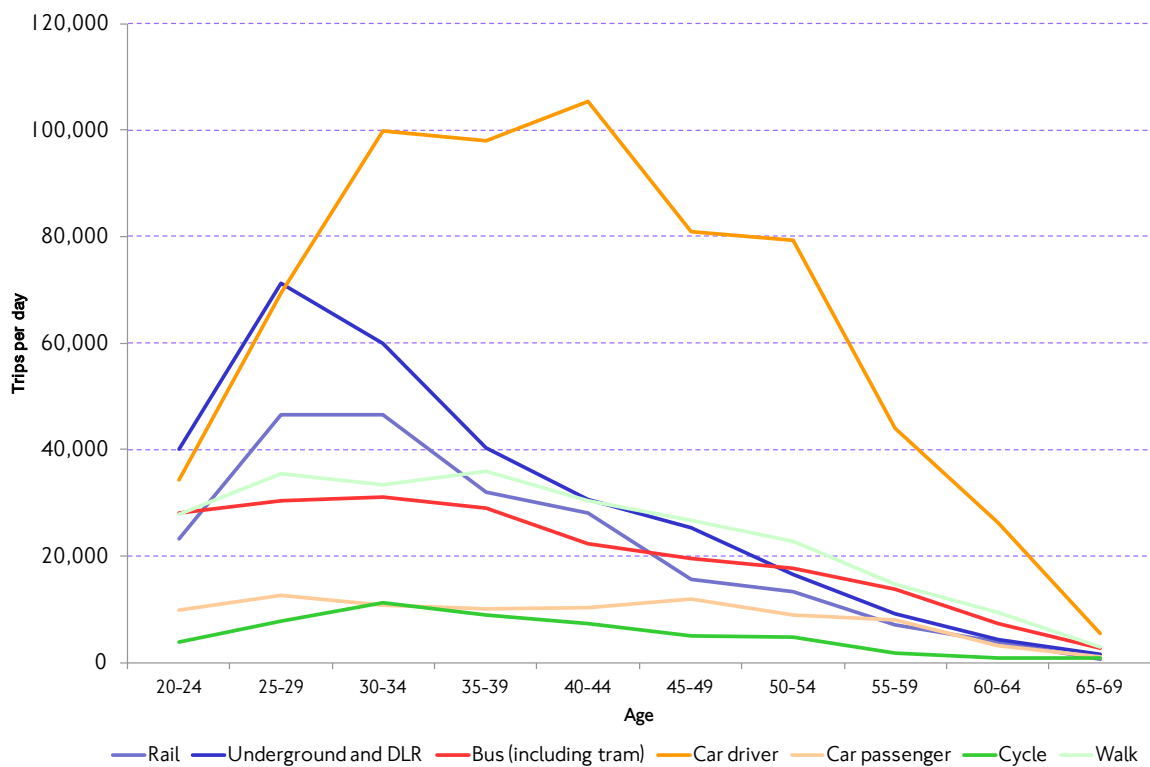


Figure 23 London residents' home-work trips by age and main mode, 2011.

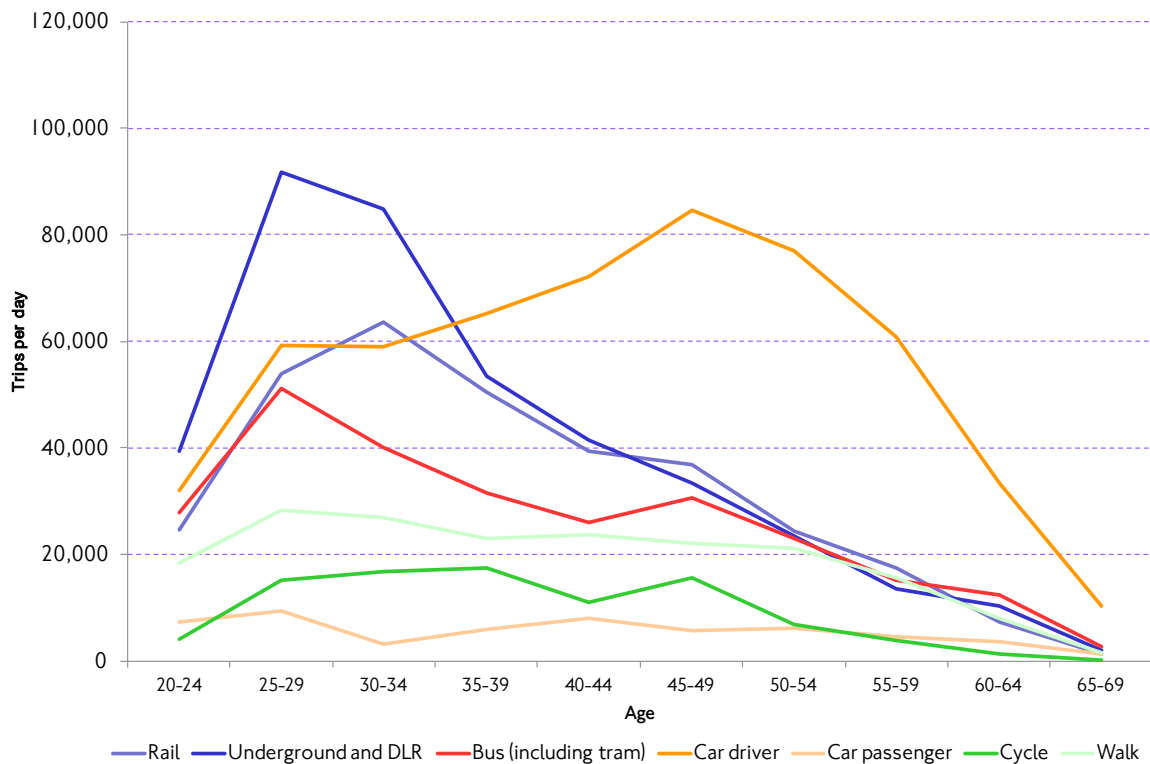
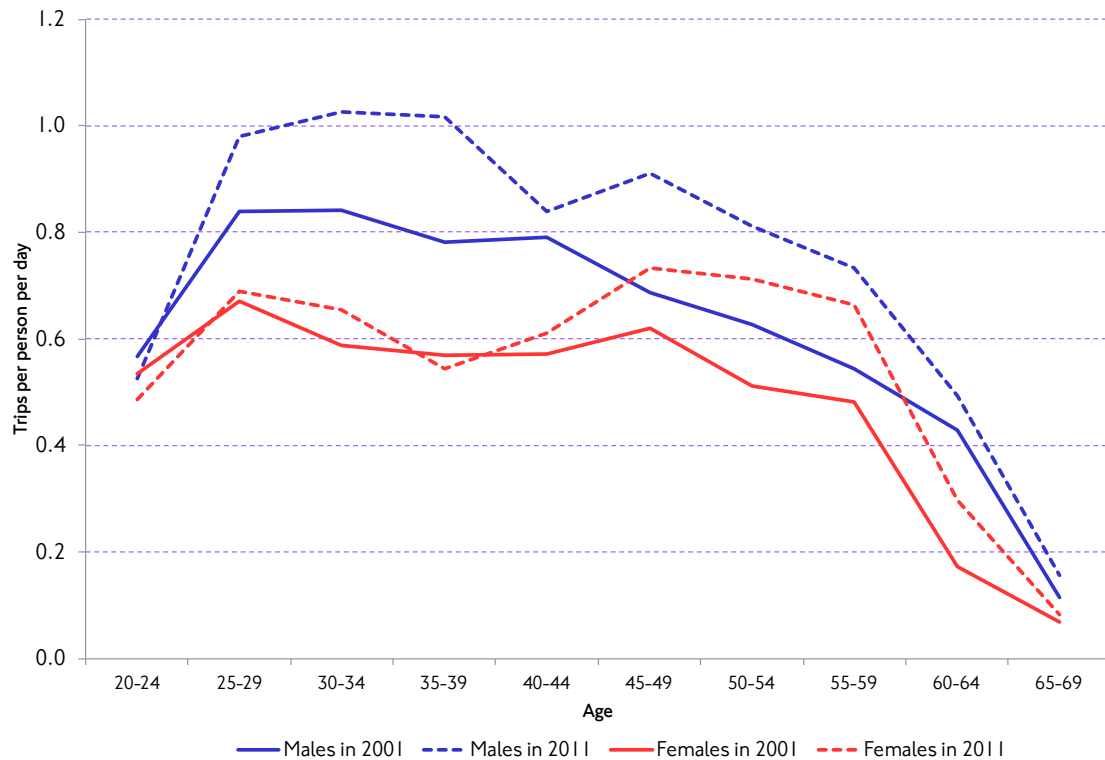


Figure 24 shows usual workplace trip rates, that is to say trips to or from the respondents' usual workplace, for an average weekday by age and gender, comparing 2001 and 2011. Usual workplace trip rates for men of all ages have

increased, up from around 0.8 trips per person per day for 25-39 year olds in 2001 to around 1.0 trips per person per day in 2011. Female trip rates among younger age groups are fairly similar between 2001 and 2011, although there was an increase for those aged over 50 in 2011. However, looking specifically at car driver trips, differences emerge.

Figure 24 Usual workplace trip rates (average weekday) for London residents, by age and gender, for the years 2001 and 2011.



Car driver journey to work

Figure 25 shows the time of day profile of car driver trips by journey purpose, for 2001 and 2011. While leisure trips and 'other work' trips show a reasonably similar pattern between the two years, usual workplace trips have reduced substantially, particularly at the morning and evening peaks; in 2001, over 300,000 usual workplace trips started in the morning peak hour of 8am, which fell to less than 200,000 in 2011.

Figure 25 Time of day profile of car driver trips by journey purpose (average weekday) for London residents, for the years 2001 and 2011.

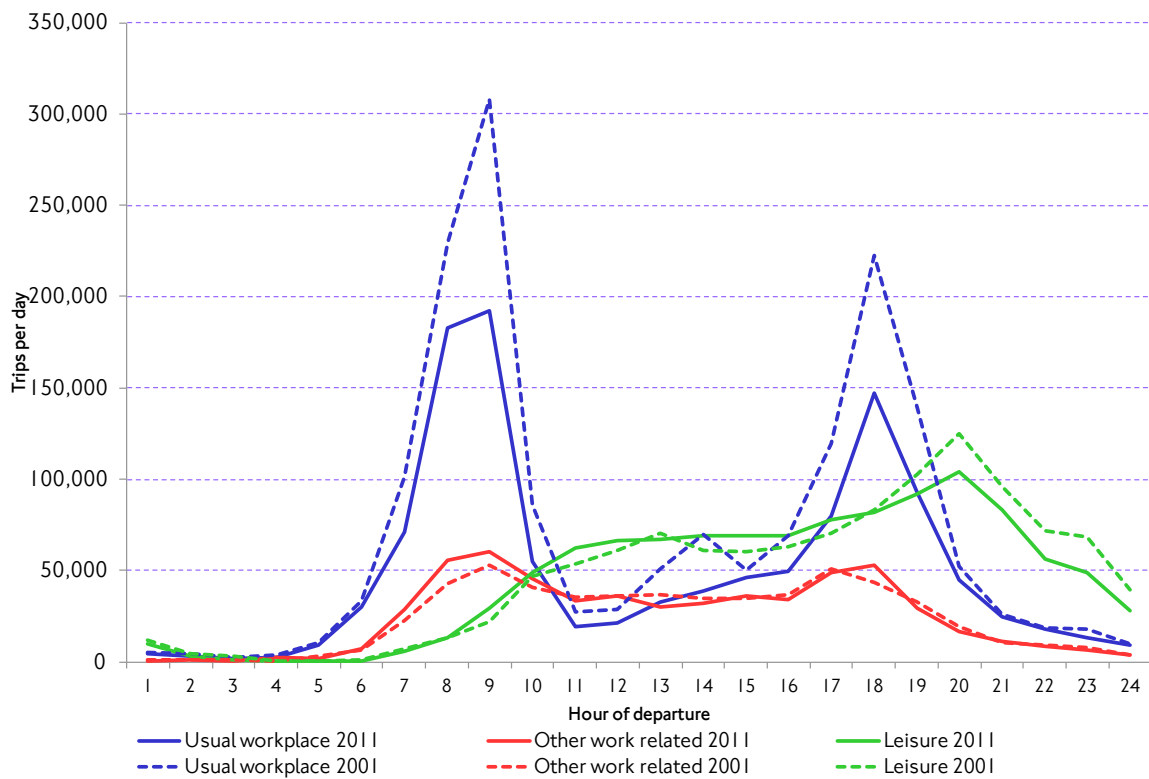


Figure 26 explores these changes in usual workplace trips in more detail by showing changes in home-work car driver trip rates for residents of inner and outer London by cross-sectional cohort, for the years 1991, 2001 and 2011.

Age groups

For inner London, every age group shows decreases between 1991 and 2001 followed by further decreases to 2011 – with the exception of the 20-29 age groups who show a marginal increase between 1991 and 2001 – before a decline to 2011. While for outer London, every age group shows decreases between 2001 and 2011, with the 40-49 age groups also showing a decrease between 1991 and 2001 (all other age groups increase between these years).

Cross-sectional cohorts

For inner London residents, home-work car driver trip rates have decreased for cohorts aged 30-39, 40-49 and 50-59 in 1991 as well as for those aged 20-29 in 2001. The only cohort to show any increase are those aged 20-29 in 1991, who show an increased trip rate in 2001 when aged 30-39, before a decrease in 2011 to a trip rate lower than 1991 levels. For outer London residents, all cohorts other than those aged 20-29 in 1991 increased home-work car driver trip rate between 1991 and 2001, however all cross-sectional cohorts subsequently showed decreases between 2001 and 2011.

Figure 26 Home-work car driver trip rates (average weekday) for London residents, by cross-sectional cohort and inner/outer London, for the years 1991, 2001 and 2011.

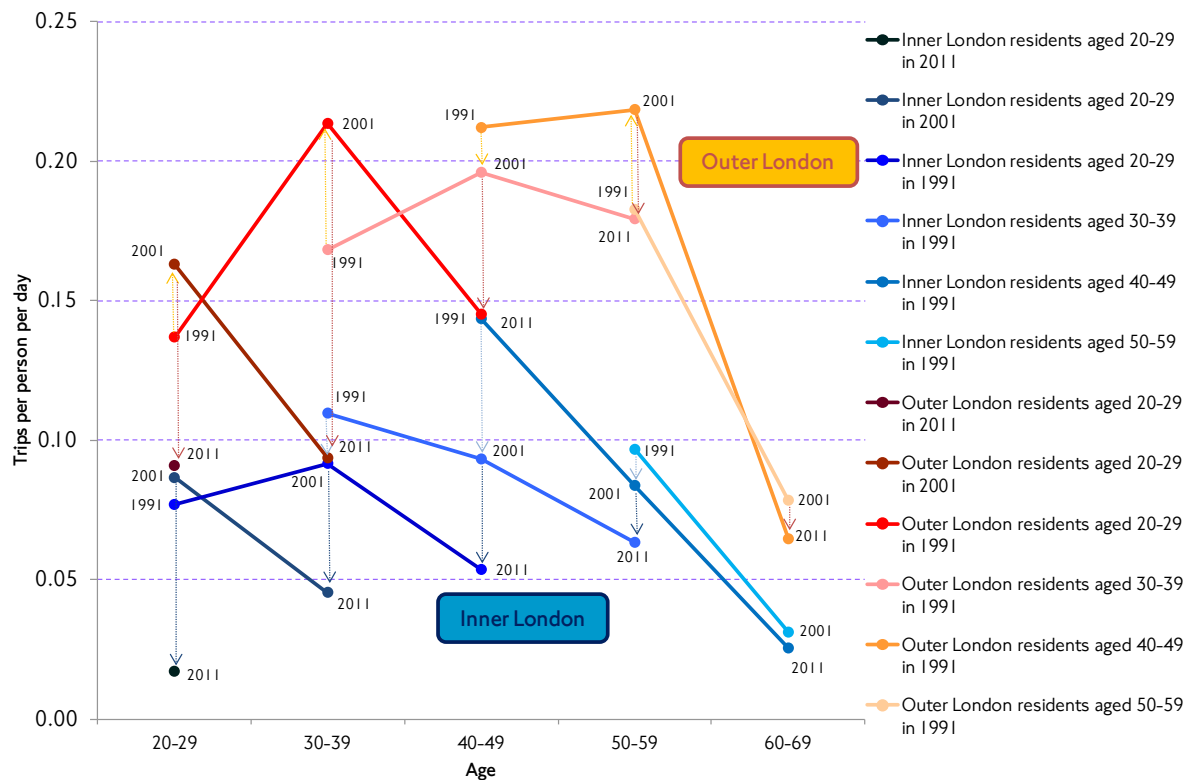
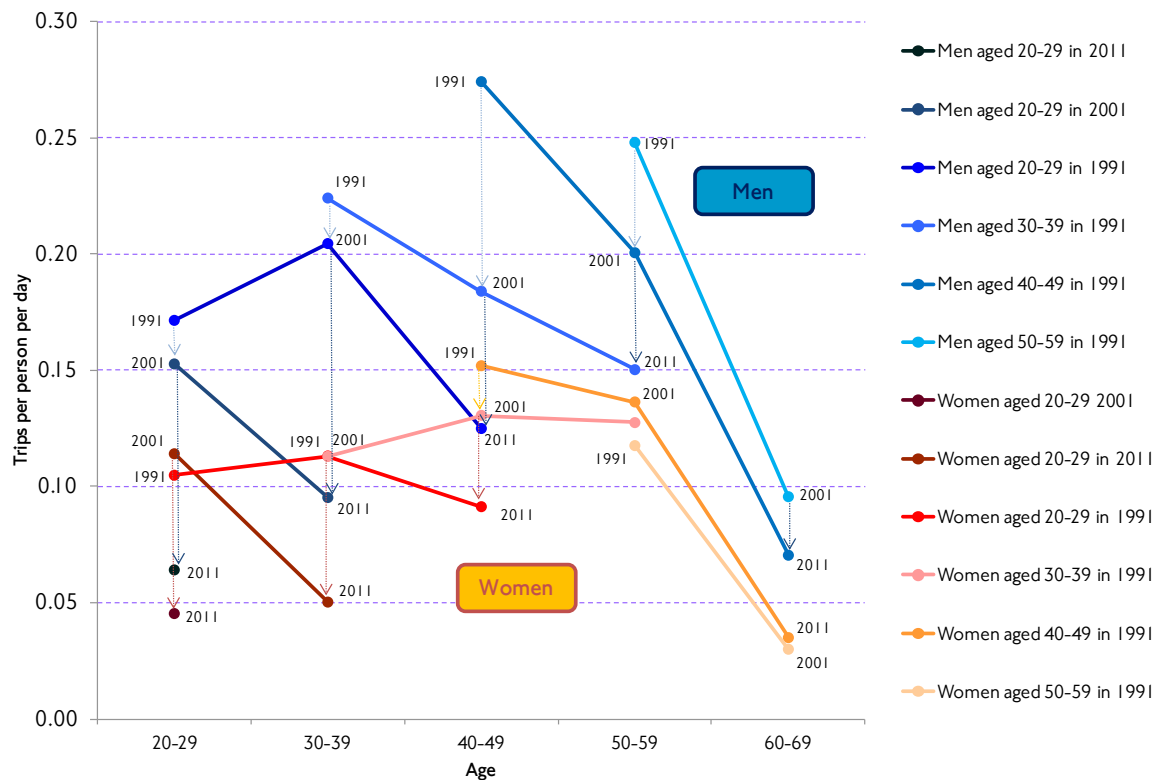


Figure 27 also displays changes in home-work car driver trip rates, this time by gender and age, for the years 1991, 2001 and 2011. For men, home-work car trip rates continually decreased for cohorts aged 30-39, 40-49 and 50-59 in 1991, while men aged 20-29 in 1991 showed an increase between 1991 and 2001 before a decrease between 2001 and 2011. For men, all age groups decreased home-work car driver trip rates between 1991 and 2001, and again to 2011.

For women, cohorts aged 20-29 and 30-39 in 1991 show fairly stable home-work car trip rates, with both cohorts showing a minor increase between 1991 and 2001, followed by a small decrease and flattening respectively between 2001 and 2011.

Figure 27 Home-work car driver trip rates (average weekday) for London residents, by cross-sectional cohort and gender, for the years 1991, 2001 and 2011.



Conclusion

This paper has examined the ways in which people of different ages change their travel across generations and within their own generation over time. Building on analysis of long-term travel trends previously presented in *Travel in London* report 6, this paper has applied cohort analysis to show changes in trip rates by mode, car ownership, driving licence holding, and work related travel.

Key themes identified include strong growth in public transport and cycling, however the nature of this growth is highly age-dependent. For instance, the increase in cycle trip rates has been largely accounted for by younger age groups while there has been little change for older age groups. The paper has shown how all cross-sectional cohorts decreased rail-based trip rates between 1991 and 2001 before increasing up to 2011, while car driver trip rates have been reducing, particularly among younger generations.

Distinct patterns of travel behaviour in inner and outer London can be seen across all modes, including walking and cycling. The paper has also shed light of changing travel among children and teenagers, where an increase in bus trip rates between 2001 and 2011, during which time a range of concessionary measures were introduced, seems to have substituted walking trip rates, which have decreased over the same period.

Other themes identified include changing peaks in car ownership, driving licence holding and car driver work trips; as younger people in previous generations have

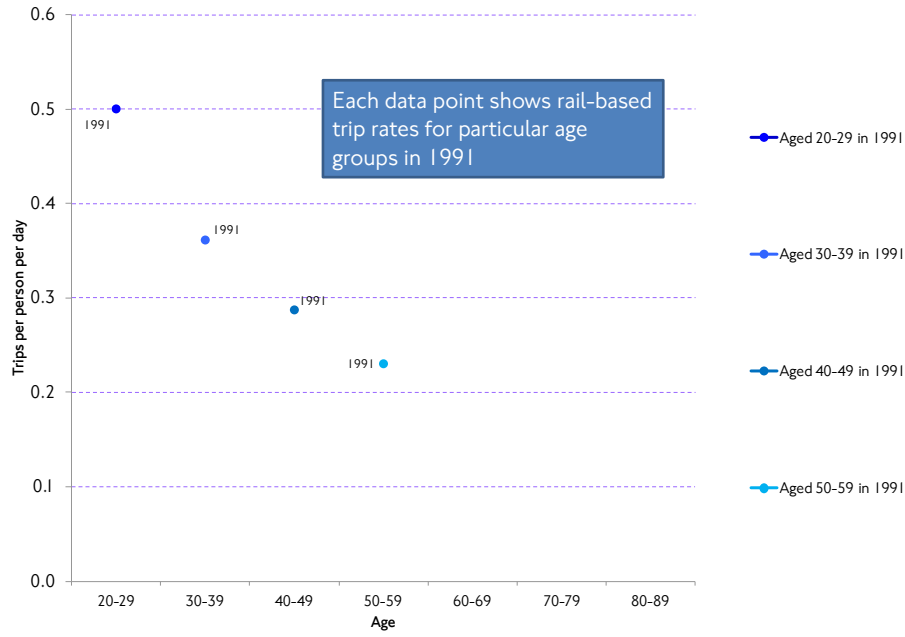
continued to own a car / retained their driving licence, with current young people in their late teens and 20s less likely to own a car or hold a driving licence than their predecessors. Data also seems to suggest that older people in their 70s and 80s who do not hold a driving licence are more likely to stay in London in their later years than people who do hold a licence who may be more likely to migrate away, thus leading to a decline in the overall percentage of older people who hold a driving licence over time.

These trends have a strong relationship to transport policy; it is likely that a detailed understanding of the way in which people of change their travel patterns across generations and within their own generation over time will provide a useful tool to consider future demand of the transport system, and help to better assess where investments should be focussed.

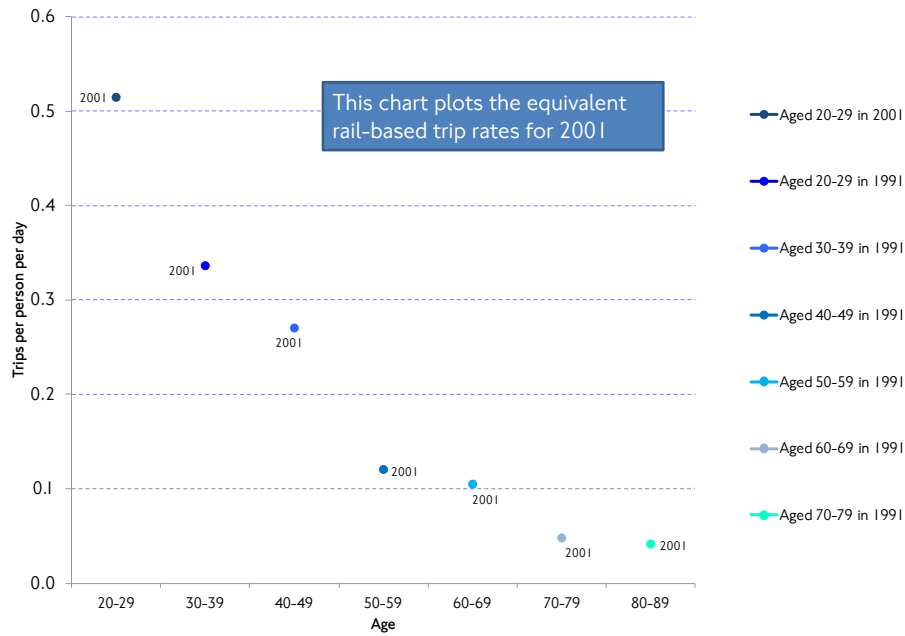
The analysis presented in the paper has provided a useful starting point to uncover what lies beneath aggregate trends in travel behaviour that have been shown in previous *Travel in London* reports and elsewhere. Next steps might be to apply this method of analysis to other related themes such as specific journey purposes or non-travel. Also, the use of additional datasets would provide a further insight, as would the use of robust statistical testing of relationships.

Appendix: Seven step guide to understanding figure 3

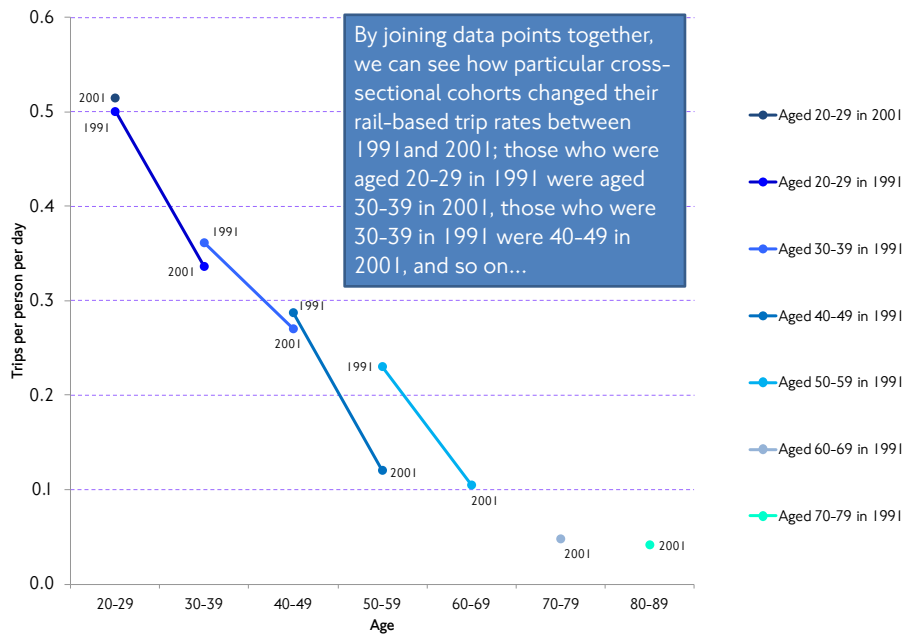
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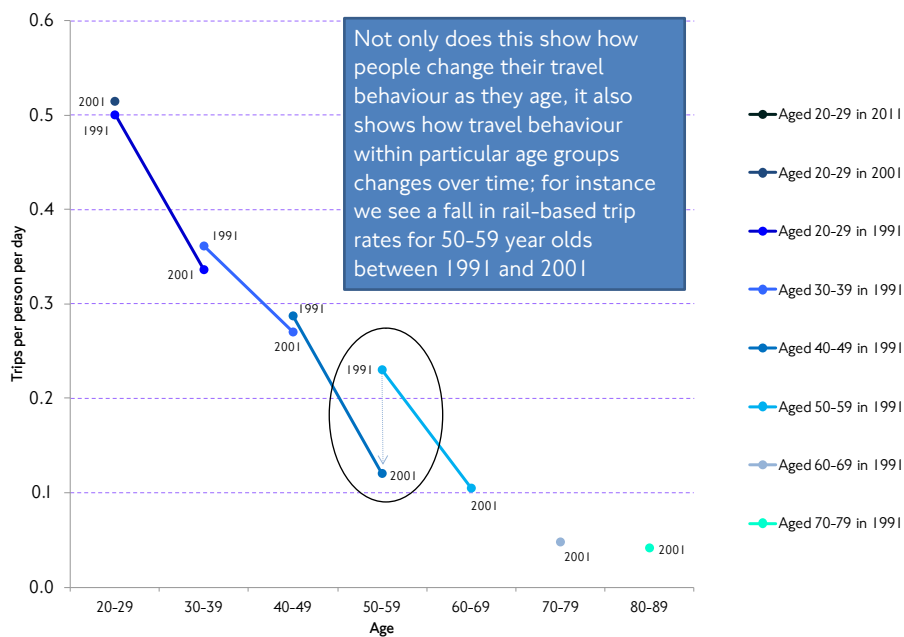
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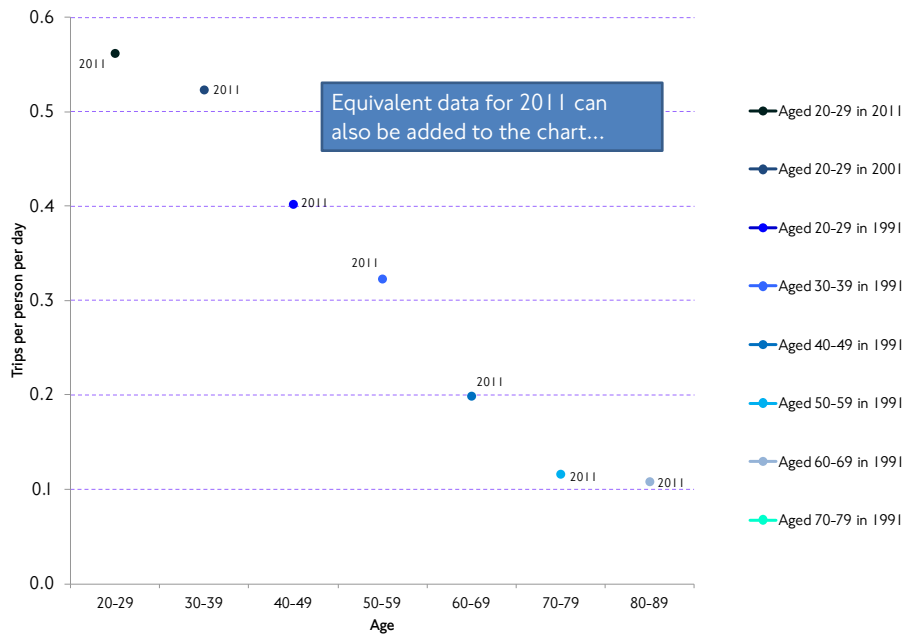
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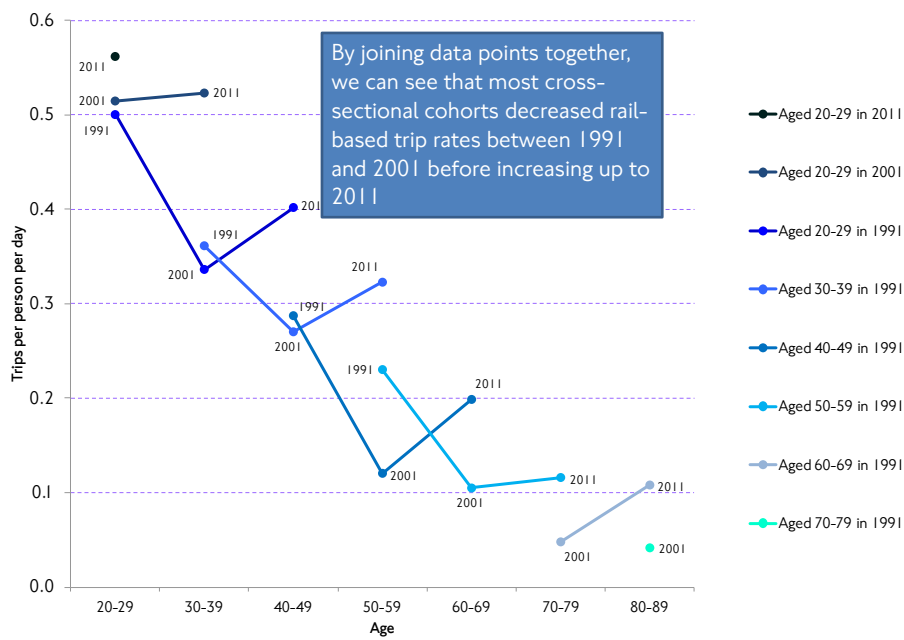
Step 4



Step 5



Step 6



Step 7

