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Access to Transport and Life Opportunities

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Executive summary

Key findings

Transport access:

- The majority (69%) of the population have personal access to cars and an even larger proportion of the population (87%) are frequent (weekly) car users.
- But a significant minority – nearly a third of the adult population, do not have personal car access and are reliant on public transport or other modes to support their lives.
- Lack of personal car access is more common amongst young adults, those in BME groups, those with mobility impairments, unemployed people and those with low incomes.

Employment participation: Personal car access plays an important role when it comes to accessing employment:

- Having personal car access makes it 3.8 times more likely that someone is employed rather than unemployed (compared to not having car access).
- The association between having personal car access and employment is of greater importance for men than women, and for those living outside London and Metropolitan areas.
- For unemployed people, having or gaining personal car access increases the likelihood of moving into paid employment.

Access to services: Both personal car access and public transport access are important for being able to access services (healthcare, food shops and learning facilities) when needed:

- Personal car access makes it twice (2.0 times) as likely that someone can access services.
- Having a car available to drive when needed is also of greater importance for accessing services for those with mobility impairments and those living in rural areas.
- Rating local public transport as good rather than poor makes it nearly three times (2.8 times) more likely that someone can access services.
- Short journeys by public transport to town centres (10 minutes or less) make it 1.7 times more likely that someone can access services (compared to journeys of over 30 minutes).

Social participation: Both personal car access and public transport access are important for being able to go out socially:

- Having personal car access makes it 1.7 times more likely that someone can go out socially.
- Having personal car access has greater importance in relation to going out socially, for those with health-related mobility impairments and those living in rural areas.

- Rating local public transport as good rather than poor makes it 1.4 times more likely that someone can go out socially.

Wellbeing: Transport access plays a minor role for the measures of personal wellbeing examined in the study:

- Rating local public transport as good, rather than poor, makes it slightly less likely that someone feels under strain, has poor mental health or reports being dissatisfied with life.
- Amongst the older population aged 50 and over, having personal car access as a driver makes it less likely (by 0.8 times) that someone reports feeling lonely.

The study

This report presents the findings from a study conducted by NatCen and the University of the West of England (UWE Bristol), commissioned by the Department for Transport (DfT) to investigate how access to transport affects the life opportunities and wellbeing of people living in England. This has provided new evidence that access to public and private transport has wide-ranging positive impacts on people's lives.

Access to transport is considered in relation to:

(i) Personal car access;
(ii) Bus service availability near to the home;
(iii) Rating of local public transport; and.
(iv) Concessionary bus pass holding.

Life opportunities are considered in relation to:

(i) Being in paid employment (for those of working age);
(ii) Job security (for those in paid employment);
(iii) Personal income (for those in paid employment);
(iv) Ability to access services; and
(v) Ability to go out socially.

Wellbeing is considered in relation to:

(i) Feeling under strain;
(ii) Poor mental health;
(iii) Dissatisfaction with life overall; and
(iv) Loneliness, specifically amongst the population aged 50 and over.

Data

The study involves analyses of two national longitudinal data sets: Understanding Society and the English Longitudinal Study of Ageing (ELSA). Understanding Society provides a representative sample of the general population of adults living in England for 2011-15. ELSA provides a representative sample of people over 50 living in England for 2014-17, enabling additional analysis of the older population. Both surveys involve interviews with the same people each year, making it possible to investigate how the lives of individual people are changing over time. Longitudinal data like this enables stronger evidence to be obtained of causal relationships between access to transport and life opportunities compared with cross-sectional data sets like the National Travel Survey (NTS).

Study structure

There are two parts to the study:

- Part 1: Understanding variations in transport access and use across the population; and
- Part 2: Understanding how transport access affects life opportunities and wellbeing.

Part 1: Variations in transport access and use across the population

The extent to which transport access and use varies across the population in England is reported on an annual basis through the NTS. Linking Understanding Society data to local bus service data provided a new opportunity to:

(i) Assess how transport access and use varies across the broader range of socio- demographic characteristics captured in Understanding Society (including, for example, ethnicity); and
(ii) Consider indicators of transport access and use not available in the NTS (such as bus service availability).

Who has personal car access?

Consistent with findings from the NTS, Understanding Society data confirms that over two-thirds of people (69%) aged 16 and over living in England have personal car access (defined as holding a driving licence and having access to a car or van that they can drive whenever they want). This means, however, that a significant minority (31% - nearly a third) of the population do not have personal car access and are reliant on other forms of mobility (including getting lifts) to support their lives.

Personal car access is less prevalent amongst the following population groups (the percentage with personal car access is shown in brackets):

- Young people aged 16-24 (34% have personal car access);
- People from African (38%), Caribbean (44%), Bangladeshi (50%) and Pakistani (51%) ethnic groups;
- People with health-related mobility impairments (54%);
- People that live alone (49%);
- People living in rented accommodation (38% of social renters and 58% of private renters);
- Students (22%), people who are unemployed (30%), people who are long-term sick and disabled (39%) and people looking after family (53%); and
- People with no educational qualifications (44%) and with gross personal income under £500 per month (41%).

Personal car access is less prevalent for people living near frequent bus services (55% of people with more than one bus every five minutes have personal car access), implying that good public transport access may reduce the need for personal car access.

Who has access to bus services?

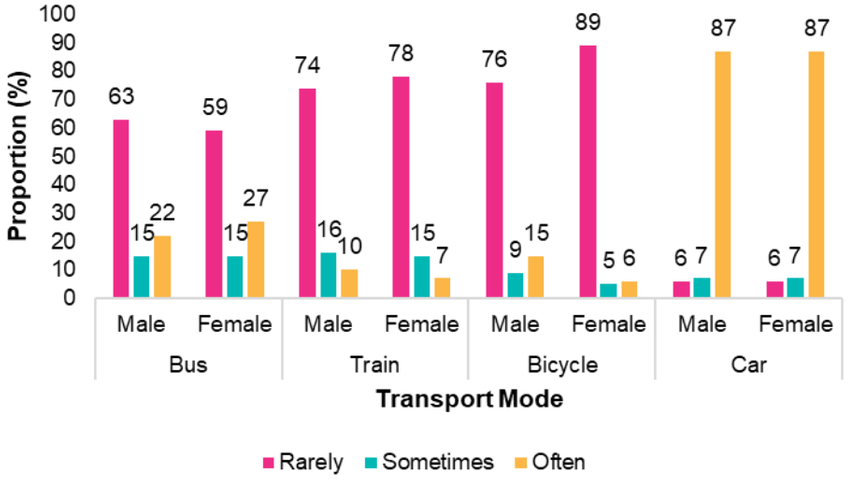
People living in London and other large cities have more frequent bus services near their home, relative to the rest of the population. Bus service availability is therefore better for groups that are more highly concentrated in urban centres (e.g. Black and Minority Ethnic (BME) groups, renters and unemployed people). People on the highest incomes (over £2,420 per month) have better bus service access than people on middle incomes (£500-£2,420 per month).

People's rating of local public transport is strongly linked to bus service availability. One-fifth of people (21%) are served by more than one bus every five minutes. Of these, three-quarters (77%) rate public transport as good compared to only 36% of people served by buses once or twice per hour.

Who uses cars?

Car use, either as a driver or as a passenger, is much more prevalent than use of public transport and bicycles. Almost nine-in-ten (87%) adults (both men and women) use a car often (defined as at least once a week) (see Figure A 1). People living near to high frequency bus services use cars less frequently, indicating that better bus access reduces the need to use a car.

Figure A: Frequency of using transport modes by gender



Source: Understanding Society

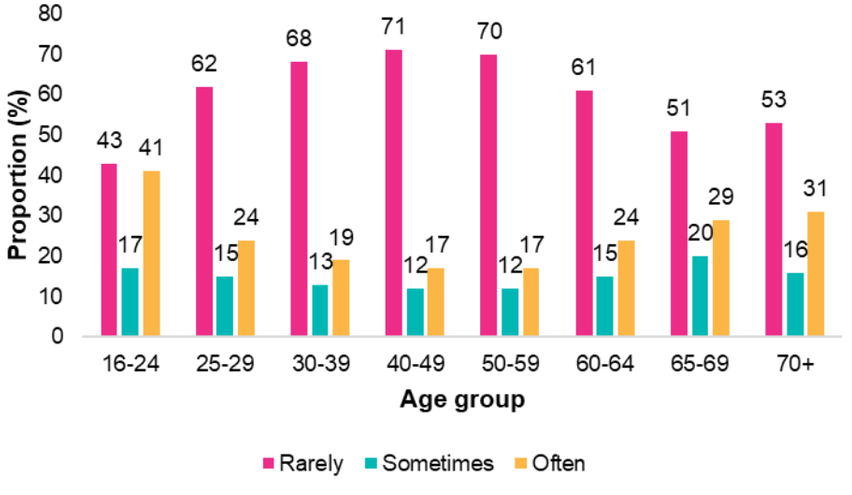
Population groups with lower levels of personal car access (e.g. young people aged 16-24) tend to use cars less frequently. It is notable however that people with low personal incomes are as likely to use a car often as those with higher incomes, despite limited personal car access; 84% of those with a monthly income of less than £500 often travel by a car (at least once a week) but only 41% have personal car access. This suggests that people with low incomes rely on lifts from others in their household or in their wider social network.

Who uses public transport?

On average, one-quarter (25%) of the adult population use buses often (at least once a week). This increases to 54% amongst people that do not have personal car access; indicating the importance of buses to people without cars. Bus use is more common for people living near frequent bus services and those living in London and other large cities. Frequent bus use is also more common amongst the following population groups (the percentage that travel by bus often is shown in brackets):

- Young adults aged 16-24 (41% use buses often) and people aged 70+ (31%) (see Figure A 2);
- People from BME groups (e.g. 62% of those of African ethnicity);
- People that live alone (36%);
- People living in rental accommodation (40% of social renters and 29% of private renters); and
- People with no educational qualifications (34%), of working age and not in employment (e.g. 44% of unemployed), in temporary employment (30%) and with low personal incomes (e.g. 37% of those with a monthly income under £500).
- People with mobility impairments use buses as often as those without mobility impairments, with a quarter using buses often (at least once a week).

Figure B: Bus use frequency by age



Source: Understanding Society

One-in-ten (8%) people use trains often (at least once a week). Frequent use of trains is most common amongst the groups identified below (the percentage that travel by train often is shown in brackets):

- Adults under 39 years old (14% of 16-24 year olds, 13% of 25-29 year olds and 11% of 30-39 year olds use trains often);
- Men (10%);
- People from BME groups (e.g. 29% of people from African backgrounds) and people not born in the UK (14%) (groups known to be more prevalent in London);
- Students (16%);

- People with degrees (16%), with high incomes (13% of those with a monthly income of at least £2000 per month) and in managerial and professional jobs (16%); and
- People living in London (31% of those living in Inner London and 23% of those living in Outer London).

Train use, like bus use, is higher for those without personal car access. Only 3% of people with mobility impairments are use trains often.

Part 2: How transport affects life opportunities and wellbeing

Employment participation and income

The Life Opportunities study reveals that personal car access plays an important role when it comes to accessing employment. Unemployment is more common amongst young people (11% of 18-24 year olds are unemployed) and people with mobility impairments (9% are unemployed), compared to the general working aged population (6% of whom were unemployed in 2014-15).

- Having personal car access makes it 3.8 times more likely that someone is employed rather than unemployed (compared to not having car access). Having personal car access is of greater importance for men than women, and for those living outside London and Metropolitan areas.
- Longitudinal analysis, tracking changes in individuals' circumstances over time, shows that having continued car access makes it 2.2 times more likely that someone unemployed moves into employment two years later (compared to not having car access). Furthermore, gaining car access makes it 1.7 times more likely that someone moves into employment two years later (compared to not having car access).
- Having or gaining personal car access also increases the likelihood of moving into paid employment for people in education or training; and people not in employment and not looking for work.
- For those in paid employment, having personal car access does not make any difference to whether people think they might lose their job within the next 12 months.

Personal car access is also associated with higher incomes:

- Having personal car access is associated with a 19% higher personal income (in 2014-15) compared to not having car access.
- Having continued car access is associated with a 25% larger increase in personal income over a two-year period, compared to not having car access.
- For those without personal car access, acquiring personal car access is associated with an 11% larger increase in personal income over a two-year period (compared to not having car access).

Previous research has shown people on higher incomes are more likely to buy cars (Clark et al., 2016, Dargay, 2001) and the results above indicate that having car access boosts the rate at which personal income grows over time. In this study, it was not possible to investigate possible reasons for this such as increased labour market mobility.

Access to services

People aged 70 and over, people who have impairments and people with low household incomes are less likely to be able to access services (healthcare, food shops and learning facilities) than the rest of the population. Both personal car access and public transport access are important for being able to access services:

- Having personal car access makes it twice (2.0 times) as likely that someone can access services (compared to not having car access).
- Having personal car access is particularly important for people with health-related mobility impairments and those living in rural areas to enable access to services.
- Losing car access makes it 2.9 times as likely that someone becomes unable to access services (compared to maintaining car access).
- Rating local public transport as good, rather than poor, makes it 2.8 times more likely that someone is able to access services.
- Short journeys by public transport to town centres (10 minutes or less) make it 1.7 times more likely that someone can access services (compared to journeys of over 30 minutes).

Social participation

People aged 70 and over, people who have impairments, people who are unemployed, people who are looking after dependent children, and people with low household incomes are less likely to be able to go out socially than the rest of the population. Both car access and public transport access are important for being able to go out socially:

- Having personal car access makes it 1.7 times more likely that someone can go out socially (compared to not having car access).
- Having personal car access is particularly important for people with health-related mobility impairments and those living in rural areas in enabling them to go out socially.
- Gaining personal car access makes it 1.7 times more likely that someone becomes able to go out socially (compared to not having car access).
- Losing personal car access makes it 2.3 times more likely that someone becomes unable to go out socially (compared to maintaining car access).
- Rating local public transport as good, rather than poor, makes it 1.4 times more likely that someone is able to go out socially.

Wellbeing

For older people, access to transport is linked to loneliness. Amongst over 50s, having personal car access as a driver (compared to car access as a passenger or not at all) makes it less likely (by 0.8 times) that someone reports feeling lonely. Having a concessionary bus pass and using public transport are not found to affect loneliness. While loneliness is more common amongst frequent bus users (with 39% of frequent bus users reporting feeling lonely compared to 31% on average in the over 50s age group), it is important to consider other factors in interpreting this finding; for example, frequent bus users are also more likely to live alone and be retired.

Transport access has less impact on the other measures of personal wellbeing examined. Rating local public transport as good, rather than poor, makes it slightly less likely that someone reports feeling under strain, has poor mental health or reports being dissatisfied with life.

Implications

Overall, the study reveals that having personal car access opens up life opportunities including, employment, access to services and social participation. The majority (69%) of the population have personal access to cars and a larger proportion (87%) of the population often use cars (at least once a week). The study also highlights the risk of economic and social exclusion for those with no personal car access and no access to good public transport. Nearly a third of the population do not have personal access to a car and this is more common amongst young adults, those in BME groups, those with impairments, unemployed people and those with low incomes. Given the benefits of personal car access, it is important that barriers to car access are not disproportionate for those who are more reliant on cars, particularly people living in small towns and rural areas, people with mobility impairments and people on low incomes.

At the same time as acknowledging the benefits of personal car access, it is important to recognise that not everyone is able to drive or wishes to drive, and this study revealed how frequent local bus services provide a valuable mobility option. For example, those without personal car access make more frequent use of public transport, particularly buses. Positive opinions of public transport (which are linked to living close to good public transport services) are associated with better access to services and increased social participation. Hence access to life opportunities can be enhanced for some groups through public transport systems, with this potentially including innovative forms of personalised or public transport such as car clubs or the bringing together of different transport options through Mobility as a Service (MaaS). These systems may be more flexible in time and space, offering transport opportunities that are similar in scope to those provided by personal cars.

Study limitations

Data was not available from Understanding Society and the English Longitudinal Study of Ageing (ELSA) surveys to allow an assessment of the role of walking and cycling for life opportunities and wellbeing. These are important modes in providing access to local destinations and improving wellbeing and should be considered in relation to investment decisions and as an avenue for further research. It was also not possible to comprehensively assess the role of all forms of public transport. Data availability constraints prevented analysis of access to rail, metro and tram stations and services in an equivalent way to how bus access was analysed in this study. The data exists in principle and this remains a valuable avenue for further research.

The study was primarily designed to identify population-level evidence as a starting point for investigation. Further research would now be valuable to examine the impact of transport access on life opportunities for the specific circumstances of population sub-groups, including young people, people with mobility impairments and those with low incomes.

1 Introduction

Access to transport varies across the English population with markedly lower car access for younger and older adults and for people in lower income households. Public transport availability depends upon where people live, with greater availability in cities than in towns and rural areas. Not everyone is able to use local public transport – many people with health conditions are unable to use local buses or trains, or do not feel able to do so.

A person's opportunities in life are determined by many possible factors, including their family background, education, assets, health and where they live. The 2003 Social Exclusion Unit report 'Making the Connections' (SEU, 2003) found that the transport available to people affects access to opportunities that have a major impact on their life chances such as work, learning and healthcare. A summary of more recent evidence on the link between transport access and life opportunities is provided in Chapter 2 but some key findings are highlighted next to provide context to the research conducted.

Recent research by the Joseph Rowntree Foundation into transport-related barriers to employment looked at six low-income neighbourhoods in England and Scotland. It found employment opportunities were difficult to reach by public transport and out-of-work residents were therefore unwilling to look for jobs, especially if they perceived jobs to be insecure (Crisp, et al., 2018). Another recent study used English Census data for 2011 to show that longer public transport times to employment were associated with lower employment levels, after accounting for population and car availability (Johnson, et al., 2017).

People's ability to access essential services, such as healthcare facilities and food shops, and maintain social connections has been found to be enhanced by car ownership (Van den Berg et al., 2009), and by public transport availability (Lucas et al., 2009). It has been shown that it is particularly important for older people's social connections that they are able to undertake travel (Ormerod et al., 2015).

Furthermore, interest has increased in recent years on how the environments in which people live and their lifestyles affect their wellbeing. In particular, there is concern at how to address loneliness and poor mental health. It is important to understand the role transport plays in a person's wellbeing and it can be expected that one key way in which transport affects wellbeing is by enabling or preventing people to participate in work, social life and use of services.

This study addresses the following overarching question:

"What is the relationship between access to transport and life opportunities (such as employment, health care, education, relationships and community) across the lifecycle and for different groups?"

The study seeks to identify the ways in which transport can act as a barrier, and also an enabler, for life opportunities and show how this may vary at different stages in an individual's life course and for different groups in the population. Most of the current evidence is qualitative in nature and applies to selected locations and population groups in England. There is a lack of evidence for what this means for the population in general. In this study, the role of transport for life opportunities is examined for large, representative samples of the population of England. The data used is longitudinal and tracks the same individuals over time, thereby increasing the confidence of identifying

causal relationships. For example, the data allows it to be investigated whether changes in individual circumstances, such as access to a car, are linked to changes in life opportunities.

The study provides findings relevant to a number of areas where the Department for Transport is currently working with other government departments to develop evidence and policies:

- Loneliness Strategy/Fund – findings from this study contribute to understanding the role of transport to support people's relationships and social connections.
- Ageing Grand Challenge – the ageing population is creating new demands for the transport system and findings from this study indicate the importance of addressing these demands.
- Housing and Transport – low-skilled employment has become dispersed and often difficult to reach by public transport. The findings from this study help to understand how widespread this problem has become and how it can be tackled.
- Inclusive Transport Strategy – this seeks to improve disabled people's access to all modes of transport and the findings from this study highlight the importance of access to different modes of transport for disabled's people's life opportunities.
- Transport Investment Strategy - this aims to build a stronger, more balanced economy by enhancing productivity and responding to local growth priorities and the findings from this study show the significance of transport for helping people find work and stay in work.
- Cycling and Walking Investment Strategy – the aim is for cycling and walking to be the natural choices for shorter journeys and this study indicates at which points in people's lives cycling is likely to be an option and of benefit.

The research focuses on two main themes: social participation and wellbeing, and employment participation and income. It uses two large surveys: Understanding Society (University of Essex, Institute for Social and Economic Research, 2018) and the English Longitudinal Study of Ageing (Banks, et al., 2018), and is complemented by data on public transport access provided by the Department for Transport. It builds on existing evidence in three ways. Firstly, it provides quantitative evidence that applies to the full population of England. Secondly, it utilises objective measures of public transport access, constructed at a small geographical level, using data provided by the Department for Transport. Thirdly, it explores relationships between transport availability and life opportunities using longitudinal data which allows more confidence about causality.

The report is organised as follows. In the next chapter a summary is provided of existing knowledge on the link between transport access and life opportunities as background to the new research conducted. In chapter 3 the methodology of the data analysis is explained before results are reported in chapters 4 to 6.

Chapter 4 extends the knowledge that exists on how transport access and use vary across the population. It addresses the following research questions:

- How does access to transport (private and public) vary by different groups in the population?

Chapter 5 presents an assessment of whether transport availability affects access to services, social connections and wellbeing and addresses two research questions:

- To what extent does transport availability (private cars and public transport) affect access to services, social connections and wellbeing?
- Are there differences in the importance of transport by gender, age, disability and where people live?

Chapter 6 explores associations between transport access and employment, job security and income and addresses two research questions:

- To what extent is access to a car or public transport associated with employment participation, job security and income?
- How do the relationships between transport availability and employment participation, job security and income differ for different groups in the population?
- To what extent are changes in car or public transport access associated with employment participation, job security and income?

Summary and conclusions are discussed in chapter 7.

2 Existing knowledge

2.1 Introduction

This chapter summarises what is known about the role of transport in supporting life opportunities and the gaps in evidence that motivated this study.

A major contribution to understanding the role of transport for people's life opportunities was provided by the UK Government's Social Exclusion Unit report 'Making the Connections' (Social Exclusion Unit, 2003). This report focused on the problems experienced by people facing social exclusion in reaching work and key services and highlighted that inability to access work and services prevented people from breaking the cycle of social exclusion. The report was followed by the introduction of a national measurement system for monitoring accessibility, a series of national initiatives to improve local transport services and the requirement for English local transport authorities to put in place accessibility plans assessing problems in their areas and delivering solutions. Since 2001, central government has no longer required local transport authorities to report on their delivery of accessibility plans and it is up to local authorities to deliver schemes they consider appropriate.

In this chapter we review what more we know today on the role of transport in supporting life opportunities since the 2003 Social Exclusion Unit report. Furthermore, interest has gathered in recent years on how transport influences people's wellbeing and how people perceive their lives are going (subjective wellbeing[1]). Most of the published research on how access to transport affects participation in different spheres of life focuses on 'at-risk' population groups or localities and is qualitative in nature, involving talking to people about their experiences. This is understandable given that transport is only one of a number of factors that play a role in the complex processes that shape people's life opportunities and quantitative measurement can be challenging.

In the rest of this chapter we identify what evidence is available on how transport affects people's life opportunities and wellbeing. Before doing that, we introduce a theoretical conceptualisation of the relationship between transport access, life opportunities and wellbeing to help frame the evidence.

[1] Subjective wellbeing is defined formally in the 2013 OECD Guidelines on Measuring Subjective Well-Being (OECD, 2013) as "Good mental states, including all of the various evaluations, positive and negative, that people make of their lives, and the affective reactions of people to their experiences".

2.2 The relationship between transport access, life opportunities and wellbeing

A conceptual relationship between transport access, life opportunities and subjective wellbeing is set out in Figure 2:1 below[2].

Figure 2:1 Conceptual relationship between transport access, life opportunities and subjective wellbeing

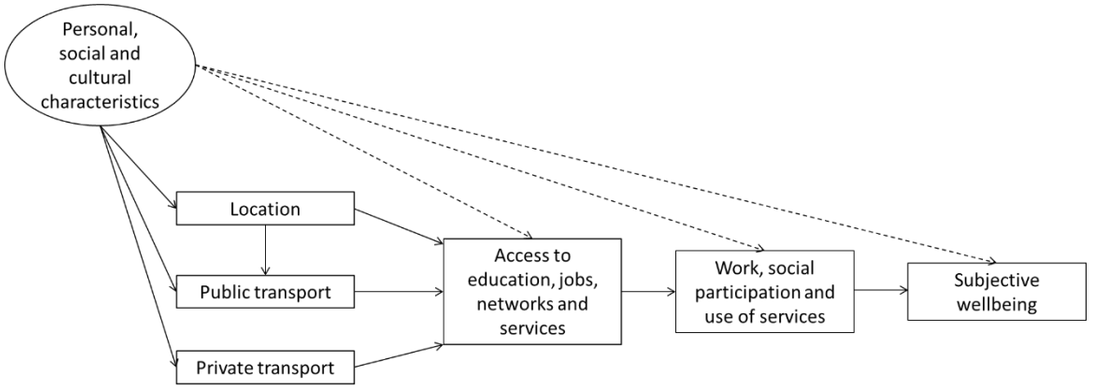


Figure 2.1 shows that people's ability to access activities (education, jobs, networks and services) is related to the location where someone lives (which determines the jobs, networks and services nearby) and public and private transport options available to connect them to activity destinations. Public transport options will be location dependent but also depend on the ability of an individual to use them. Private transport options will depend on an individual's resources (financial and other) and their social network. Access to activities provides the potentiality for people to participate in education, work, social, leisure, cultural, etc. opportunities which in turn contribute to subjective wellbeing.

In the literature, the term *transport disadvantage* is used to denote difficulties in accessing and using transport (both public and private). Delbosc and Currie (2011) define transport disadvantage as "a multidimensional construct with characteristics associated with location, access to mobility, and the limitations on personal access associated with the physical, social and psychological characteristics of individuals". Hence, the combination of location, public transport and private transport shown in Figure 2.1 can be seen to represent transport advantage or disadvantage.

This conceptualisation holds across the population but there will be notable differences in needs and priorities, especially with respect to life stage.

[2] This is partially based on Alexa Delbosc's theoretical model of transport's influence on subjective wellbeing (Delbosc, 2012). This suggests transport influences subjective wellbeing via three different pathways, the most important of which is access to destinations and activities that are important to people's lives. The other two pathways are mobility itself ('freedom to travel' and to be physically active) and transport infrastructure (through externalities such as pollution).

The next section looks at what is known about how transport access and use varies across the English population. This provides context for looking further at this in the current study and then seeing how transport access affects access to jobs/services, life opportunities and subjective wellbeing.

2.3 Transport access and use

Reference is made to published results from the National Travel Survey (NTS) for England for 2017 (DfT, 2018a) and to research studies that have carried additional in-depth analysis of NTS data and other datasets.

2.3.1 Licence holding and car access and use

About four out of five people aged 30 to 69 have a driving licence but only 30% of those aged 17 to 20, 67% of those aged 21 to 29 and 64% of those aged 70 or more have a driving licence (DfT, 2018a). Older men have higher licence holding rates than older women, but rates are similar for men and women of a younger age.

While 24% of households do not have a car, the figure is 44% for the lowest household income quintile (DfT, 2018a). Nineteen per cent of adults are in households without a car but 44% of adults of Black ethnicity and 24% of Asian ethnicity are in households without a car. Those in households without a car mostly use public transport and walk.

Driving is less frequent among under 30-year olds and those 70 or over (in line with driving licence holding) (DfT, 2018a). On the other hand, trips as a car passenger are more frequent among 17-20 year olds and those aged 60 or over. Women are more likely than men to be car passengers and less likely to be car drivers. Those in the lowest household income quintile use the car less frequently as driver or passenger . Single parents drive less frequently and are car passengers more frequently than other household types. Those in managerial and professional occupations drive more frequently than other people. Those with mobility impairments drive less (245 trips per year) than those without mobility impairments (509 trips per year). Car trips (both as driver and passenger) are more frequently made by those living in less urbanised residential contexts.

DfT's 'Car Travel Econometrics' study looked at the determinants of licence holding, car access and car use (DfT, 2018b). It used NTS data for 1995-2012 to look at trends over time as well as across the population. Findings showed that being female, not having children, being a manual or unskilled worker, lower personal income, living in a more urbanised area and living within a short distance of frequent local buses were associated with not having a licence. While a trend was shown for licence holding to become more likely between 1995 and 2012 (as 'baby boomer' drivers moved into retirement and replaced previous cohorts who drove less), it became less likely for recent birth cohorts.

In the same study, it was found that being female, more adults in the household, having children, being in paid employment, higher skilled employment, living in a less urbanised area, and not living within a short distance of frequent local buses and rail were associated with greater likelihood of car access for those with a driving licence. Having a higher personal income was strongly associated with licence holding and with car access at the start of the period (1995), but this association has weakened over time.

The car driving mileage of those with car access was found to be linearly related to personal income and was positively associated with being male, being in paid employment, higher skilled employment and living in a less urbanised area. The only association with age was that those aged 65 and over (with car access) drove fewer miles than other age groups.

DfT commissioned a study to explain why young adults are driving less than previous generations (Chatterjee et al., 2018). It included an analysis of Understanding Society data which showed the likelihood of acquiring a driving licence was strongly associated with being in full-time employment or gaining employment, and was also linked to other indicators of economic capital/potential (educational qualifications, household income and having a father working when aged 14). The study concluded from the broader evidence considered that the reduction in driving has been influenced by changes in young people's socio-economic situations (increased higher education participation, rise of lower paid, less secure jobs and decline in disposable income) and living situations (decline in home ownership and re-urbanisation). It has also been influenced by the trend for starting families at an older age and for face-to-face interaction to be substituted by digital communication. Having a car is not seen as essential to the lives of young adults as previously seen.

2.3.2 Public transport access, rating and use

Nearly all those living in urban conurbations, cities and towns live within 6-minute walk of a bus stop (93%), but only 87% of those in rural towns and fringes and 74% in rural villages, hamlets and isolated dwellings live within 6-minute walk of a bus stop (DfT, 2018a). Across the whole population, 63% of people are satisfied with local bus frequencies and 64% with local bus reliability.

Bus trips are more frequent among 17-20 year olds and those aged 60 or over than other age groups and more frequent among women than men (DfT, 2018a). Those in the lowest two income quintiles use the bus more frequently than other quintiles. Single adults use the bus more frequently than other household types. Those in managerial and professional occupations use the bus less frequently than those in other occupational categories (intermediate, routine and manual). Those with mobility impairments use buses nearly as much (46 trips per year) as those without mobility impairments (58 trips per year). Bus trips are more frequent for those living in urban than rural areas.

The percentage of eligible pensioners holding concessionary bus passes was 70% in 2017 (having dropped from a peak of 78% in 2011 and 2012) (DfT, 2018a). It was slightly lower for men (67%) than women (71%). It was highest in urban conurbations at 78% and lowest in rural villages, hamlets and isolated dwellings at 56%. Twenty-eight per cent of those aged 60 and over used a bus at least once a week in 2017, dropping from a peak of 35% in 2008-10. 45% of those aged 60 and over used a bus less than once a year or never in 2017.

Humphrey and Scott (2012) used NTS data to find that concessionary pass holding was associated with being aged between 70 and 84 (compared to aged 60-69), being female, having a lower income, owning home rather than renting, not having car access, and having a nearby frequent bus service. Having impairments with going out on foot or difficulties with using local buses were associated with less likelihood of having a pass. Higher frequency of pass use (among pass owners) was associated with being aged 60-69 (compared to 70-84), being female, not having car access, and having a nearby frequent bus service. Living more than 14-minute walk from a bus

stop was associated with less frequent bus use. Having difficulties with going out on foot or difficulties with using local buses were both associated with less frequent bus use.

Rail use is less frequent among those aged 60 or more than younger age groups (DfT, 2018a). Rail is used twice as much by those in the highest income quintile than on average. Those in managerial and professional occupations are more likely to use rail than other occupational categories and it is used twice as much by those living in urban conurbations than the average.

2.3.3 Bicycle ownership and use

Bicycle ownership rates are highest for 40-49 year olds at 49% but are only 23% for those 60 and over and 32% for 21-29 year olds (DfT, 2018a). Bicycle use is considerably less frequent among those aged 70 or more and considerably less frequent among women than men. Those in the lowest income quintile use a bicycle less frequently than other quintiles. Bicycle use is twice as high in urban cities and towns than urban conurbations and rural areas.

2.3.4 Types of travel undertaken

Older people aged 60 and above make more shopping, personal business and social/leisure trips than younger members of the population (DfT, 2018a); highlighting their needs for transport to serve these purposes. Mobility impairments increase with age; such that 29% of those aged 70 and over have a mobility impairment compared with only 4% of those aged 16 to 49. Those with mobility impairments travel less than those without mobility impairments, but the difference is minimal for shopping, personal business and social/leisure trips, which indicates these types of travel are particularly important to those with a mobility impairment.

Lucas et al. (2016) found from analysis of NTS data that lower weekly trip frequency is associated with lack of driving licence, lack of household car, household income below the median, non-white ethnicity and having a mobility impairment. The association of trip frequency with income was most notable for “social and leisure trips that potentially incur an additional cost at the destination end, such as visits to the cinema and other paid leisure activities”. This highlights an area worth investigating in the new analysis in this study – is there evidence that those people with low incomes have more limited opportunity for social activities? This is considered in chapter 5 of this report.

2.4 Access to jobs and services

A national measurement framework was established to annually monitor accessibility to key services at the local level in England after the 2003 ‘Making the Connections’ report (Social Exclusion Unit, 2003). This has continued since 2014 in the form of ‘Journey Time Statistics’ (DfT, 2018c) which report journey times by car, public transport/walking and cycling to jobs and services. These show how access to jobs and services[3] varies geographically across England down to the level of Local-layer Super Output Areas[4] in England. They show that variation in average minimum travel times by

[3] Employment, primary schools, secondary schools, further education, GP, hospital, food centre and town centre

[4] A Lower-layer Super Output Area is a geographic unit used to report small area statistics in England and Wales. They are built from groups of contiguous Output Areas and have been

car to jobs and services between urban and rural areas are less striking than by public transport/walking. Journey times by public transport/walking are on average 15 minutes across the range of eight key services in urban areas and 29 minutes on average in rural areas. As an example, the average journey time by public transport/walking to a hospital is 34 minutes in urban areas and 61 minutes in rural areas.

Comparing different services, 90% of the population is within 15 minutes travel time by public transport/walking of a food store, 83% within 15 minutes of a GP, 32% within 15 minutes of a town centre and 5% within 15 minutes of a hospital. Twelve per cent of the population is within 15 minutes travel time by public transport/walking of a large-size employment centre (with 5000+ jobs) and 67% within 15 minutes of a medium-size employment centre (with 500-4999 jobs).

DfT's 'Journey Time Statistics' are helpful in giving an overall picture of access to jobs/services but accessibility for any individual will depend upon their personal situation; including, the transport options they are willing and able to use. Furthermore, whilst objective measurements of accessibility are informative, subjective perceptions will determine whether people take advantage of opportunities. It has been found that for most trip purposes, subjective journey times by public transport (as reported in the National Travel Survey) are longer than objective times (based on DfT's Core Accessibility Indicators) in urban areas (Curl et al., 2015). For rural areas, the opposite was found, with subjective journey times being shorter than objective times. This suggests that public transport is not perceived to provide fast journeys, at least in urban areas. The next section turns to the role of transport and accessibility in affecting individual's life opportunities; the main focus of this report.

2.5 Role of transport for work, social participation and use of services

2.5.1 'Making the Connections' report main findings

It is useful to start by referring to findings from the 2003 'Making the Connections' report (Social Exclusion Unit, 2003) which examined transport and accessibility problems experienced in deprived areas. With respect to employment, it reported that transport (lack of personal transport or poor public transport) was a barrier for two out of five jobseekers in getting a job, and transport costs were a problem for one in four jobseekers getting to a job interview. It found one in four young people had not applied for a particular job during the last 12 months due to transport barriers. It also found 16-18 year old students had difficulties affording the costs of attending college with 6% of 18-24 year olds turning down further education opportunities due to transport barriers.

With respect to social participation, the report found that 18 per cent of people without a car find seeing friends and family difficult because of transport problems, compared with 8 per cent for car owners. It also found that people without cars are also twice as likely to find it difficult getting to leisure centres (9 per cent) and libraries (7 per cent). The report found that 31 per cent of people without a car have difficulties travelling to their local hospital compared to 17 per cent of people with a car and it found 16 per cent of people without cars find access to supermarkets difficult compared to 6 per cent of the population as a whole.

automatically generated to be as consistent in population size as possible. The minimum population is 1000 and the mean is 1500. There are over 30,000 of these areas in England.

2.5.2 Case studies

Since the 'Making the Connections' report, further insights have been obtained on the role of transport access for life opportunities from case studies of specific population groups or geographic areas in England. Two major studies have focused on how transport affects access to work. The Centre for Cities report 'Access all Areas: Linking People to Jobs' (Clayton et al., 2011) looked at four case study areas with contrasting economic performance (the wider Milton Keynes area, South Hampshire, Greater Manchester and the Sheffield City Region), and showed how the spatial mismatch between where low-skilled workers live, and where the jobs they seek are located is a key barrier to employment. A Joseph Rowntree Foundation funded study into transport-related barriers to employment in low-income neighbourhoods looked in depth at the situations of out-of-work residents of six neighbourhoods in England and Scotland (Crisp et al., 2018). It found employment opportunities were difficult to reach by public transport and out-of-work residents were therefore unwilling to look for jobs; especially if they perceived jobs to be insecure.

Two case studies have looked at how transport access affects young people's life prospects. Kenyon (2011) found from focus groups that inadequate access to transport is a substantial barrier to access and achievement in higher education for undergraduate students (including non-traditional students, i.e. those not relocating to attend university). Ricci (2016) looked at transport disadvantage, social exclusion and wellbeing of young adults aged 16 and over in a peripheral housing estate in Bristol. She found their experiences with bus services were negative and car driving was seen as the key to freedom and autonomy, even with its costs. She concluded that transport disadvantage constrained young people's freedom to choose and pursue their objectives in life, such as attending college courses and securing a job.

There have been relatively few attempts at systematic evaluation of the benefits of initiatives aimed at improving accessibility for target groups/areas. A case study evaluation of four projects funded by the Urban Bus Challenge Fund (Lucas et al., 2009) in deprived communities found that users of the enhanced/new bus services were predominantly non-car owners and used the buses for a mixture of travel purposes, often involving new journeys not made previously. The social benefits of the projects were calculated based on fare savings and journey time savings to users. It was not possible to calculate the social benefits based on job take-ups, health visits or shopping trips, as no method existed to calculate benefits of these impacts.

A review of the accessibility planning process in 2012 (Kilby and Smith, 2012) found there was a lack of systematic monitoring and evaluation of accessibility initiatives. In-depth assessment of a number of different types of initiatives showed that they were well-targeted at those in need and tangibly improved access, but data was not available to assess specific impacts on people's lives (short-term or long-term). The same point was made in an international review of transport projects in Welfare to Work programmes in the UK, United States and France (FIA, 2006).

2.5.3 Population-wide analysis

While case study research provides valuable insights for the groups/areas considered, it is difficult to generalise to the broader population and to quantify impacts. Findings are reported next from a small number of studies that have quantified relationships between transport access and work, social participation and use of services.

Kawabata (2003) found that improved public transport job-accessibility increased the likelihood of being employed for those without cars in Los Angeles and San Francisco, cities with high car dependency, but not in Boston which is a more compact city with a well-developed public transport system. A recent study used English Census data at the Middle-layer Super Output Area (MSOA) level for 2011 to show that longer public transport times to employment were associated with lower employment rates, after accounting for population and car availability (Johnson et al., 2017).

In a review of American research, Blumenberg and Ong (2001) found that better access to jobs increases the employment and income of welfare recipients, and that having personal car access is strongly associated with moving into work from welfare. They showed welfare recipients living in job-poor neighbourhoods in Los Angeles who were reliant on public transit had significantly more limited access to employment than those with a car.

A study in the Netherlands has shown that car ownership is associated with a larger social network (Van den Berg et al., 2009). Delmelle et al. (2013) also found that car ownership was associated with satisfaction with social contacts after controlling for other factors in an analysis of survey data collected in Vienna. The role of transport for loneliness has been investigated for a survey sample obtained in Eindhoven, Netherlands (Weijs-Perrée et al., 2015). This found that car ownership was associated with reduced loneliness, and reduced loneliness was associated with increased social satisfaction. Frequency of walking was also associated with increased social satisfaction. Another Dutch study found that older people report feeling lonelier, but when controlling for transport and other factors this was no longer the case (Van den Berg et al., 2016). Greater satisfaction with the neighbourhood and facilities in the neighbourhood and greater use of bicycle, car and public transport were all associated with lower levels of loneliness (Van den Berg et al., 2016).

A Foresight evidence review on how transport provision and the built environment can support an ageing population has some useful findings on the role of transport for older people (Ormerod et al., 2015). It refers to Age UK findings that those aged 75 and over report the greatest difficulties in accessing local amenities. Giving up driving has been found to be associated with a reduction in healthcare visits, reduced social networks and activity participation. Research on the impact of the introduction of the concessionary bus pass since 2006 shows increased bus use by older people since its introduction with surveys of users suggesting that it enables them to engage in new activities and pursuits and gives a sense of belonging (Ormerod et al., 2015).

A long-term assessment has been made of the role of car access for poverty exposure based on the experience of participants of the Moving to Opportunity programme in the United States which gave housing vouchers to help low-income households move out of and stay out of concentrated poverty by moving to lower poverty neighbourhoods (Blumenberg and Pierce, 2017). It was found that car access reduced households' neighbourhood poverty exposure by 3-4%, implying it plays a key role in enabling families to stay out of poverty. Bus access measured in terms of walking time to a bus stop was not significant.

The next section looks at the role of transport to broader wellbeing.

2.6 Role of transport for subjective wellbeing

Delbosc (2012) has noted there is only a small body of research examining the link between transport and subjective wellbeing and most of this is concerned with the

importance of transport to older people. One study was of an elderly UK population and found a high rating of local services and proximity to shops was associated with improved quality of life, although ratings of local transport and contact with friends and relatives were not associated with quality of life (Banister and Bowling, 2004). A European study found out-of-home mobility strongly associated with higher quality of life (Mollenkopf et al., 2005). Delbosc also noted that a number of studies have found older people stopping driving is linked to depressive symptoms (e.g. Marottoli et al., 1997).

With respect to the adult population in general, a Swedish study has shown dissatisfaction with daily travel contributes to lower subjective wellbeing, mostly due to it contributing to dissatisfaction with daily activities (Bergstad et al., 2011). Number of cars in the household and amount of weekly car use were not directly associated with subjective wellbeing but amount of weekly car use was positively associated with satisfaction with travel, implying that car use contributes to satisfaction with daily activities. There is a growing body of international research on the specific role of commuting on subjective wellbeing that shows more time spent time commuting is associated with lower subjective wellbeing, but this is quite a small effect and can be compensated by benefits of employment (Clark et al., 2019).

The relationship between transport, social exclusion and subjective wellbeing has been examined based on a household survey of 535 residents of Melbourne (Delbosc and Currie, 2011a). Transport access was measured in the survey through asking people how easy or difficult they found 18 aspects of transport. Four transport disadvantage groups were identified from the data: ‘general transport disadvantage’; ‘transit disadvantage’; ‘vulnerable/impaired’; and ‘rely on others’. It was found members of all the groups tended to live in outer/remote areas of the city and those in the ‘vulnerable/impaired’ group made substantially fewer journeys. It was also found that those in the ‘vulnerable/impaired’ group were more likely to be socially excluded and to have lower subjective wellbeing. This group was profiled as older retired females who are unlikely to be working full-time, and are more likely to be looking after someone with an illness or disability.

Delbosc and Currie (2011b) followed up this analysis to assess whether transport disadvantage is particularly deleterious to subjective wellbeing when combined with social exclusion. They found social exclusion more strongly associated with lower subjective wellbeing than transport disadvantage but that a combination of both led to the lowest subjective wellbeing scores. Unemployment and lack of social support were the most important aspects of social exclusion for lower subjective wellbeing. Relying on others for transport was the transport disadvantage with the strongest negative association with subjective wellbeing. Looking at the profile of those facing transport disadvantage and social exclusion, these were more likely to be unemployed, a single parent, receive a disability pension, not own a car and be aged 20-54.

2.7 Summary

National Travel Survey statistics show that car access is lower for younger adults, older adults, those in BME groups, and those with lower household income. It is also lower for those living in more urbanised areas and living near to public transport. Over time, car access has been increasing amongst older adults in the population and decreasing for younger adults, for whom economic factors appear to be an important influence (Chatterjee et al., 2018).

Those without access to a car rely mostly on public transport and walking. Those with mobility impairments use buses as much as those without impairments but travel less by other modes of transport. Older people use concessionary bus passes more frequently when they do not have a car and have nearby bus services. Lower income is associated with fewer social and leisure trips which potentially could lead to lower subjective wellbeing.

DfT's 'Journey Time Statistics' show how journey times to key services are about twice as long by public transport/walking for those people living in rural areas compared to those living urban areas, while journey times to key services by car do not differ much between rural and urban areas. This study will investigate whether there is evidence of reduced life opportunities for those without a car in rural areas.

There is detailed case study evidence on the role of transport access for selected locations and population groups in England but an absence of evidence for what this means for the population in general. Quantitative studies (mostly conducted outside the UK and mostly based on cross-sectional analysis) indicate that car access is important to finding work and social connections. They also show better public transport accessibility to jobs contributes to increased employment rates. Transport disadvantage (relying on lifts) has been found to compound social exclusion in lowering subjective wellbeing.

This review has highlighted the value of a new, systematic investigation for the English population of how access to transport (in terms of both private transport and public transport) affects economic and social opportunities and personal wellbeing. It is especially attractive that longitudinal data sets are available for such an analysis, as they offer the prospect of more credible assessments of causality.

3 Methodology

The analyses conducted in this study uses two prominent UK longitudinal datasets which re-interview the same people at regular intervals, allowing analysis of change over time. A variety of analytical approaches are employed to answer the research questions. This chapter gives an overview of the data and methodologies employed.

3.1 Data Used

There are two large surveys used in this study: Understanding Society and the English Longitudinal Study of Ageing (ELSA). This is supplemented by local transport and accessibility data provided by the Department of Transport and local area (spatial) data from the 2011 Census. Only survey participants living in England are selected from Understanding Society, as the public transport and spatial data employed in this study is not available for all countries within the United Kingdom.

For the most part, the analyses are conducted for people aged 16 and above. For some analyses, this sample is restricted further. The analysis of employment participation and income uses a sample of those aged 18-64 due to the low prevalence of under eighteen-year olds in work. Whenever the sample used is restricted, this is indicated clearly in accompanying tables and figures.

3.1.1 Understanding Society

Understanding Society[5] (University of Essex, Institute for Social and Economic Research, 2018) is the largest longitudinal household panel study of its kind. It was launched in 2009 when it started collecting data from adults and young people (aged 10-15) in approximately 40,000 households in the United Kingdom through an annual interview. Seven waves of data were available at the time of this study, spanning Wave 1 *collected in 2009-10) to Wave 7 (collected in 2015-16). It collects high-quality longitudinal data for a diverse range of topics, including health, education, work, income, family, social life and transport. Some information is collected by Understanding Society in each annual wave with other information collected less frequently.

Transport variables available in Understanding Society are:

- Number of cars/vans in the household (all waves)
- Full UK driving licence (all waves)
- Car access (“Do you normally have access to a car or van that you can use whenever you want to?”) (all waves)
- Subjective assessment of local public transport (“How would you rate public transport services in your local area?”) (waves 3 and 6)
- Frequency of travel by car/bus/train/bicycle[6] (waves 4 and 6)
- Usual commute mode and duration (all waves for those in paid employment)

Understanding Society obtains responses on the following indicators of social participation and wellbeing (for which analyses are reported in chapter 5):

[5] See https://www.understandingsociety.ac.uk/documentation/mainstage for more details
[6] Frequency of walking is not asked in Understanding Society which prevented its consideration in this study

- Access to services (“Are you able to access all services such as healthcare, food shops or learning facilities when you need to?”) (waves 3 and 6)
- Go out socially (“Do you go out socially or visit friends when you feel like it?”) (waves 3 and 6)
- Feeling under strain (“Have you recently felt constantly under strain?) (all waves)
- Mental health (measured based on the General Health Questionnaire scale - a 36 point scale derived from 12 questions including the strain question above - the scale is used to identify minor psychiatric disorders) (all waves)
- Life satisfaction (“How dissatisfied or satisfied are you with your life overall?”) (all waves)

Understanding Society obtains responses on the following indicators of employment participation and income (for which analyses are reported in chapter 6):

- Current employment situation (all waves)
- Job security (“How likely do you think it is that you will lose your job during the next 12 months?”) (waves 3 and 6)
- Gross personal income per month (all waves)

Regarding disability, Understanding Society asks:

- "Do you have any long-standing physical or mental impairment, illness or disability? I mean anything that has troubled you over a period of at least 12 months or that is likely to trouble you over a period of at least 12 months".

For those that respond affirmatively, it then asks:

- “Do these health problems or disabilities mean that you have substantial difficulties with any of the following areas of your life?":
  - Mobility (moving around at home and walking)
  - Lifting, carrying or moving objects
  - Manual dexterity (using hands to carry out everyday tasks)
  - Continence (bladder and bowel control)
  - Hearing (apart from using a standard hearing aid)
  - Sight (apart from wearing standard glasses)
  - Communication or speech problems
  - Memory or ability to concentrate
  - Recognising when you are in physical danger
  - Your physical co-ordination (e.g. balance)
  - Difficulties with own personal care
  - Other health problem or disability

Both of these questions were used in the analysis presented in this report. Specifically, six items from the second question were selected: mobility, continence, hearing, sight, speech and memory impairments, as these were considered the most likely to affect people’s ability to travel and ease of travel.

3.1.2 English Longitudinal Study of Ageing

The English Longitudinal Study of Ageing (Banks, et al., 2018) is a unique and rich source of information on the dynamics of health, social, wellbeing, and economic circumstances of people living in England aged 50 and older[7]. It began in 2002 and returns to its participants every two years. Eight waves of data were available at the time of this study.

ELSA asks the following questions about transport availability:

- Do you have use of a car or van when you need one (either as a passenger or driver)?
- Do you ever drive this car or van yourself?
- Do you have a concessionary travel bus pass issued by your local authority?
- In the last month, how many times have you used your concessionary travel bus pass when boarding a bus?
  - None
  - 1-5
  - 6-10
  - 11-20
  - 21 or more
- How often do you use public transport?
  - Every day or nearly every day
  - Two or three times a week
  - Once a week
  - Two or three times a month
  - Once a month or less
  - Never

ELSA also obtains responses to the following question on loneliness:

- How often do you feel lonely? (hardly ever or never, some of the time, often) (waves 3-8)

Regarding disability, ELSA asks:

- "Do you have any long-standing illness, disability or infirmity? By long-standing I mean anything that has troubled you over a period of time, or that is likely to affect you over a period of time."

For those that respond affirmatively, it then asks:

- "Does this illness or disability limit your activities in any way?"

[7] See https://www.elsa-project.ac.uk for more details

3.1.3 Local public transport and accessibility data

Understanding Society and ELSA data records were linked to local public transport and accessibility data provided by the Department for Transport[8] and local spatial data from the Office for National Statistics (ONS). This was facilitated by access to special licence data containing each responding household's location at Lower-layer Super Output Area (LSOA) level[9].

The Department for Transport provided 2016 data on the number of bus stops and bus service frequencies, within a five- and ten-minute walk of LSOA population-weighted centroids, at different times of day[10]. This was used to generate the following variables:

- Number of bus stops with at least one off-peak service per hour (based on 12.00-13.00 time period) within 5 minutes walk of LSOA centroid
- Number of bus stops with at least one off-peak service per hour (based on 12.00-13.00 time period) within 10 minutes walk of LSOA centroid
- Highest off-peak (based on 12.00-13.00 time period) service frequency of a bus stop within 5 minutes walk of LSOA centroid
- Highest off-peak (based on 12.00-13.00 time period) service frequency of a bus stop within 10 minutes walk of LSOA centroid

Linking Understanding Society and ELSA data records to this bus data enabled the study to consider objective measures of bus availability at a level of geographical granularity not available in other studies. It may be possible in future to create these measures for multiple years, rather than just for 2016. This could allow examination of how changes in local bus service provision over time affect people's life opportunities. It is potentially possible to generate similar measures for rail access, but this was outside the resources available to this project. Local bus services play a greater role in personal travel than rail, metro and tram services and hence it was considered justifiable to focus on these.

Understanding Society and ELSA data records were also linked to Department for Transport Journey Time Statistics data for 2016[11] which enabled the following variables to be generated:

- Number of employment centres with 500 to 4,999 jobs within 30 minutes by public transport/walking

[8] The authors would like to thank the UK Data Service and NatCen's data release panel for facilitating access to these variables.
[9] A Lower-layer Super Output Area is a geographic area designed to improve the reporting of small area statistics in England and Wales. They are built from groups of contiguous Output Areas and have been automatically generated to be as consistent in population size as possible. The minimum population is 1000 and the mean is 1500. There are over 30,000 of these areas in England.
[10] The data sources were the Department for Transport's National Public Transport Access Nodes (NaPTAN) dataset of public transport access points (bus stops, rail stations, airports, ferry piers, tram/metro/underground stops) and Traveline National Dataset (TNDS) of public transport timetables for bus, light rail, tram and ferry services in Great Britain. A GIS analysis was performed to obtain measures of bus access for each LSOA.
[11] DfT (2018c). Journey time statistics: 2016. Department for Transport. Available at https://www.gov.uk/government/statistics/journey-time-statistics-2016 (4/1/19)

- Travel time to nearest employment centre with 500 to 4,999 jobs by public transport/walking (minutes)
- Number of food stores within 15 minutes by public transport/walking
- Travel time to nearest food store by public transport/walking (minutes)
- Travel time to nearest town centre by public transport/walking (minutes)

Finally, Understanding Society and ELSA data records were also linked to a Department for Transport lookup table of LSOAs to National Travel Survey settlement type categories and a Census lookup table of LSOAs to MSOA[12] 2011 population densities (persons/hectare).

3.2 Methods of Analysis

The analyses conducted in this study involved a variety of statistical methods. In general, for each outcome of interest (e.g. access to services) the sequence of analysis followed is shown in Table 3:1. The sequence of analysis starts with cross-sectional analysis based on one wave of data which examines relationships at a fixed point in time. This first uses simple descriptive methods to describe the data and explore patterns before using multiple regression models to identify relationships between variables and to see if these relationships hold for different population subgroups. Longitudinal analysis follows this based on two waves of data and seeking to explain changes over time. It follows a similar sequence as the cross-sectional analysis, first describing the data and exploring patterns before using multiple regression models to identify relationships between variables.

Further details of the different forms of analysis are provided in the next sub-sections.

[12] A Medium Layer Super Output Area level typically has a population of 7000

Table 3:1 Summary of analytical approaches employed	
Analytical approach	**Contribution to understanding**
Cross-sectional frequencies and cross-tabulations for a single wave of panel data	Prevalence of a variable of interest (e.g. access to services) amongst the population and amongst population subgroups (e.g. females / males) at a single point in time
Cross-sectional multiple regression models for a single wave of panel data	Factors ('predictors') associated with a variable of interest (e.g. access to services) at a single point in time, accounting for other factors
Cross-sectional multiple regression models with interaction terms for a single wave of panel data	Indication of whether a relationship between two variables of interest (e.g. access to services and car access) is different for population subgroups (such as those with disability)
Longitudinal transition frequencies and cross tabulations for a pair of waves of panel data	Prevalence of changes ('transitions') occurring in a variable of interest from one time period to the next (e.g. being able to access services to not being able to access services) amongst the sample and subgroups (e.g. those experiencing a change in car access)
Longitudinal multiple regression models for a pair of waves of panel data	Factors ('predictors') associated with transition in a variable of interest (e.g. being able to access services to not being able to access services), accounting for other factors
Longitudinal multiple regression models with interaction terms for a pair of waves of panel data	Indication of whether a relationship between two variables of interest (e.g. transition in access to services and car access) is different for population subgroups (such as those with disability)

3.2.1 Cross-sectional analysis

Cross-sectional analysis is the starting point for all the analyses presented in this report. Descriptive analysis is conducted initially to describe the data and explore patterns (for example, to explore if an outcome such as access to services differs by gender with a statistical test conducted to see if the difference is statistically significant). Weighting is applied to the sample data to produce results which are representative of the population of England[13].

With statistical tests, if both the outcome of interest and an independent variable are categorical (i.e. yes/no, female/male), statistical significance is estimated using a chi-square test. A chi-square test is a measure of association between two categorical variables. Where either the outcome or the independent variable is continuous (such as income), a t-test is used to calculate statistical significance. In these cases, this is a two-sample t-test, which compares the means of two groups and indicates if there is a statistically significant difference between them.

For statistical tests on weighted data it is necessary to take account of the sampling structure used to collect the data. This is a problem if the data has cases where only one respondent is available in a stratum (areas selected for sampling as part of the random probability survey sampling). For these cases, it was possible to merge geographically adjacent data. This is a standard approach for such issues and does not

[13] For Understanding Society, the appropriate weight for this analysis was *indinub_xw*, which is provided in the End User Licence data.

impact on the representativeness of findings. This was the approach taken for the small number of respondents affected.

Multiple regression analysis is conducted to explore the relationship between an outcome and two or more independent variables. This analysis is unweighted. Where outcomes are continuous, such as personal income, an Ordinary Least Squares (OLS) regression model is used. Binary outcomes (i.e. outcomes with only two values) are analysed using a logistic model. In some cases, the outcome of interest is categorical, such as employment (categorised as in work, in full time education or training, unemployed and not in work or not seeking work). In these cases, a multinomial logit model is used.

3.2.2 Longitudinal Analysis

Longitudinal analysis is conducted through analysis of changes ('transitions') in outcomes of interest from one wave to another wave. The longitudinal analysis is unweighted. Where the outcome considered has binary responses (loneliness, not loneliness), a pair of transitions are of interest (e.g. transitioning from loneliness in an earlier wave to not loneliness in a later wave and transitioning from not loneliness in an earlier wave to loneliness in a later wave). Where the outcome considered has more than two categories, attention is then focussed on selected transitions. For example, the analysis of employment looks at transitions of people not in work (studying full-time, unemployed or not in work and not looking for work) in one wave and whether or not they moved into work by the next wave.

Descriptive analysis of transitions is conducted first to assess the extent of change taking place in the outcome variable and to assess whether change is associated with change in potentially relevant independent variables (such as car access). Transition tables are presented to show these. Table 3:2 illustrates what a transition table may look like. The first row shows us that of those individuals in work in 2012-13, 95% were still in work in 2014-15, suggesting that transitions out of work in this population are relatively uncommon. The third row indicates that of those who are unemployed (i.e. not in work, but actively seeking work) in 2012-13, two-fifths (43%) find work by 2014-15, one-third (35%) are still not working but looking for work and one-fifth (19%) have stopped looking for work altogether.

Table 3:2 Employment transitions 2012-13 to 2014-15

2012-13	**2014-15**			
Employment status	**In work (%)**	**Full-time student (%)**	**Unemployed (%)**	**Not in work and not looking for work (%)**
In work	95	1	2	3
Full-time student	39	49	10	2
Unemployed	43	3	35	19
Not in work and not looking for work	19	1	11	68

Descriptive analysis is followed by multiple regression analysis to identify predictors of the transitions. Predictors tested include baseline variables representing the situation at the earlier wave and change variables representing change taking place between the

earlier wave and later wave. Where a transition could either happen or not happen, a logistic model is used. Where more than two options existed, a multinomial logit model is used.

3.2.3 Sub-group analysis

Some groups within the population may differ both on outcomes of interest and in how other factors affect them. For instance, women with children may be much less likely to be in work than men with children and analysing the impact of children on the whole sample may not be satisfactory in explaining differences. This report incorporates sub-group analysis capturing differences by:

- Age
- Gender
- Whether the person has a mobility impairment
- Residential settlement type

Sub-group analysis is conducted by extending regression models to include interaction terms, which estimate how a factor, such as car access, is associated with an outcome for each sub-group. For example, sub-group analysis by gender will include car access, gender and the gender-car access interaction. Here, the coefficient of car access would be the association between car access and the outcome for men, the gender outcome would be the difference between the outcome for women relative to men, and the interaction term would be the difference in the association between car access and the outcome for women. This allows investigating if the association between a characteristic, such as car access, has a different impact on the outcome, such as income, for men relative to women.

3.2.4 How results are presented

Throughout this report, results are presented in several ways, depending on how the estimates were produced. This includes:

- Odds Ratios (OR): The odds ratio is the ratio of the odds of an outcome when a factor is present compared to not present. For example, if the odds ratio of the association between smoking and lung cancer was 2.50, it would indicate that lung cancer is two and a half times more likely for someone who smokes, relative to a non-smoker.
- Relative Risk Ratios (RRR): Relative risk is a ratio of the probability of an event occurring in the exposed group versus the probability of the event occurring in the non-exposed group. Using the example above, a relative-risk ratio of 2.50 would indicate that the risk of contracting lung cancer is two and a half times more likely for someone who smokes compared to a non-smoker. Whereas OR are ratios of odds (or ratios of ratios), the RRR is a ratio of probabilities and hence the interpretation is slightly different.

Where possible, the upper and lower bounds of the 95% confidence intervals are presented, to indicate the uncertainty around estimates. This means that if a survey was conducted 100 times, the results would be within the upper and lower bounds of the confidence interval 95 times out of 100. For example, if 53% of people agreed with a statement, with a confidence interval of +/- 3%, 95 times out of 100 you would expect the result to be between 50% and 56%.

If 100 samples were drawn for a population and confidence intervals created for the difference between group means each time, 95 of those confidence intervals would contain the true difference in means between the groups.

All graphs presented in this report have accompanying tables, which are available in the report appendices. Where graphs of odds ratios, relative risk ratios and probabilities are presented, the coloured dot indicates the estimate for that group, whilst the "whiskers" surrounding these dots indicate the 95% confidence intervals. The size of the whisker indicates the level of certainty around the result, short whiskers indicate greater certainty, whilst longer whiskers indicate less certainty.

4 Variations in transport access and use

This chapter presents results for how access to transport and use of different transport modes varies across the population based on analysing Understanding Society data. It addresses the following research question:

- How does access to transport (private and public) and use of different transport modes vary by different groups in the population?

This chapter first considers car access and use before turning to bus access and use, using objective measures of local bus access developed using DfT bus data. It also includes results on how rail and bicycle use vary across the population.

The results in this chapter are based on analysing Understanding Society data collected in the 2014 and 2015 calendar years (wave 6) for adults living in England in the General Population Sample (GPS), Ethnic Minority Boost Sample (EMBS) and former British Household Panel Survey sample (BHPS). The focus of this chapter is on variations in transport access and use across the population, rather than how transport access and use change over time, hence the results are based on cross-sectional analysis of one wave of data[14].

Summary of key findings

- The majority (69%) of the population have personal access to cars and an even larger proportion of the population (87%) are frequent (weekly) car users. A significant minority – nearly a third of the population (31%) - do not have personal car access and are reliant on public transport or other modes to support their lives.
- Lack of personal car access is more prevalent amongst young people, those with health-related mobility impairments, those who are unemployed and those with low income. It is also less prevalent for those people living near frequent bus services, implying that good public transport access may reduce the need for personal car access.
- As expected, people living in London and other large cities have more frequent bus services near their home, relative to the rest of the population. Bus service availability is therefore better for those groups in the population that are highly concentrated in urban centres (e.g. BME groups, renters and the unemployed).
- People's rating of local public transport is strongly linked to bus service availability. Over three-quarters (77%) of those served by more than one bus every five minutes rate public transport as good compared to only 36% of those served by buses once or twice per hour.

Findings for specific population groups:

- Adults under the age of 30 have more limited car access and lower car use than other age groups but better bus access and make greater use of buses, trains and bicycles.

[14] Weighting has been applied to all descriptive analyses to obtain a more accurate estimate of the proportion of the population with a given characteristic. Regression models have not been weighted.

Summary of key findings

- Older people (aged 70 and over) have more limited car access and lower car use than adults aged 30-69, the same bus access as other age groups, but rate local public transport more highly and use buses more and trains and bicycles considerably less frequently.
- Women have more limited car access than men but use cars as frequently. They use buses more frequently and trains and bicycles less frequently.
- People from Asian backgrounds have more limited car access than those of white ethnicity, although their car use is similar. People from Black backgrounds have more limited car access and lower car use than those of white ethnicity and use buses and trains more often.
- People with health-related mobility impairments have more limited car access and lower car use than those without mobility impairments. They use buses as frequently as the general population but not as much other people with similar characteristics (in terms of age, etc.), which implies they experience barriers to using buses. They use trains and bicycles considerably less frequently than the rest of the population.
- People with personal incomes in the lowest quintile have considerably more limited car access but only slightly lower car use than people with higher incomes and make greater use of buses but less use of trains. Their frequency of bicycle use is similar to those with higher incomes.

4.1 Car access and use

4.1.1 Factors associated with car access

Car access is defined in Understanding Society in terms of a person having a driving licence and normally having access to a car or van that they can use whenever they want. Some individuals have a driving licence, but no access to a car, whilst others have no licence and no car access.

Chapter 2 reported on how car access varies across the English population based on published results from the National Travel Survey data for 2017. Car access is lower for younger and older adults and for BME groups and those with lower household income. It is also lower for those living in more urbanised areas and living near to public transport. The profile of car use is similar to car access. Those with mobility impairments drive half as much as those without mobility issues.

It is estimated from the data that around two-thirds (69%) of people aged 16 and over have a full UK driving licence and normally have a car or van that they can use whenever they want[15]. Fewer than one-in-ten people (7%) with a licence do not have access to a car. Overall, 23% of people have no licence with 1% being aged 16 and unable to drive.

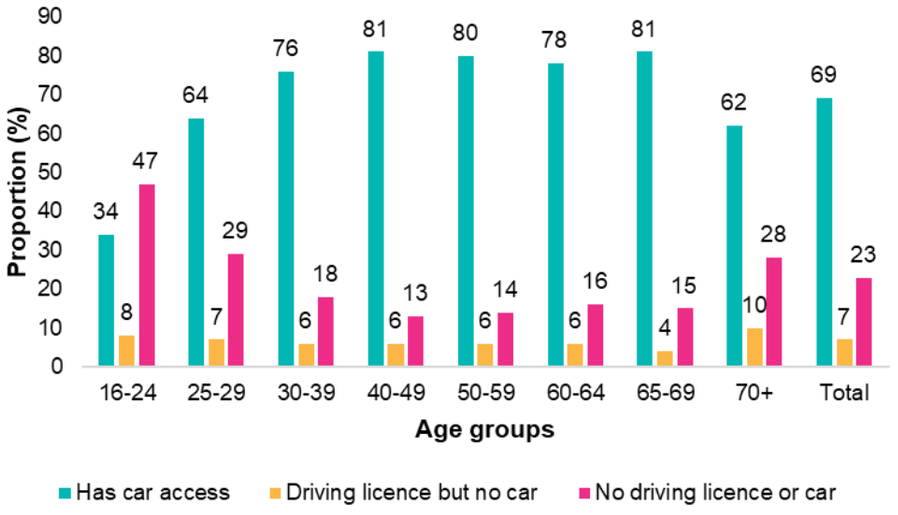
[15] This corresponds closely with the National Travel Survey 2017 result that 81% of adults aged 17 and over are in households with a car (DfT, 2018a), with 59% of adults the main driver of a household car, 10% the secondary driver of a household car and 12% a non-driver. Note that the question used in Understanding Society provides a more specific indication of whether someone has a car available to them that they can drive.

Notable results for how car access varies for different groups in the population are as follows (see Appendix table A:1 for full results):

- **Age**. Car access increases steadily with age reaching a peak for those in their 40s, 50s and 60s and decreases for those aged 70 and over. Only a third (34%) of people aged between 16 and 24 have access to a car that they can drive compared to four-fifths (76-80%) of people aged 40-69 and six-in-ten (62%) of people aged over 70
- **Gender**. A lower proportion of women (64%) have access to a car than men (75%).
- **Ethnicity**. A lower proportion of adults of African (38%), Caribbean (44%), Bangladeshi (50%), Pakistani (51%), mixed (49%) and other ethnicity (58%) have access to a car than adults of white other (66%), Indian (70%) and white UK ethnicity (71%). Relatedly, car access is less common amongst adults not born in the UK (61%) compared to people born in the UK (70%)[16].
- **Mobility impairments**. About half (54%) of adults with mobility impairments have access to a car compared with seven-in-ten (71%) adults without mobility impairments.
- **Living circumstances**. Only about half (49%) of adults living alone have access to a car, compared with four-fifths (82%) of adults living with a partner.
- **Housing tenure.** Only two-out-of-five (38%) of adults living in public sector rental accommodation and three-out-of-five (58%) adults living in private sector rental accommodation have access to a car compared to four-out-of-five adults living in owned accommodation.
- **Educational attainment**. Less than a half (44%) of adults without qualifications have access to a car compared with over four-fifths (84%) of adults with a degree.
- **Employment status**. Those adults not in employment have considerably lower levels of access to a car (22% of full-time students, 30% of unemployed adults, 39% of long-term sick and disabled adults, 53% of adults looking after family or home and 68% of retired adults). Adults in temporary employment (63%) and in semi-routine and routine jobs (62%) are also less likely to have access.
- **Personal income**. Two-fifths (41%) of adults with gross personal incomes of more than £500 per month[17] have access to a car, compared with nine-in-ten (89%) adults with incomes of greater than £2,000 per month.
- **Settlement type**. Two-in-five (41%) adults living in Inner London, 64% of adults living in Outer London, 61% of adults living in other Metropolitan areas and 64% of adults living in other cities with over 250,000 population have access to a car compared to 84% living in rural areas.

[16] The data used in this analysis is for England only, but the definition of migrant status is based on whether or not they were born inside or outside of the UK.
[17] The poorest fifth in the personal income distribution.

Figure 4:1 Car access by age (%)



Source: Understanding Society
Unweighted base: 31,094

Results from analysis that simultaneously controls for multiple factors[18] allows for further exploration of individual factors that affect car access (see Appendix table A:9). This analysis is generally consistent with the above results and shows that all the characteristics identified above as being associated with car access (in terms of bivariate relationships) are also associated with car access in a similar way after controlling for other factors. One exception is that ethnicity is not found to be associated with car access after accounting for other factors.

An important finding is that living near to frequent bus services is associated with lower car access, even after accounting for other residential location characteristics (settlement type, population density and proximity to food stores). People served by more than one bus every ten minutes are around three quarters as likely to have access to a car than those served by buses once or twice an hour. In other words, increasing bus frequency increases the likelihood that people have no access to a car. However, people's rating of local public transport is not associated with car access after accounting for bus service frequency. It therefore appears that (objectively measured) bus access is more important to people's decision to have a car than their opinion of the quality of local public transport.

The results from Understanding Society data are consistent with what is already known about car access, but also show that lower car access is associated with not being born in the UK (applying to 11% of the adult population), living in rental accommodation (applying to 31% of the adult population), having a temporary job (applying to 9% of the

[18] Multiple logistic regression model results (without weighting) based on Understanding Society 2014-15 sample of all adults in GPS, EMBS and BHPS samples living in England who answered the car access question. Independent variables included in model: age group, gender, ethnicity, whether born in the UK, whether lives with partner, number of children, whether has mobility/sight/memory impairments, housing tenure, personal income, educational attainment, employment status, whether works in temporary job, job type, local public transport rating, off-peak bus service frequency, travel time to nearest food store, settlement type, and population density. These variables were selected based on their theoretical plausibility in influencing car access or statistical significance in bivariate relationship with car access.

adult population), not having any educational qualifications (applying to 12% of the adult population) and having mobility impairments (applying to 12% of the adult population). People in these circumstances can be interpreted as having more limited resources and capabilities to own and run a car. The results also suggest that living near to frequent bus services (two-in-five people (41%) live near to a bus stop served by more than one bus every ten minutes) reduces the need to have a car. Overall, the results give a comprehensive picture of which groups within the adult population have access to a car they can use whenever they want.

4.1.2 Factors associated with car use

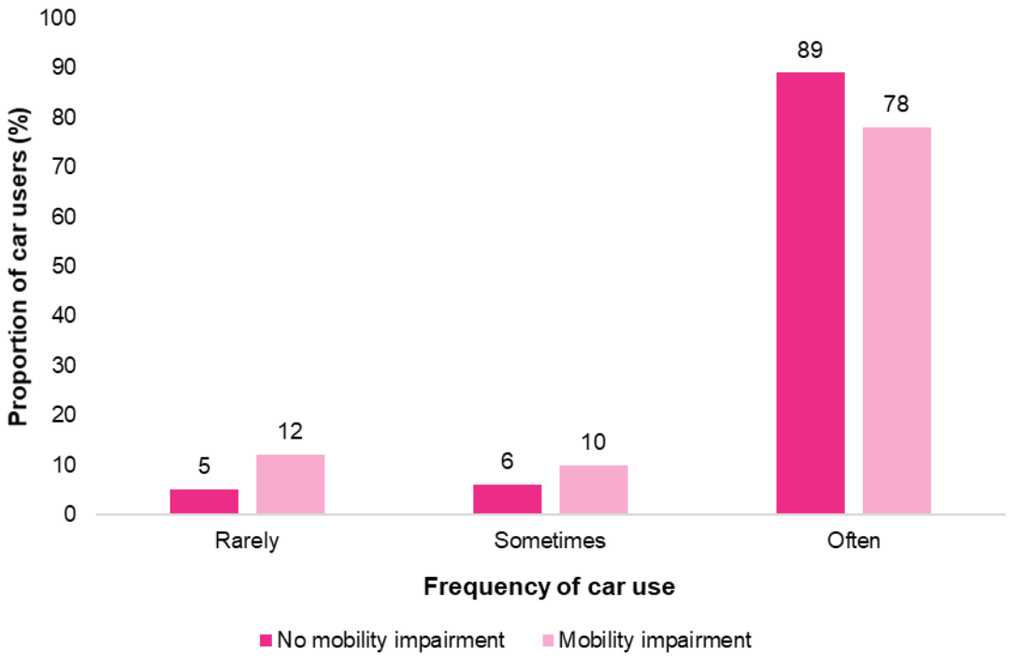
With the National Travel Survey, car use is considered in terms of reported number of trips by car (as driver or passenger) from seven-day travel diary records completed by survey participants. The measure of car use available from Understanding Society is derived from the single question "How frequently do you travel by private car or van, whether as a driver or passenger?" with responses coded into the three categories of 'often', 'sometimes' and 'rarely' according to the responses given[19]. It offers an alternative indication of car use to the National Travel Survey, representing a more subjective assessment of frequency of car use.

It is estimated from the data that almost nine-in-ten (87%) adults aged 16 and over use a car often (at least once a week), whilst 7% use a car sometimes (at least once a month but less than once a week) and 6% use a car rarely (less than once per month) (see Appendix table A:2)

Similar groups of people who have lower prevalence of car access also report travelling by car less frequently (see Appendix table Appendix table A:2). For example, three-quarters (78%) of those who have mobility impairments use a car often, compared with almost nine-in-ten (87%) of those without mobility impairments (see Figure 4:2). This is consistent with the lower access to a car reported for those with mobility impairments in section 4.1.1. One exception is gender where the same percentage of women and men use a car often, even though a lower percentage of women have access to a car.

[19] Categorised as 'often' when the options 'at least once a day', 'less than once a day but at least 3 times a week' or 'once or twice a week' were chosen, categorized as 'sometimes' when the options 'less than that but more than twice a month' or 'once or twice a month' were chosen, and categorised as 'rarely' when the options 'less than that but more than twice a year', 'once or twice a month' or 'less than that or never' were chosen. This is further collapsed to 'often' and 'sometimes/rarely' for the purpose of the logistic regression analysis.

Figure 4:2 Car use frequency by mobility impairment (%)



*Source: Understanding society (*Appendix table A:2*)*

Unweighted base: 28,547

There is a striking difference in car use for those adults living near very frequent bus services. Three-quarters (74%) of adults living near to a bus stop served by more than one bus every five minutes use a car often compared to 87% overall.

Results from analysis that simultaneously controls for multiple factors [20] show some important differences in the factors associated with using a car often than the bivariate relationships. After accounting for other factors, being aged between 16 and 24 is not associated with lower car use, implying that it is this age group's socio-economic characteristics that are responsible for lower car use. Being female is associated with a higher likelihood of using a car often than being male after accounting for other factors. Indian, Pakistani and Bangladeshi ethnicity is associated with a higher likelihood of using a car often than white UK ethnicity after accounting for other factors.

Having children is more strongly associated with using a car often than it is with car access which implies that those adults in households with children who have cars tend to use them often. In contrast, personal income is less strongly associated with using a car often than it is with car access which implies that those adults with lower income who have cars tend to use them often. A similar result applies to educational qualifications and job type.

After controlling for other factors, the result persists that living live near to a bus stop served by a bus more than once every ten minutes is associated with reduced

[20] Multiple logistic regression model results (without weighting) based on Understanding Society 2014-15 sample of all adults in GPS, EMBS and BHPS samples living in England who answered the car use frequency question. The same set of independent variables is included in the regression model of car use as the model of car access.

likelihood of using a car often (see Appendix table A:10). The likelihood is about three-quarters of those who live near to a bus stop served only once or twice per hour. This implies that better bus access reduces the need to use a car. As with car access, people's rating of local public transport is not statistically significant after accounting for bus service frequency which indicates that bus access is more important to people's frequency of using a car than their opinion of the quality of local public transport.

4.2 Bus access, rating and use

Chapter 2 reported that those people living in rural areas are less likely to live near to a bus stop than those in urban areas, but it is not known how access to public transport varies by other population characteristics. Bus use has the opposite profile to car use, with it being more frequently used by younger and older adults, those with lower household income and those living in more urbanised areas. Those with mobility impairments use buses nearly as much as those without mobility impairments.

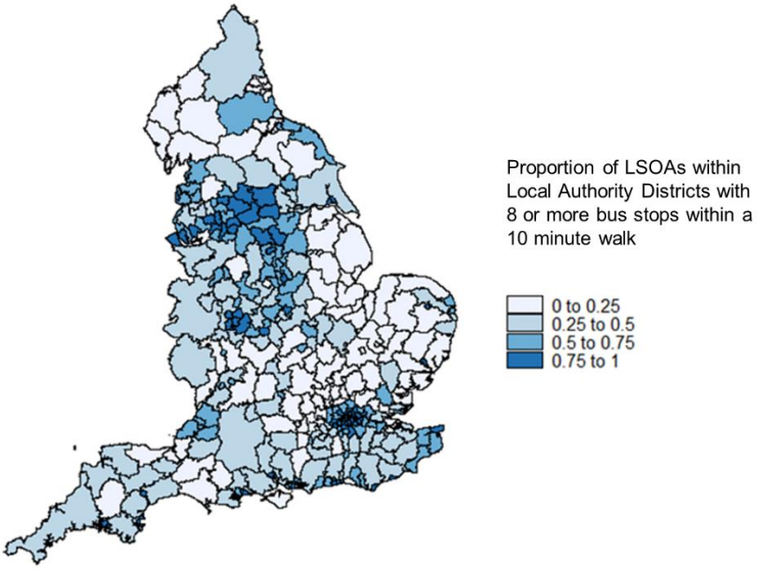
4.2.1 Factors associated with bus access

By linking Understanding Society data records to bus data provided by the Department for Transport, this study obtained objective measures of bus access for each survey participant, both in terms of the number of bus stops within walking distance and the frequency of buses serving those local bus stops. It has been shown in section 4.1 that living near to frequent bus services is associated with lower car access and use. In this section it is shown how bus access varies across the population.

The geographical distribution of bus stops across England is shown in Figure 4:3. This indicates the proportion of Lower-Layer Super Output Areas (LSOAs)[21] within Local Authority Districts (LAD) that have eight or more bus stops within a ten-minute walk from the centre of the LSOA[22]. Similarly, Figure 4:4 indicates the proportion of LSOAs within each LAD that has four or more off-peak bus services within a ten-minute walk of the centre of the LSOA. The maps suggest that having frequent bus services tends to coincide with having more bus stops[23], and both tend to occur in the most urbanised areas of the country.

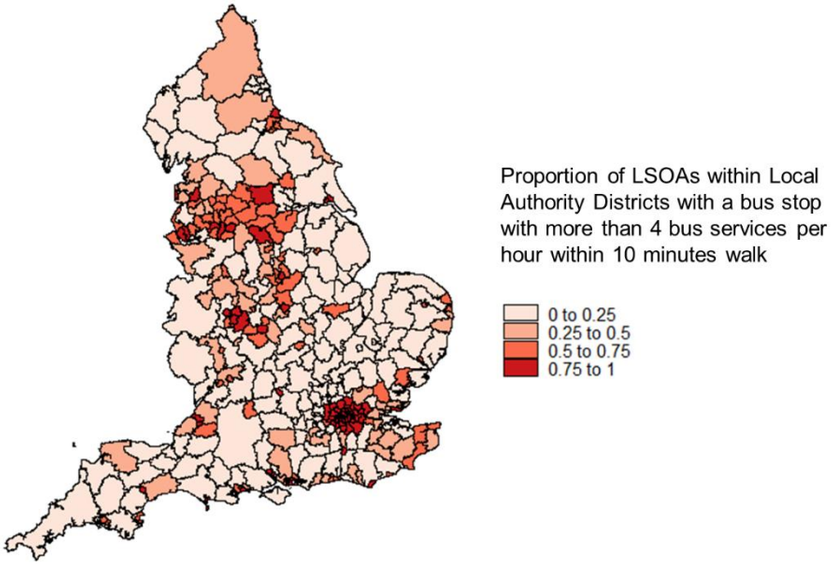
[21] LSOA is a small geographical area that has a homogenous population size (mean population: 1,500, minimum 1,000)
[22] In a few cases, LSOA boundaries overlap LAD boundaries. In these cases, the LSOAs have been allocated randomly to one LAD.
[23] The correlation between number of bus stops and bus service frequency is 0.56, implying that living in an area with a large number of bus stops tends to mean there are also frequent buses.

Figure 4:3 Availability of bus stops within a 10-minute walk in England



Source: Department for Transport

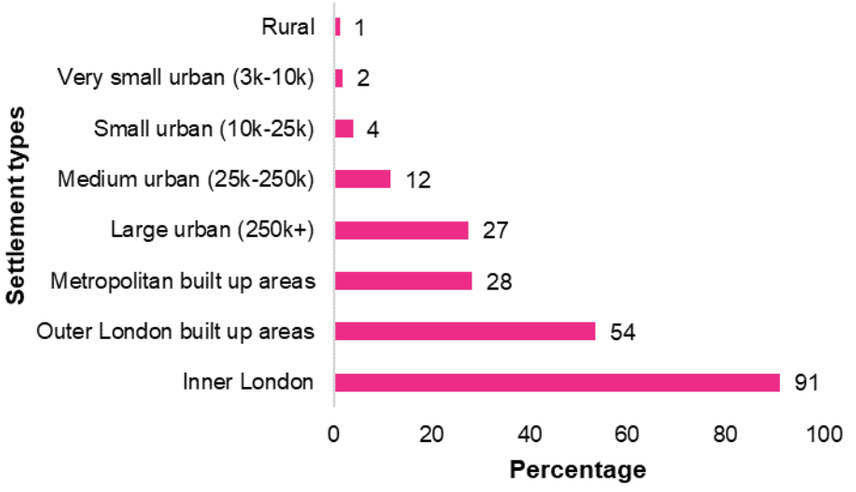
Figure 4:4 Availability of bus services within a 10-minute walk in England



Source: Department for Transport

The difference in bus access by urbanisation is starkly evident from which shows that 91% of adults in Inner London live within 10-minute walk of a bus stop served by a bus more than once every five minutes (thirteen or more buses each hour), compared with just 1% of adults living in rural areas.

Figure 4:5 Percentage of individuals with a bus at least every 5 minutes by settlement type (%)



Source: Understanding Society (see Appendix Table A:4)
Unweighted base: 31,116

Investigation of how bus access (both in terms of the number of bus stops within walking distance and the frequency of buses serving those local bus stops) varies by population groups shows much better bus access for BME groups, those not born in the UK, those living in rental accommodation, those unemployed and those without access to a car (see Appendix table A:4 and A:5). These are groups known to be resident in urbanised areas more than average. With increased age, bus access tends to be worse, although the 16-24 age group has similar bus access to the 40-59 age group. Those living with a partner tend to have worse bus access than those living without a partner. An interesting result is that the least and most economically advantaged adults have better bus access than those in the middle (see Figure 4:6).

Figure 4:6 Percentage of individuals with a bus at least every 5 minutes by income group (%)

Source: Understanding society (Appendix table A:4)
Unweighted base: 31,116

The results obtained in this study based on measures of bus access not previously available confirm that bus access varies considerably according to level of urbanisation, and also show that BME, those not born in the UK, those living in rental accommodation, those unemployed and those without access to a car tend to have better bus access.

4.2.2 Factors associated with local public transport rating

In 4.2.1 it was seen how bus access, measured objectively in terms of bus stops and services available locally, varies across the population. Understanding Society obtains a subjective assessment of public transport based on the question "How would you rate public transport services in your local area?"[24]. This provides an alternative indicator of public transport access to that considered in the previous section. Given the question refers to local public transport, it is likely it will reflect what people think about local buses rather than trains or other forms of public transport.

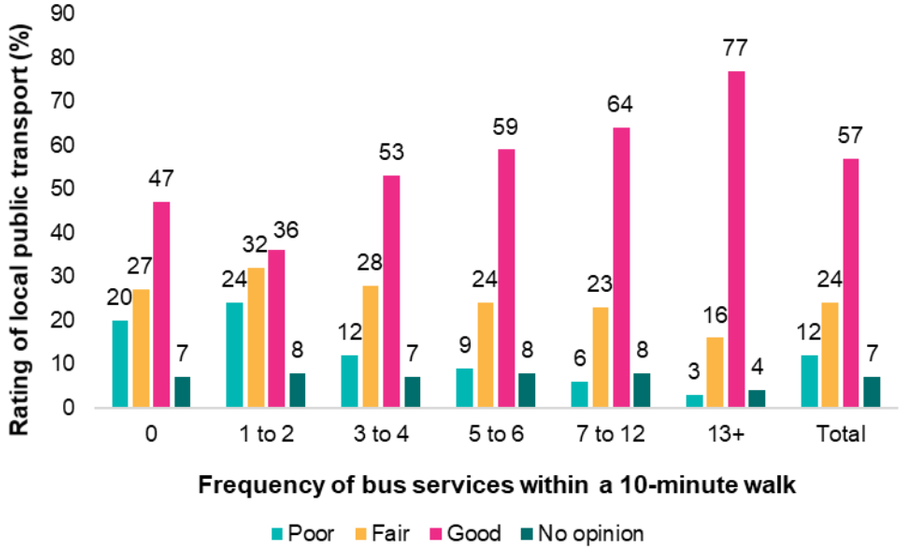
It is interesting to see whether people have a more positive assessment of local public transport when they have more bus stops and services available near to where they live (see Appendix table A:3). Figure 4:7 indicates that people are more likely to rate their local public transport as good if there are more frequent bus services where they live. Two-thirds (64%) of adults served by more than one bus every ten minutes, but not more than one every five minutes, rate their local public transport as good and

[24] Possible responses are 'excellent', 'good', 'fair', 'poor', 'no opinion/ cannot rate' and 'don't know'. The latter two options were both coded as 'no opinion'. In order to run regression analysis on this variable, it was collapsed into a binary variable. The response options 'excellent' and 'good' were treated together as 'good', while 'fair' and 'poor' were treated together as 'poor'.

three-quarters (77%) of adults served by more than one bus every five minutes rate their local public transport as good.

One half (47%) of adults with no bus services near where they live rate their local public transport as good, suggesting that perceptions of public transport do not only depend on the physical availability of bus stops and services. For example, previous studies have found discrepancies between actual and perceived journey times by public transport (Curl et al., 2015). It is interesting that adults served by buses once or twice per hour have a worse rating of local public transport (one third (36%) rate their local public transport as good). These people may have expectations from public transport which are not being met.

Figure 4:7 Rating of local public transport by bus service frequency within a 10-minute walk



Source: Understanding Society (see Appendix table A:3)
Unweighted base: 28,484

The rating of local public transport does not vary much across population groups. It varies less than objective bus access reported in 4.2.1. It is more positive for those living in more urbanised areas and for some population groups who tend to live in those areas (BME groups, those not born in the UK and those without access to a car).

Older people (aged 70 and above) are slightly more likely to have a positive rating of local public transport (62% compared with 57% for the population average), despite their bus access being slightly worse. Those in rental accommodation and unemployed are only slightly more likely to rate their public transport positively than the rest of the population, despite having considerably better objectively measured bus access.

Results from analysis that simultaneously controls for multiple factors[25] show that the spatial context in which people live has the greatest influence on how public transport

[25] Multiple logistic regression model results (without weighting) based on Understanding Society 2014-15 sample of all adults in GPS, EMBS and BHPS samples living in England who answered the rating of local public transport question. The same set of independent variables is

is rated. Living in a larger urban area, a more densely populated neighbourhood and near food stores are all strongly associated with a higher likelihood of rating public transport as good (see Appendix table A:14). Having frequent local bus services is also important. For example, living near to a bus stop served by a bus more than once every five minutes is associated with over twice (2.2) the likelihood of rating public transport as good compared to living near to a bus stop served only once or twice per hour.

There are not many population characteristics associated with the rating of local public transport. Being aged 70 or more and lower educational attainment are associated with a more positive rating, while having mobility impairments is associated with a more negative rating.

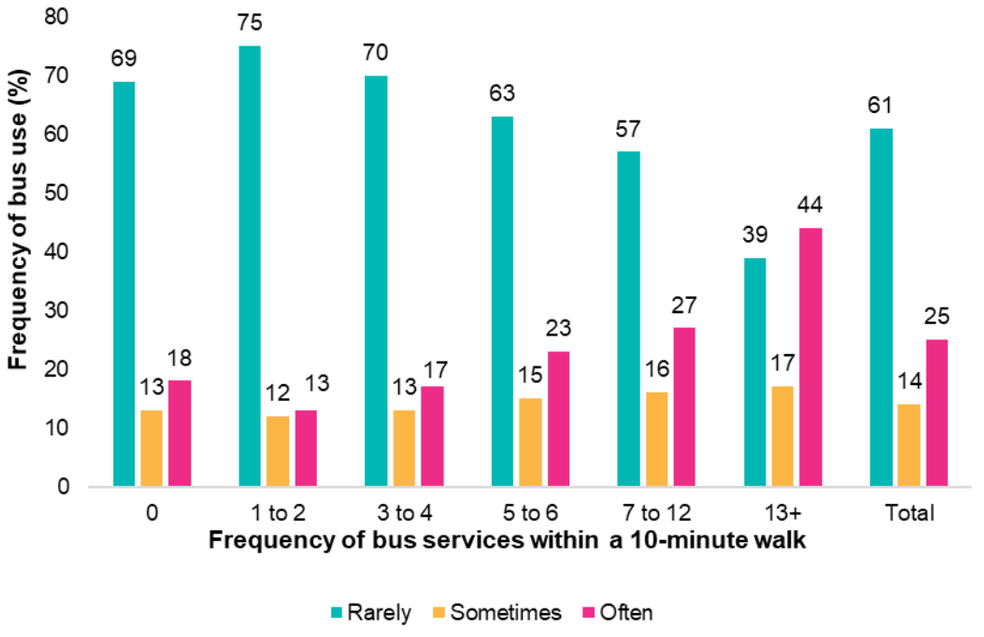
4.2.3 Factors associated with bus use

Similarly to car use, the measure of bus use available from Understanding Society is derived from the question “How frequently do you travel by ordinary bus?” with responses coded into three categories in the same way. Again, it offers an alternative indication of bus use to the National Travel Survey, representing a more subjective assessment of frequency of bus use. It is estimated from the data that one-in-four (25%) adults aged 16 and over use buses often (at least once a week), while 14% use buses sometimes (at least once a month but less than once a week) and 61% use buses rarely (less than once per month).

Adults who live in areas with better bus access are more likely to use buses often. Over two-fifths (44%) of adults living near to a bus stop served by a bus more than once every five minutes often take the bus. This is more than double the proportion who use buses often in areas served by buses every 15 minutes or less. However, even in areas served by a bus more than once every five minutes, two-fifths (39%) of adults rarely take the bus (see Appendix table A:6).

included in the regression model of local public transport rating as the model of car access, except that car access is included as an additional variable.

Figure 4:8 Frequency of bus use according to bus service frequency within a 10-minute walk



Source: Understanding society (see Appendix table A:6)

Unweighted base: 28,547

Notable results for how bus use varies for different groups in the population are as follows (see Appendix table A:6):

- **Age**. Four-in-ten (41%) people aged 16-24 use buses often. This reduces for 25-59 year olds: with less than a fifth (17% of 40-59 year olds) using buses often. Bus use increases for those 60 and over with 31% of those aged 70+ using buses often.
- **Gender**. A quarter (27%) of women use buses often compared to one-fifth (22%) of men.
- **Ethnicity**. A higher proportion of adults of African (62%), Caribbean (55%), mixed (45%) Bangladeshi (43%), Other (39%), Pakistani (34%), Indian (31%) and white other (31%) ethnicity use buses often than adults of white UK ethnicity (23%).
- **Living circumstances**. Over one third (36%) of adults living alone use buses often compared with only two-in-ten (18%) adults living with a partner.
- **Housing tenure.** Four-out-of-ten (40%) adults living in social rental accommodation and three-out-of-ten (29%) adults living in private rental accommodation use buses often compared to less than a fifth (17%) of adults living in owned accommodation with a mortgage.
- **Educational attainment**. One third (34%) of adults without qualifications use buses often compared with one-in-five adults with a degree (21%).
- **Employment status**. Those adults not in employment are more likely to use buses often (50% of full-time students, 44% of unemployed adults, 30% of retired adults, 29% of long-term sick and disabled adults) with self-employed workers least likely to use buses often (12%).

- **Personal income**. Two-fifths (37%) of adults earning less than £500 per month use buses often, compared with just 16% of adults with incomes of more than £2,000 per month.
- **Car access.** Over half (54%) of adults without car access use buses often compared with one-in-ten (12%) adults with access to a car.

Frequent bus use is also more prevalent amongst adults not born in the UK (35%) and in temporary employment (30%). Those with mobility impairments are just as likely to use buses often as those without mobility impairments.

Results from analysis that simultaneously controls for multiple factors[26] show that not having access to a car has the largest positive association with using buses often (it is 6-7 times more likely for those without access to a car). The spatial context in which people live has a large influence on bus use. Living in a larger urban area, a more densely populated neighbourhood and in close proximity to food stores are all strongly associated with a higher likelihood of using buses often.

Having frequent local bus services is important after considering these spatial variables. For example, living near to a bus stop served by a bus more than once every five minutes is associated with one and two-thirds (1.67) times the likelihood of using buses often compared to living near to a bus stop served only once or twice per hour. Also, rating local public transport as good is associated with one and a third (1.38) times the likelihood of using buses often as rating public transport as poor.

There are some important differences compared to the bivariate relationships in the population characteristics associated with using buses often. Economic circumstances and spatial context appear to account for much of the variation in bus use. Other characteristics (younger age, gender, renting from the public sector, educational attainment) are not associated with bus use. However, adults aged 60 and over are associated with a much higher likelihood (about twice as much) of using buses after accounting for other factors (see Appendix table A:11 for full results). This suggests a greater willingness to use buses, all other things being equal, which is likely to be influenced by the availability of the concessionary bus pass to those reaching statutory retirement age.

Indian, Pakistani and Bangladeshi ethnicity is not associated with a higher likelihood of using buses often than white UK ethnicity after accounting for other factors, nor is being born outside the UK. Having mobility impairments is associated with a much lower likelihood (0.55 times) of using buses often after controlling for other factors. Mobility impairments are much more prevalent in older age; hence this implies that older people with mobility impairments do not have the same increased likelihood of using buses often as older people without mobility impairments.

After accounting for other factors, the negative association between personal income and likelihood of using buses often is attenuated such that a gross income of at least £2,000 per month is associated with only 0.83 times the likelihood of using buses often of those with an income of less than £500 per month. This implies other factors such as

[26] Multiple logistic regression model results (without weighting) based on Understanding Society 2014-15 sample of all adults in GPS, EMBS and BHPS samples living in England who answered the bus use frequency question. The same set of independent variables is included in the regression model of bus use as the model of car access, except that car access is included as an additional variable.

higher income individuals living in less urbanized areas account for a large part of the difference in using buses mentioned previously for the bivariate relationship.

In summary, the results add to what is known from existing data sources about factors influencing bus use. Having access to a car and spatial context, including the frequency of local bus services, are the most important influences on bus use. Being aged 60 and over, living alone, being a full-time student and working in a temporary job are also associated with increased bus use.

4.3 Factors associated with train use

National Travel Survey results show that rail use is less frequent among those aged 60 or more and more frequent by those with a higher household income and those living in urban areas.

Similarly to car use, the measure of train use available from Understanding Society is derived from the question “How frequently do you use a train, not including underground, tram or light rail?” with responses coded into three categories in the same way. Again, it offers an alternative indication of train use to the National Travel Survey, representing a more subjective assessment of frequency of train use. It is estimated from the data that under one-in-ten (8%) adults aged 16 and over use trains often (at least once a week), while 15% use trains sometimes (at least once a month but less than once a week) and 75% use trains rarely (less than once per month).

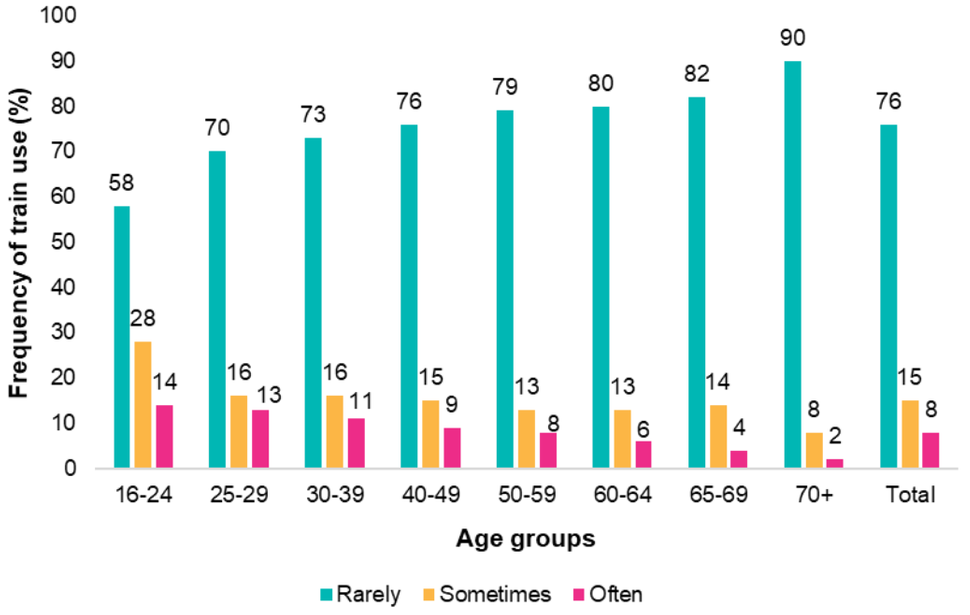
Train use varies for different groups in the population, as follows (see Appendix table A:7):

- **Age**. Train use decreases steadily with age, as indicated in Figure 4:9
- **Gender**. Opposite to buses, a higher proportion of men (10%) use trains often than women (7%).
- **Ethnicity**. A higher proportion of adults of African (29%), Caribbean (20%), mixed (23%), other (17%), Bangladeshi (14%), Indian (14%), other white (14%) and Pakistani (10%) ethnicity use trains often than adults of white UK ethnicity (7%).
- **Mobility impairments**. Only 3% of those with mobility impairments use trains often compared to 9% of those without mobility impairments.
- **Educational attainment**. One-in-six (16%) adults with a degree use trains often compared with 2% of adults with no qualifications.
- **Employment status**. Full-time students and those in paid employment are more likely to use trains often (16% and 11% respectively) than those not in education, training or employment.
- **Personal income**. One-in-seven (13%) adults earning more than £2,000 per month use trains often, compared with just 5% of adults with incomes between £500 and £999 per month and 9% of adults with incomes less than £500 per month.
- **Car access.** One-in-six (16%) adults with a driving licence but no car access use trains often compared to 7% of adults with access to a car and 11% of adults with no driving licence.

Frequent train use is also more prevalent amongst adults not born in the UK (14%) and those in management and professional occupations (16%). It is much more prevalent

for those living in Inner London (31%) and Outer London (23%) than all other settlement types.

Figure 4:9 Train use frequency by age (%)



Source: Understanding society (see Appendix table A:7)

Results from analysis that simultaneously controls for multiple factors[27] show that not having access to a car has a large positive association with using trains often, as it does with using buses often (it is about three times more likely for those without access to a car to use trains often). Living in Greater London has a large positive association with using trains often (about five times more likely to use trains often than living anywhere else). Other spatial variables are not associated with train use frequency (see Appendix table A:12).

The results for population characteristics are generally consistent with the bivariate relationships mentioned above. One exception is being born outside the UK is not found to be associated with using trains often after accounting for other factors.

The results for frequency of train use are in line with those from the National Travel Survey but highlight a wider range of socio-economic factors that are associated with increased train use. The results demonstrate the dominant effect of London on train use amongst the adult population of England.

[27] Multiple logistic regression model results (without weighting) based on Understanding Society 2014-15 sample of all adults in GPS, EMBS and BHPS samples living in England who answered the train use frequency question. The same set of independent variables is included in the regression model of train use as the model of car access, except that car access is included as an additional variable.

4.4 Factors associated with bicycle use

National Travel Survey results show that bicycle use is considerably less frequent among women, older adults and those with lower household income. It is twice as frequent in smaller cities and towns than larger urban conurbations and rural areas.

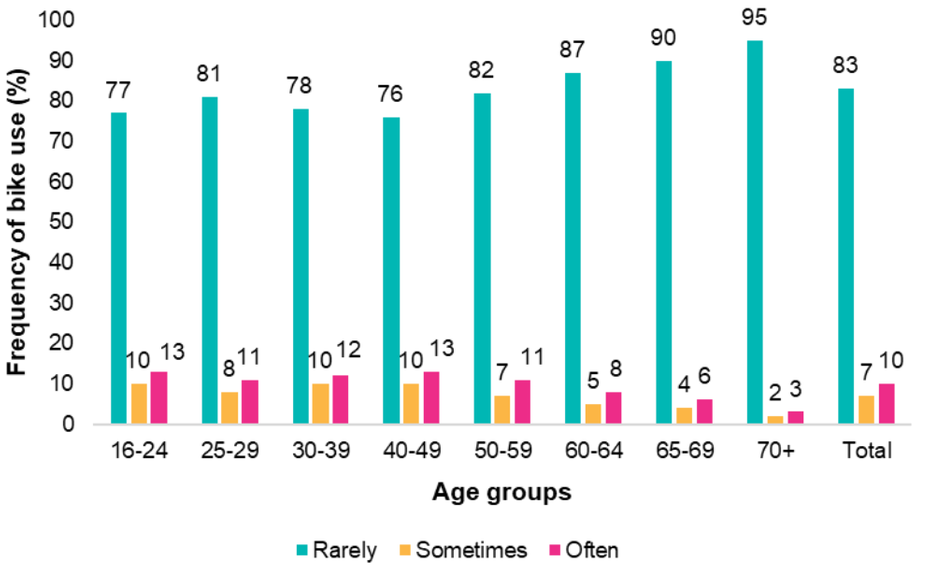
The measure of bicycle use available from Understanding Society is derived from the question “How frequently do you use a bicycle?” with responses coded into three categories as for car use. Again, it offers an alternative indication of bicycle use to the National Travel Survey, representing a more subjective assessment of frequency of bicycle use. It is estimated from the data that under one-in-ten (10%) adults aged 16 and over use bicycles often (at least once a week), while 7% use bicycle sometimes (at least once a month but less than once a week) and 83% use bicycles rarely (less than once per month).

Bicycle use varies amongst the following groups (see Appendix table A:8):

- **Age**. Only 3% of adults aged 70 and above use bicycles often compared to one-in-ten (10%) of the overall population.
- **Gender**. A higher proportion of men (15%) use bicycles often than women (6%).
- **Ethnicity**. A lower proportion of adults of Pakistani (3%) Indian (5%), Bangladeshi (6%), Caribbean (7%) and African (8%) ethnicity use bicycles often than adults of other ethnicities.
- **Mobility impairments**. Only 3% of those with mobility impairments use bicycles often compared to 11% of those without mobility impairments.
- **Educational attainment**. One-in-seven (14%) adults with a degree use bicycles often compared with 5% of adults with no qualifications.
- **Employment status**. Full-time students and those unemployed are more likely to use a bicycle often (15% and 14% respectively) than those of other employment status.
- **Personal income**. Those adults with the lowest incomes and highest incomes are more likely to use a bicycle often (11% of adults earning less than £500 per month and 13% of adults earning more than £2,000 per month).
- **Car access.** Three-in-twenty (15%) adults with a driving licence but no car access use a bicycle often compared to 10% of adults with access to a car and 9% of adults with no driving licence.

Frequent bicycle use is also more prevalent amongst adults working in temporary jobs (15%) and adults living in Inner London (15%) compared to adults living in Outer London (8%) and other Metropolitan areas (7%). One-in-ten adults use bicycles often in other areas.

Figure 4:10 Bike use frequency by age (%)



Source: Understanding society (see Appendix table A:8)

Results from analysis that simultaneously controls for multiple factors[28] show that not having access to a car has a large positive association with using a bicycle often, as it does with using buses and trains often (it is two times more likely for those with a driving licence but no car access to use a bicycle often and 1.4 times more likely for those without a driving licence) (see Appendix table A:13). The results for settlement type are consistent with the bivariate relationships mentioned above. The results for population characteristics are generally consistent with the bivariate relationships mentioned above. One exception is personal income is not found to be associated with using bicycles often after accounting for other factors.

The results for frequency of bicycle use are consistent with the National Travel Survey, but also show that white ethnicity, having degree-level education, being a full-time student and working in a temporary job are associated with increased bicycle use.

4.5 Conclusions

The results reported in this chapter provide new insights on population differences in transport access and use due to having different measures available to the National Travel Survey and testing explanatory variables not available in the National Travel Survey.

The results from Understanding Society data are consistent with what is already known about car access, but also show that lower car access is associated with not being born in the UK, living in rental accommodation, having a temporary job, not having any

[28] Multiple logistic regression model results (without weighting) based on Understanding Society 2014-15 sample of all adults in GPS, EMBS and BHPS samples living in England who answered the bicycle use frequency question. The same set of independent variables is included in the regression model of bicycle use as the model of car access, except that car access is included as an additional variable.

educational qualifications and having mobility impairments. The same population groups with more limited car access report less car use, although the differences are less striking. For example, of those in the lowest income quintile 41% have car access (compared to 69% on average across the population) with 84% reporting using a car often (compared to 87% on average). Women are just as likely to use a car frequently as men, even though a lower percentage of women have access to a car. Living near to frequent bus services is associated with reduced likelihood of using a car often, as it is with reduced likelihood of car access. This implies that better bus access reduces the need to own and use a car.

The results obtained for bus access (measured in terms of the number of bus stops within walking distance and the frequency of buses serving those local bus stops) show that it varies considerably according to level of urbanisation. The findings also show that people from BME groups, those not born in the UK, those living in rental accommodation, those unemployed and those without access to a car tend to have better bus access. The spatial context in which people live has the greatest influence on how public transport is rated. Having frequent local bus services is also important. For example, living near to a bus stop served by a bus more than once every five minutes is associated with over twice (2.2) the likelihood of rating public transport as good compared to living near to a bus stop served only once or twice per hour. Very few characteristics are associated with individuals' rating of local public transport. Being aged 70 or more and lower educational attainment are associated with a more positive rating, while having mobility impairments is associated with a more negative rating.

Regular bus use is more likely for those without car access, those living in a city and those served by frequent bus services. Being aged 60 and over, living alone, being a full-time student and working in a temporary job are also associated with increased bus use.

The results for frequency of train use are in line with those from the National Travel Survey but highlight a wider range of socio-economic factors that are associated with increased train use. The results demonstrate the dominant effect of London on train use amongst the adult population of England.

The results for frequency of bicycle use are also consistent with the National Travel Survey, but additionally show that having a degree-level education, being a full-time student, having white ethnicity and working in a temporary job are associated with increased bicycle use.

In summary, the following key findings have been found for specific population groups:

- Adults under the age of 30 have more limited car access and lower car use than other age groups but better bus access and make greater use of buses, trains and bicycles.
- People aged 70 and over have more limited car access and lower car use than adults aged 30-69, the same bus access as other age groups, but rate local public transport more highly and use buses more frequently and trains and bicycles considerably less frequently.
- Women have more limited car access than men but use cars as frequently as men. They use buses more frequently than men and trains and bicycles considerably less frequently.

- People from Asian backgrounds have more limited car access than those of white ethnicity, although their car use is similar and, after accounting for other factors such as where they live, have a greater likelihood of being frequent car users. They have better bus access and higher bus and train use but, after accounting for other factors, have the same likelihood of being frequent bus or train users. They use bicycles less than other ethnic groups.
- People from Black background have more limited car access and lower car use than those of white ethnicity but, after accounting for other factors, have the same likelihood of being frequent car users. They have better bus access and much higher bus and train use.
- People with health-related mobility impairments have more limited car access and lower car use than the rest of the population. Although their bus access is similar to the rest of the population, they do not rate local public transport as positively. They use buses as frequently as the general population but not as much other people with similar characteristics (in terms of age, etc.), which implies they experience barriers to using buses. Those with mobility impairments use trains and bicycles considerably less frequently than the rest of the population.
- People with personal incomes in the lowest quintile have considerably more limited car access but only slightly lower car use than people with higher incomes and make greater use of buses but less use of trains. Their frequency of bicycle use is similar to those with higher incomes.

5 Social participation and wellbeing

Chapter 2 explained why transport disadvantage might affect people's ability to access services and opportunities and hence their wellbeing. It summarised evidence from studies conducted worldwide which have examined this relationship. While these indicate adverse impacts arising from transport disadvantage, it is apparent that it would be beneficial to examine this more comprehensively with larger data sets that encompass the population at large.

This chapter presents an assessment of whether transport availability affects access to services, social connections and wellbeing and addresses two research questions:

- To what extent does transport availability (private cars and public transport) affect access to services, social connections and wellbeing?
- Are there differences in the importance of transport by gender, age, disability and where people live?

The results in this chapter are mainly based on analyses of Understanding Society panel data collected between 2011 and 2015 for adults living in England. Some results are based on English Longitudinal Study of Ageing panel data collected between 2014 and 2017.

The first two sets of results presented in this chapter are concerned with transport's role in people's daily lives and specifically with respect to their ability to access services and go out socially. After this, it is investigated if there is any link between transport access and broader wellbeing in terms of strain, mental health and life satisfaction. Finally, it is examined for older people if there is any link between transport access and loneliness.

Summary of key findings

- Both personal car access and public transport access are important for being able to access services.
  - Having personal car access makes it twice (2.0 times) as likely that someone can access services. It has greater importance in relation to accessing services for those with health-related mobility impairments and those living in rural areas. Losing car access makes it three times (2.9 times) as likely that someone becomes unable to access services.
  - Rating local public transport as good, rather than poor, makes it nearly three times (2.8 times) more likely that someone can access services. Short journeys by public transport to town centres (10 minutes or less) make it 1.7 times more likely that someone can access services (compared to journeys of over 30 minutes).
- Both personal car access and public transport access are also important for being able to go out socially.
  - Having personal car access makes it 1.7 times more likely that someone can go out socially. It has greater importance in relation to going out socially for those with health-related mobility impairments and those living in rural areas. Acquiring personal car access makes it 1.7 times more likely that someone becomes able to go out socially. Losing personal car access makes it 2.3 times more likely that someone becomes unable to go out socially.
  - Rating local public transport as good, rather than poor, makes it 1.4 times more likely that someone can go out socially.
- Transport access plays a more minor role for the measures of personal wellbeing examined in this study. Rating local public transport as good, rather than poor, makes it less likely that someone feels under strain, has poor mental health or reports being dissatisfied with life.
- Amongst the older population aged 50 and over, having personal car access as a driver makes it less likely (by 0.8 times) that someone reports feeling lonely. Having a concessionary bus pass and using public transport are not found to affect loneliness. While loneliness is more common amongst frequent bus users (with 39% of frequent bus users reporting feeling lonely compared to 31% on average in the over 50s age group), it is important to consider other factors in interpreting this finding; for example, frequent bus users are also more likely to live alone and be retired.

5.1 Access to services

Understanding Society participants are asked:

"Are you able to access all services such as healthcare, food shops or learning facilities when you need to?"

Only a very small minority of Understanding Society participants in 2014-15 (wave 6) living in England responded that they were unable to access all services when they need to (609 (2.1%) of 28,525 responses). This is probably a consequence of the way the question is phrased which does not ask about ease of access, only whether access

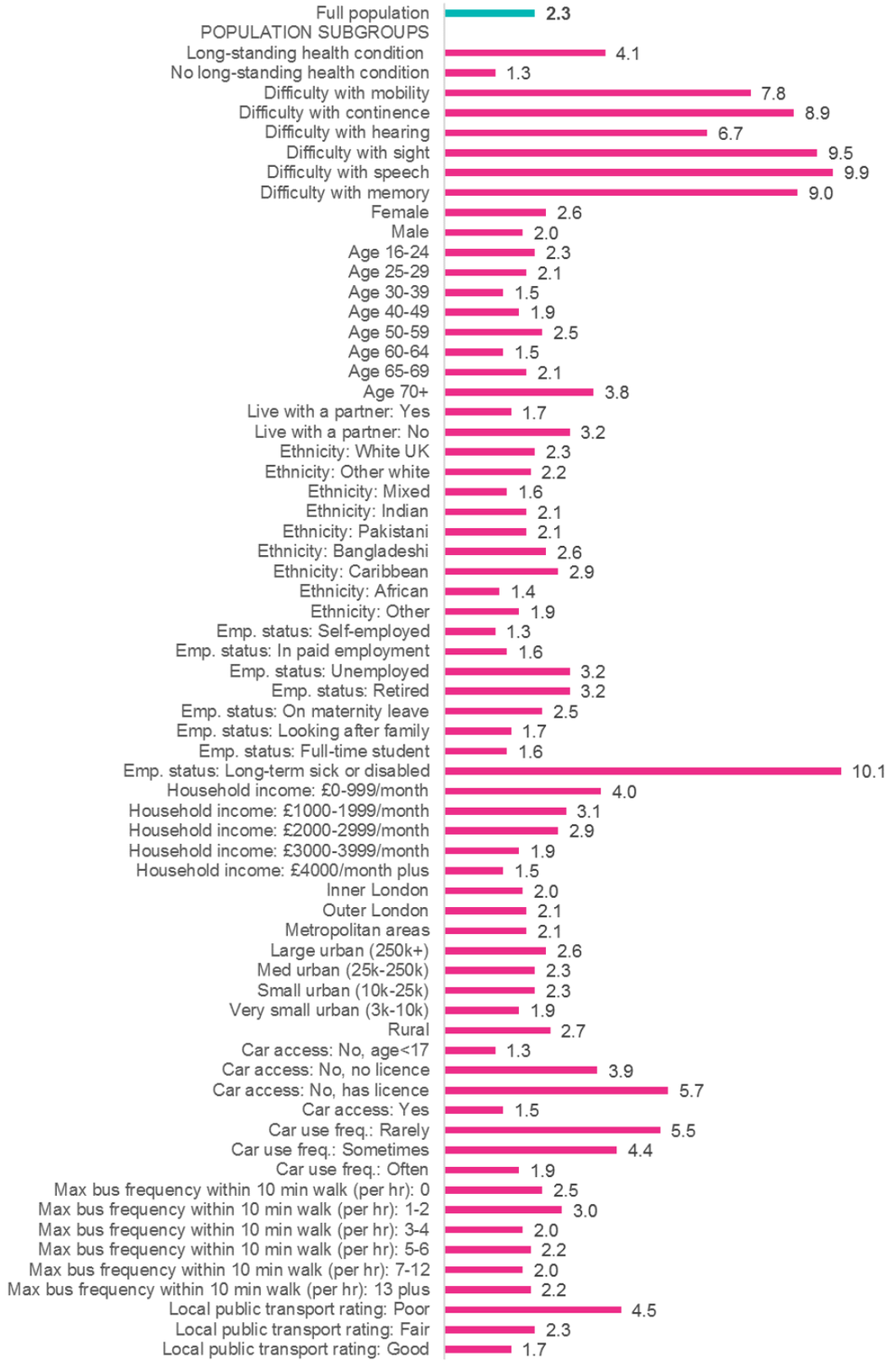
is possible. It is estimated from the data that 2.3% of the English population[29] is unable to access services when they need to. Despite this low percentage figure, it is informative to consider what population characteristics are associated with being unable to access services.

5.1.1 Factors associated with being able to access services

The ability to access services varies for different groups in the population. As shown in Figure 5:1, an inability to access services is notably more prevalent for those who have health-related impairments, who do not have car access and who rate local public transport as poor[30].

[29] Applying the appropriate sample weights.
[30] Applying the appropriate sample weights.

Figure 5:1 Percentage unable to access services amongst population sub-groups



Source: Understanding Society, 2014-15, N=28,525 (see Appendix table B:1)

The importance of health-related impairments and transport availability is confirmed in results obtained from multiple regression modelling[31] (see Appendix table B:3). Multiple regression models allow the role of individual factors to be estimated while simultaneously controlling for other factors. Having health-related mobility impairments (experienced by 12% of the sample) is associated with a lower likelihood of being able to access services compared to not having mobility impairments. Memory impairments and sight impairments are also associated with lower likelihood of being able to access services.

Having car access is associated with twice (2.0) the likelihood of being able to access services compared to not having a driving licence. Rating public transport as good increases the likelihood of being able to access services by nearly three times (2.8) compared to rating it as poor and a journey time of 10 minutes or less by public transport to the nearest town centre is associated with nearly twice (1.7) the likelihood compared to a journey time of over 30 minutes.

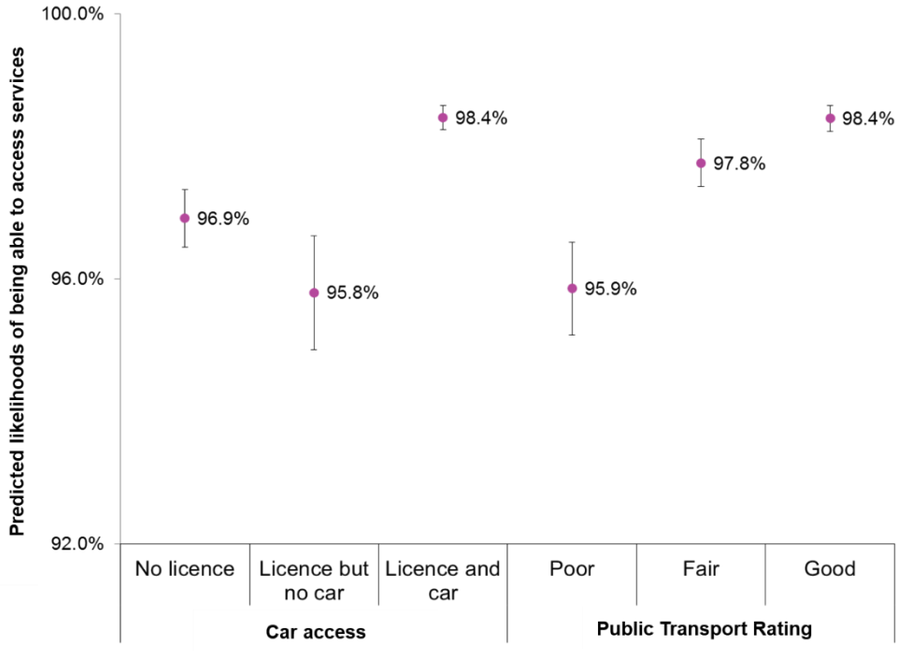
Figure 5:2 illustrates how the likelihood of being able to access services is affected by car access and public transport rating[32]. As noted previously, the majority of Understanding Society participants indicated that they can access services when they need to. It shows a 98.4% likelihood of being able to access services for having car access but 96.9% likelihood for having no driving licence. It shows a 98.4% likelihood of being able to access services for rating public transport as good but 95.9% likelihood for rating public transport as poor[33].

[31] Multiple logistic regression model results (without weighting) based on Understanding Society 2014-15 sample of all adults in GPS, EMBS and BHPS samples living in England who answered the access to services question. Independent variables tested in development of a main model – health impairments (in general and specific impairments), age group, gender, ethnicity, UK born, number of adults, number of children, parent, live with partner, housing tenure, educational qualifications, employment status, job type (SEC), part-time work, temporary work, household income, personal income, number of household cars, car access, rating of local public transport, bus stops within 5/10 minutes, bus frequencies within 5/10 minutes, settlement type, population density, travel time to nearest town centre, number of food shops within 15 minutes, travel time to nearest food shop, number of major employment centres within 30 minutes and travel time to nearest major employment centre. Variables are retained in main model if statistically significant at 99% level (this high level of confidence was chosen given the large sample size). Further model testing was conducted with frequency of use of car/bus/train/bicycle, commute mode and commute duration.

[32] These are obtained using the 'margins' command in Stata which produces the average probability of outcome if everyone in the data is treated as having a fixed value of the covariate of interest (for example, everyone having car access).

[33] As well as estimated likelihoods of being able to access services, 95% confidence intervals are shown in Figure 5.2. For example, these show statistically significant differences between having car access and not having a driving licence and between having car access and having a licence but no car access.

Figure 5:2 Predicted likelihoods of being able to access services



Source: Understanding Society, 2014-15, N=28,510

While the subjective rating of local public transport is associated with being able to access services, the objective measures of bus access that were available (number of bus stops in close proximity to residence, frequency of bus services in close proximity to residence) are not found to be statistically significant. This may be a consequence of the objective measures not adequately reflecting the usefulness of local buses for meeting activity needs (for example, serving destinations where people wish to travel). It is also possible that the subjective rating of local public transport reflects people's attitude towards and willingness to use public transport, as much as quality of provision. However, the positive association is very large and is unlikely to be unconnected with the quality of local bus services.

Investigations to see if the role of car access and public transport access varies for different groups in the population[34] show that **car access is more important for those with mobility impairments** (by nearly double (1.7 times) that of those without mobility impairments) **and for those living in rural areas** (by over three (3.3) times compared to those living in Inner London).

Additional analysis shows that using a car often and a bus often are both associated with greater likelihood of being able to access services. This indicates that actual use of transport options, as well as availability, influences ability to access services. It is also found that a one-way commute duration of between 46 and 60 minutes (which

[34] This was conducted by adding interaction terms to the main model to consider whether statistical associations with car access, travel time to nearest town centre and rating of local public transport differed for those with and without mobility impairments, for men and women, for different age groups and for different residential settlement types.

applies to about 8% of the working population) is associated with lower likelihood of being able to access services than a one-way commute duration of between 1 and 15 minutes (which applies to about 37% of the working population). However, no significant difference is found for other commute duration categories such as 61 to 90 minutes, hence this does not provide definitive evidence that longer commute durations are associated with more difficulty in accessing services.

5.1.2 Factors associated with changes in being able to access services

Factors associated with changes in being able to access services were examined through an analysis of the sample of Understanding Society participants that had valid responses to the access to services question in 2011-12 (wave 3) and 2014-15 (wave 6) (the two waves where this information has been collected). This sample included 23,791 participants with 3.8% of these (900) reporting changes in being able to access services:

- 84.8% (479) of the 565 participants who reported they were unable to access services in 2011-12 reported that they were able to access services in 2014-15
- 1.8% (421) of the 23,226 participants who reported they were able to access services in 2011-12 reported that they were unable to access services in 2014-15

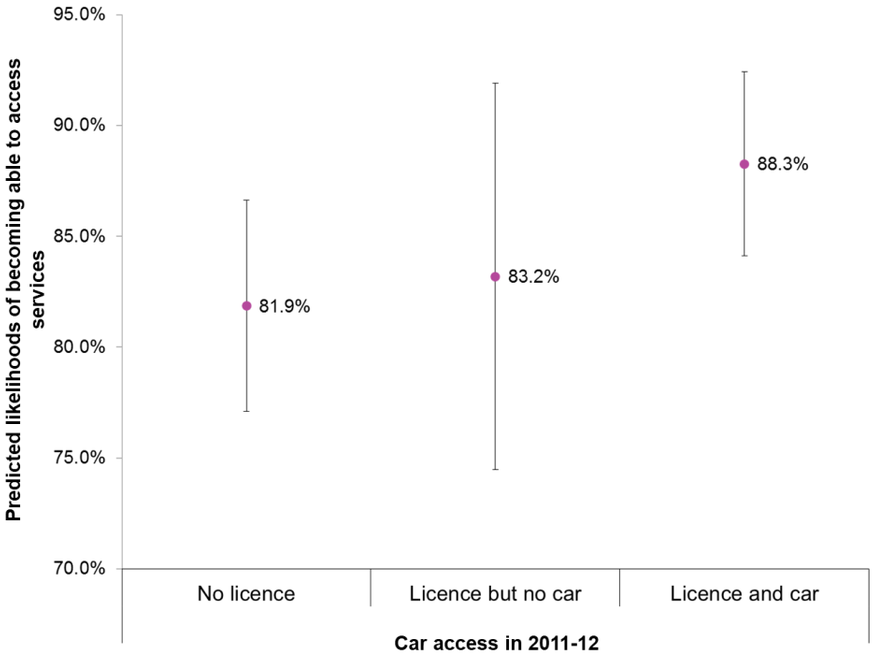
An initial examination of the extent to which changes in access to services occur in association with different life events (see Appendix table B:4) gives an indication of life events that affect the ability to access services. For example, those people who reported that they were able to access services in 2011-12, but who lost car access by 2014-15, are more likely to report being unable to access services at 2014-15.

The results for a multiple regression model[35] of becoming able to access services are shown in Appendix table B:5. There are few factors associated with this change with no life events statistically significant (not surprising since relatively few survey participants experienced the life events). There is an increased likelihood of this change for those without mobility impairments at 2011-12 and those that are a parent at 2011-12.

Figure 5:3 illustrates how the likelihood of becoming able to access services is affected by car access. Having car access is associated with a greater likelihood of becoming able to access services, but this is not statistically significant.

[35] Independent variables tested are the same ones as previously identified (included here as baseline variables for 2011-12) and the life events identified in Appendix table B:4. Change in the number of bus stops within 5/10 minutes and bus frequencies within 5/10 minutes were also tested (a change in these could only occur if the survey participant moved house). It was also tested if the role of car access and other transport access variables differed for sub-groups in the population (those with and without mobility impairments, for men and women, for different age groups and for different residential settlement types). Variables are retained in the main model if statistically significant at 95% level.

Figure 5:3 Predicted likelihoods of becoming able to access services



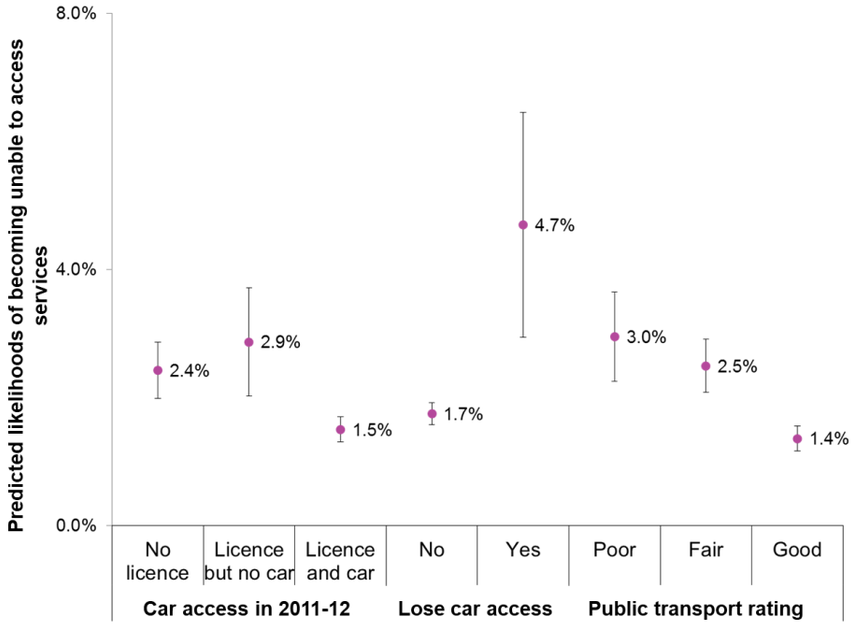
Source: Understanding Society, 2011-12 and 2014-15, N=557

On the other hand, becoming unable to access services is associated with not having car access, as can be seen in Appendix table B:6. It is one and a half (1.5) times more likely for those that do not have a driving licence at 2011-12 (compared to those with car access) and nearly three times (2.9) more likely for those that lose car access between 2011-12 and 2014-15. The large associations between becoming unable to access services and both baseline lack of car access and loss of car access provide strong evidence of a causal relationship.

Those reporting poor public transport are over twice (2.3 times) as likely as those reporting good public transport of becoming unable to access services. After accounting for this, a counter-intuitive finding is that those who have the most frequent bus services near where they live are more likely to become unable to access services. Possible explanations are that the amenities in locations with dense bus services are not perceived to be satisfactory and that there is crowding and congestion in the transport system in these locations.

Figure 5:4 illustrates how the likelihood of becoming unable to access services is affected by car access and public transport rating. It highlights that losing car access strongly increases the likelihood of becoming unable to access services.

Figure 5:4 Predicted likelihoods of becoming unable to access services



Source: Understanding Society, 2011-12 and 2014-15, N=23,129

The results in Appendix table B:6 also show that health impairments of various kinds are associated with a greater likelihood of becoming unable to access services – in particular, those who acquire mobility impairments between 2011-12 and 2014-15 are over three times (3.2) more likely to become unable to access services as those who do not. Those who move from paid employment to long-term sickness and those who rent public sector housing are also more likely to become unable to access services.

5.2 Go out socially

Understanding Society participants are asked:

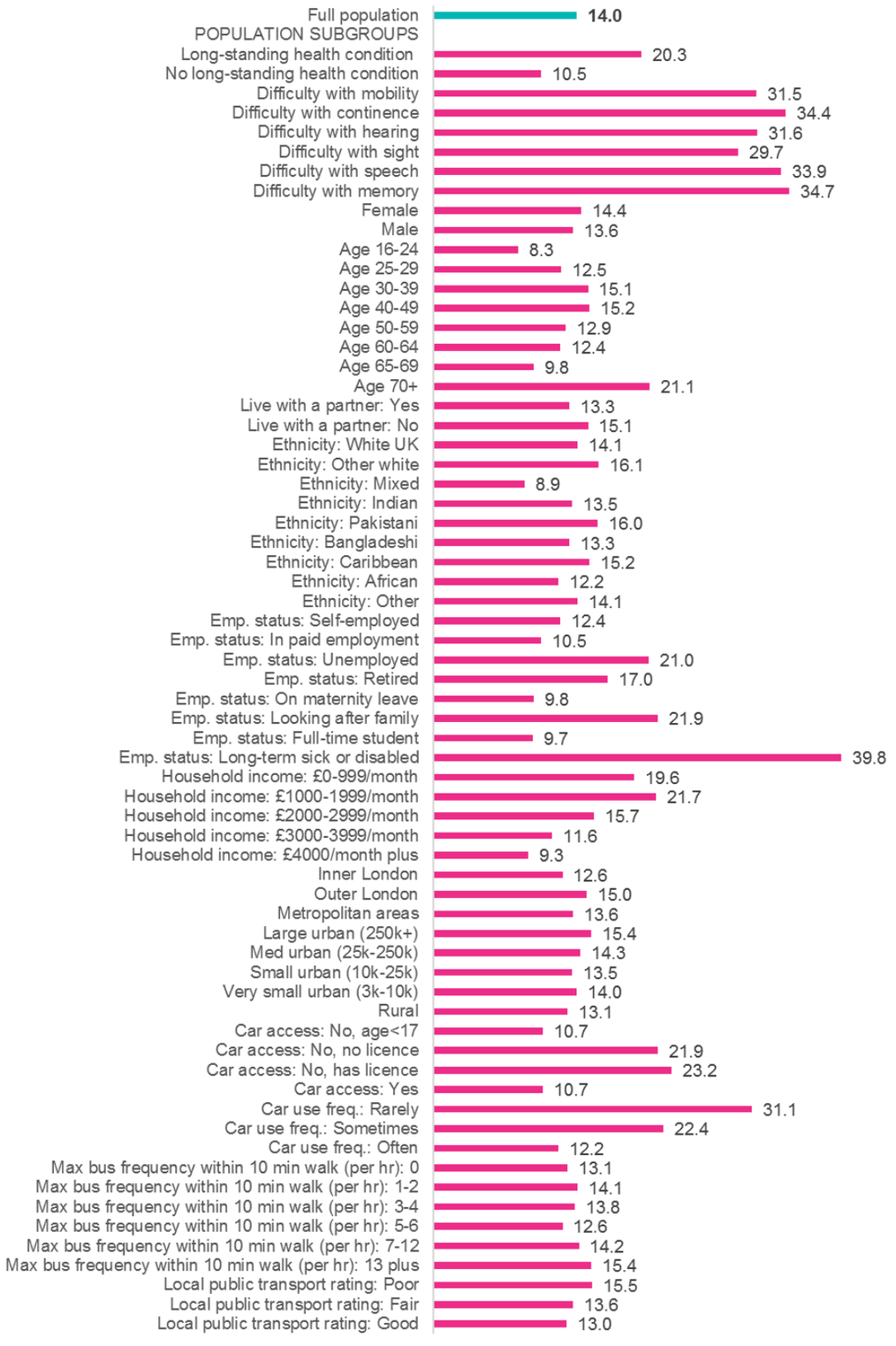
"Do you go out socially or visit friends when you feel like it?"

About one in eight Understanding Society participants living in England in 2014-15 responded that they were unable to go out socially or visit friends when they feel like it (3,898 (13.7%) of 28,545 responses). It is estimated that this applies to 14.0% of the English population.

5.2.1 Factors associated with being able to go out socially

The ability to go out socially varies for different groups in the population. As shown in Figure 5:5, an inability to go out socially is notably more prevalent for those who have health-related impairments, who are aged 70 and over, who are unemployed or looking after their family, who have low household income and who do not have car access.

Figure 5:5 Percentage unable to go out socially amongst population sub-groups



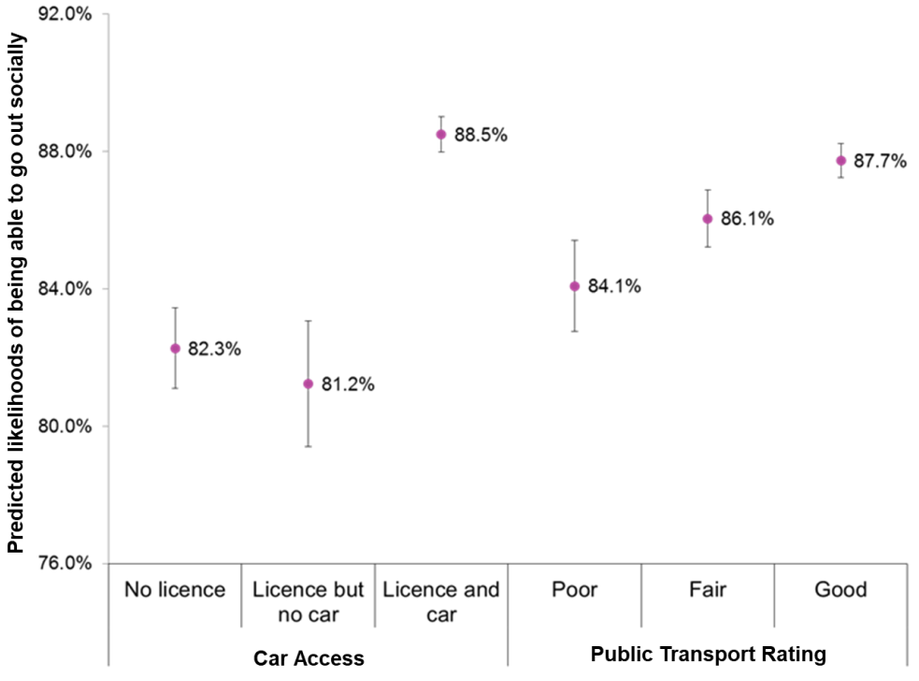
Source: Understanding Society, 2014-15, N=28,545 (see Appendix table B:1)

The importance of transport is apparent when controlling for other factors[36] (see Appendix table B:7). **Being able to go out socially is associated with car access, perception of public transport and the nature of where people live**:

- Having car access makes it nearly twice (1.7 times) as likely that someone can go out socially compared to not having a driving licence.
- Living in a household with one car per adult makes it one-and-a-half times (1.5) as likely that someone can go out socially compared to living in a household with no cars, and living in a household with more than one car per adult makes it nearly twice (1.7 times) as likely.
- Rating local public transport as good makes it nearly one-and-a-half (1.4) times as likely that someone can go out socially compared to rating public transport as poor.
- Living in Inner London makes it more likely that someone can go out socially compared to living in other areas (for example, 1.6 times as likely compared to living in rural area).

Figure 5:6 illustrates how the likelihood of being able to go out socially is affected by car access and public transport rating.

Figure 5:6 Predicted likelihoods of being able to go out socially



Source: Understanding Society, 2014-15, N=28,529

The results in Appendix table B:7 also show substantially less likelihood of being able to go out socially for those with mobility impairments, aged 70 and over and who have children. In addition, those with continence, hearing or memory impairments and those

[36] See 31.

who are male, older than 16 to 24, renting their home, long-term sick or disabled, or have a lower household income are also less likely to go out socially.

Investigations to see if the role of car access and public transport access varied for different groups in the population showed that **car access is more important for those with mobility impairments** (by one-and-a-third (1.3) times compared to those without mobility impairments) **and for those living in rural areas** (nearly twice (1.7 times) as much compared to those living in Inner London).

Further analysis showed that using a car, bus, train and bicycle (sometimes or often) are all associated with being able to go out socially. This indicates that, unsurprisingly, actual use of transport options, as well as availability, plays a role in being able to go out socially. It was also found that longer commute durations are associated with lower likelihood of being able to go out socially with, for example, four-fifths (0.8) likelihood for those with one-way commutes of between 31 and 45 minutes (which applies to about 11% of the working population) compared to those with one-way commutes between 1 and 15 minutes (which applies to about 37% of the working population).

In summary, the results show that being able to go out socially or visit friends when people feel like it depends on physical capabilities, transport availability and having adequate time and resources.

5.2.2 Factors associated with changes in being able to go out socially

Factors associated with changes in being able to go out socially were examined through an analysis of the sample of Understanding Society participants that had valid responses to the go out socially question in 2011-12 and 2014-15. This sample included 23,809 participants with 16.3% of these (3,891 out of 23,809) reporting changes in being able to go out socially:

- 59.3% (1,846) of the 3,111 participants who reported they were unable to go out socially in 2011-12 reported that they were able go out socially in 2014-15.
- 9.9% (2,045) of the 20,698 participants who reported they were able to go out socially in 2011-12 reported that they were not able to go out socially in 2014-15.

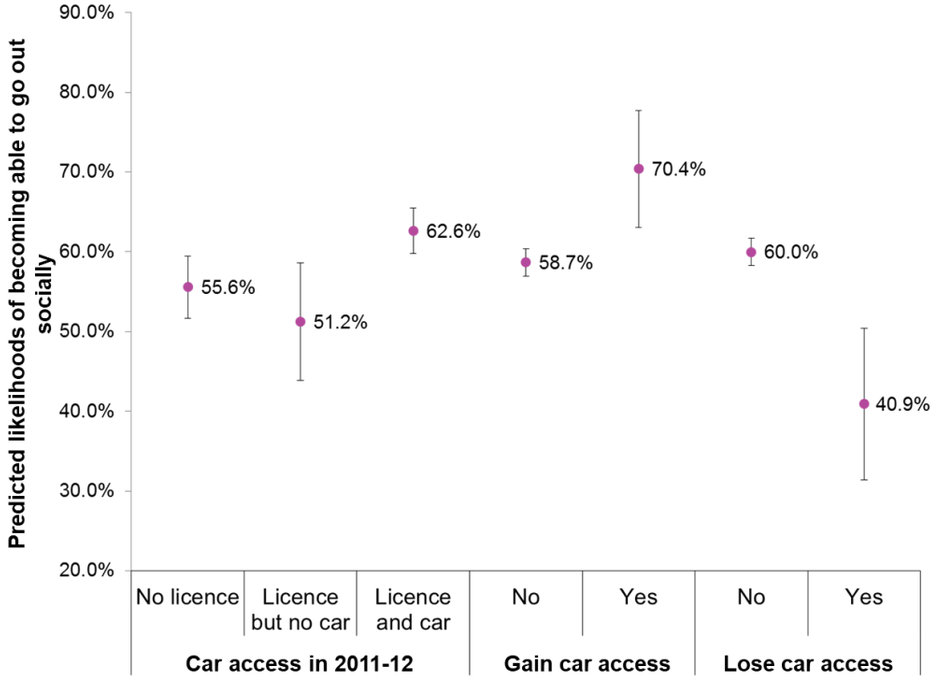
An initial examination of the extent to which changes in being able to go out socially occur in association with different life events (see Appendix table B:8) gives an indication of life events that affect the ability to go out socially. For example, those people who reported that they were not able to go out socially in 2011-12, but who gained car access by 2014-15, were more likely to report being able to go out socially in 2014-15.

Car access is shown to play a key role in becoming able to go out socially after controlling for other factors[37] (see Appendix table B:9). The likelihood of becoming able to go out socially is higher for those that have car access in 2011-12 and increases with the number of cars per adult in 2011-12. It is almost twice (1.7 times) as likely for those that gain car access between 2011-12 and 2014-15. Conversely, it is four-tenths (0.4 times) as likely for those that lose car access between 2011-12 and 2014-15. **These statistical associations between becoming able to go out socially and car access variables provide very strong evidence of a causal relationship.** Figure 5:7

[37] See 35.

illustrates how the likelihood of becoming able to go out socially is affected by car access.

Figure 5:7 Predicted likelihoods of becoming able to go out socially



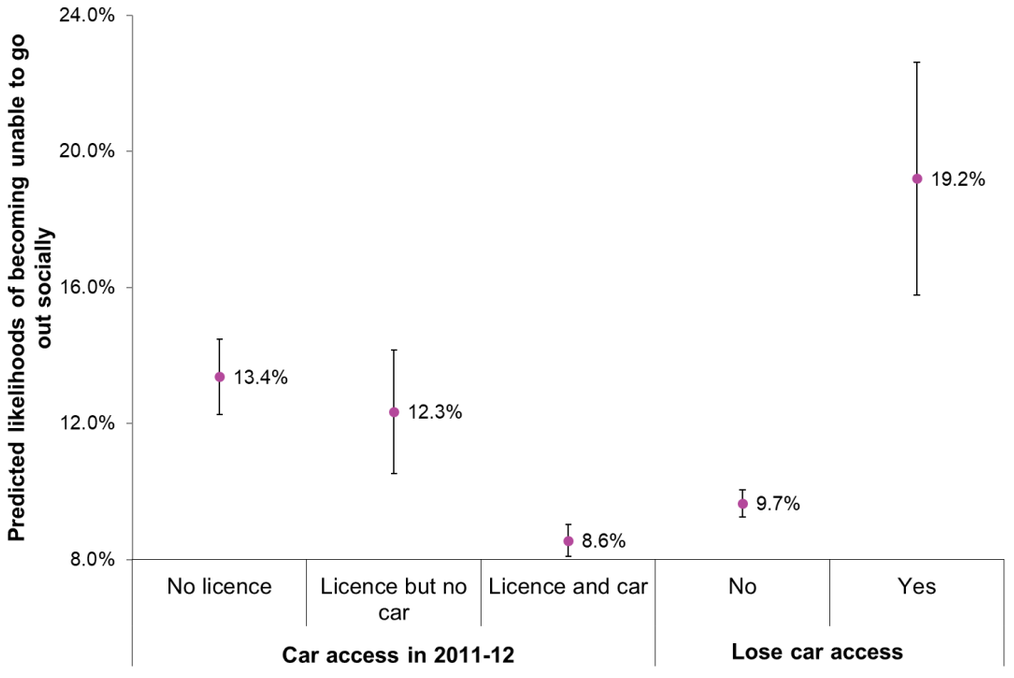
Source: Understanding Society, 2011-12 and 2014-15, N=3,109

Investigations to see if the role of car access varied for different groups in the population showed that car access in 2011-12 is more important for those with mobility impairments (by one-and-a-half (1.5) times compared to those without mobility impairments) and for those aged 70 and over (by two-and-a-half (2.5) times compared to those aged 16-24).

The likelihood of becoming able to go out socially is also lower for those with mobility impairments in 2011-12 or who acquire them between 2011-12 and 2014-15, those aged 70 and over and those who live in a smaller urban area or rural area (see Appendix table B:9). The likelihood is also higher for those who retire which is presumably due to increased time available for social activities.

Car access also plays a key role in becoming unable to go out socially, as can be seen from Appendix table B:10. The likelihood of becoming unable to go out socially is almost twice as likely (1.7 times) for those without a driving licence in 2011-12. It is more than twice as likely (2.3 times) for those that lose car access between 2011-12 and 2014-15. **Again, this provides strong evidence of a causal relationship between becoming unable to go out socially and car access.** Figure 5:8 illustrates how the likelihood of becoming unable to go out socially is affected by car access.

Figure 5:8 Predicted likelihoods of becoming unable to go out socially



Source: Understanding Society, 2011-12 and 2014-15, N=20,693

Investigations to see if the role of car access varied for different groups in the population showed that the likelihood of becoming unable to go out socially for those losing a car is nearly twice as likely (1.9 times) for those with mobility impairments and half as likely (0.5 times) for those with car access in 2011-12 living in a rural area compared to living in Inner London (for reasons that are unclear).

The results in Appendix table B:10 also show that mobility, speech and memory impairments are associated with greater likelihood of becoming unable to go out socially, as are being aged 70 or over, having more children, a low household income and renting a home. Those who move from paid employment to long-term sickness also have greater likelihood of becoming unable to go out socially, while those who retire and move from being a student to paid employment have lower likelihood.

5.3 Feeling under strain

Understanding Society participants are asked:

"Have you recently felt constantly under strain?"

About one in five Understanding Society participants living in England in 2014-15 responded that they have recently felt constantly under strain (5,918 (21.6%) of 27,406 responses)[38]. It is estimated that this applies to 20.8% of the English population.

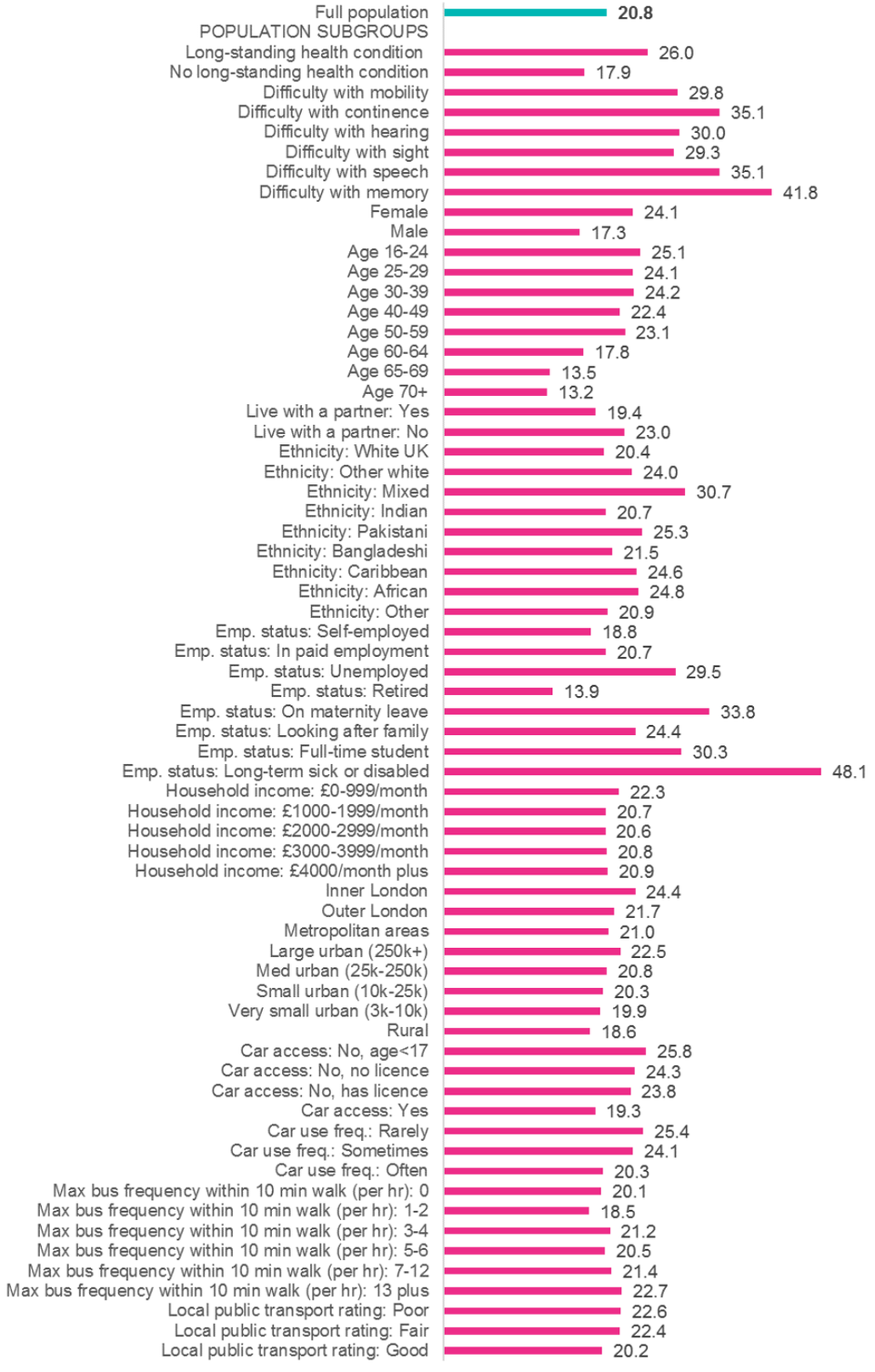
5.3.1 Factors associated with feeling under strain

As shown in Figure 5:9, feeling under strain is notably more prevalent for those who have health-related impairments, who are women, who are aged 16 to 24, who are unemployed, on maternity leave or a full-time student, live in Inner London and who do not have car access.

After controlling for other factors[39] (see Appendix table B:11), it is apparent that feeling under strain is more likely for women, for those with health impairments and those with pressure from studies or work. In particular, there is greater likelihood of feeling under strain for those with mobility, continence, hearing or memory impairments and those who are female, younger than 60, rent their home, have qualifications above GCSE, are a full-time student or are long-term sick or disabled, have management/supervisory job responsibilities and work full-time.

[38] This is the combined total of those saying 'rather more than usual' (4,808) and 'much more than usual' (1,110) with 13,577 reporting 'no more than usual' and 7,911 reporting 'not at all'.
[39] See 31.

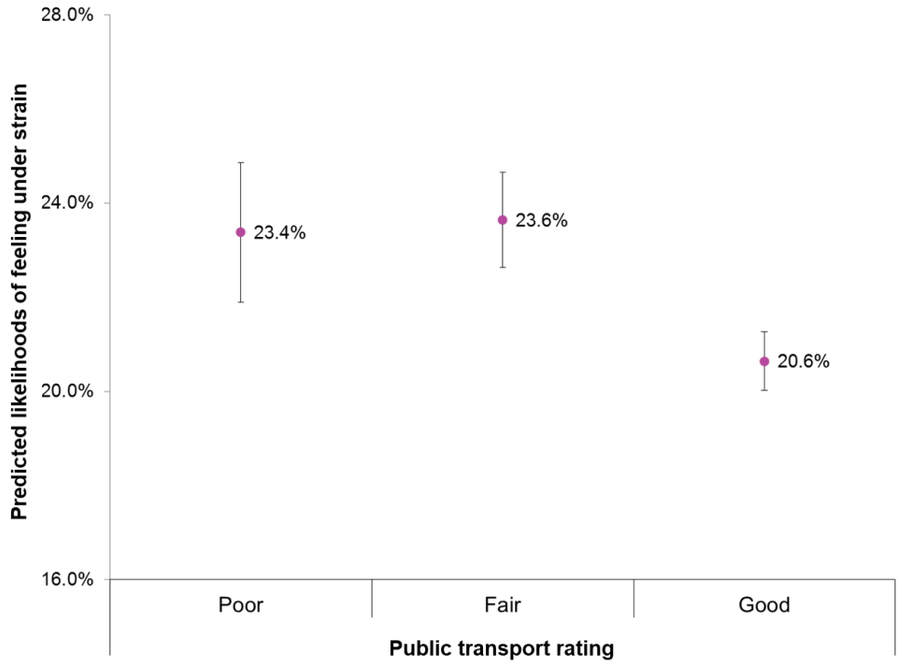
Figure 5:9 Percentage feeling under strain amongst population sub-groups



Source: Understanding Society, 2014-15, N=27,406 (see Appendix table B:1)

The likelihood of feeling under strain is greater (1.2 times) for those who rate public transport as poor compared to those who rate it as good. Figure 5:10 illustrates this. No statistically significant associations were found for other transport and accessibility variables. Investigations to see if the importance of rating of public transport varied for different groups in the population showed that the rating of public transport is not important for people with mobility impairments.

Figure 5:10 Predicted likelihoods of feeling under strain



Source: Understanding Society, 2014-15, N=27,405

Associations between frequencies of using different transport modes and feeling under strain (controlling for other factors) were examined. People who sometimes use a bicycle are less likely (0.8 times) to feel under strain than those who rarely use a bicycle. This provides a tentative indication that cycling alleviates strain in people's lives. A one-way commute duration between 31 and 45 minutes is associated with greater likelihood of feeling under strain than a one-way commute duration of between 1 and 15 minutes. However, no significant difference was found for other commute duration categories such as 61 to 90 minutes.

5.3.2 Factors associated with changes in feeling under strain

Factors associated with changes in feeling under strain were examined through an analysis of the sample of Understanding Society participants that had valid responses to the strain question in 2013-14 (wave 5) and 2014-15 (wave 6). This sample included 23,003 participants with 24.3% of these (5,590 out of 23,003) reporting changes in feeling under strain:

- 14.1% (2,463) of the 17,462 participants who reported not feeling under strain in 2013-14 reported feeling under strain in 2014-15
- 56.4% (3,127) of the 5,541 participants who reported feeling under strain in 2013-14 reported not feeling under strain in 2014-15

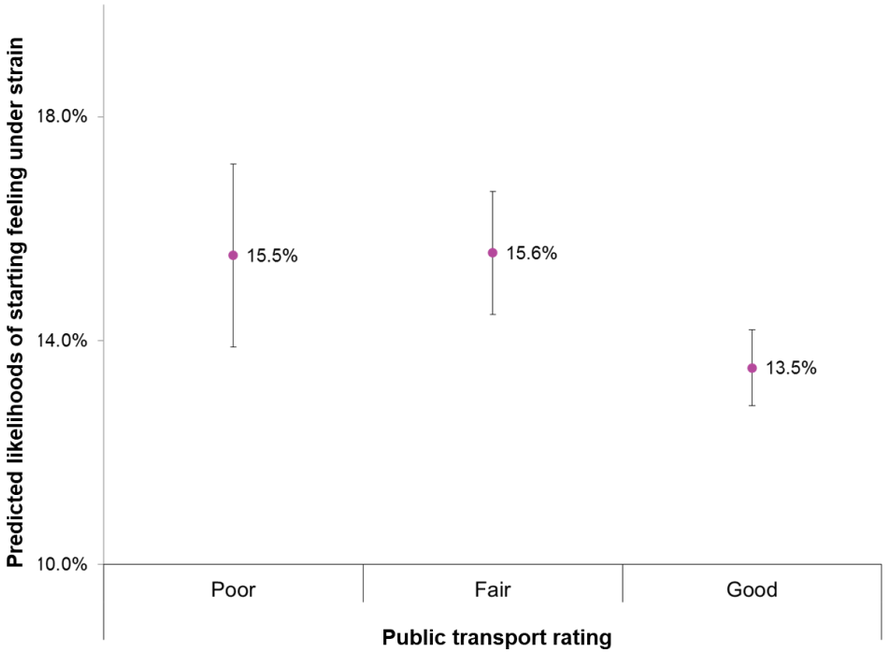
An initial examination of the extent to which changes in feeling under strain occur in association with different life events (see Appendix table B:12) gives an indication of life events that affect feeling under strain. For example, those people who reported that they were not feeling under strain in 2013-14, but who lost car access by 2014-15, were more likely to report feeling under strain in 2014-15.

Car access was not found to play a role in starting to feel under strain after controlling for other factors[40] (see Appendix table B:13). People who report poor public transport[41] are more likely (1.2 times) to start feeling under strain than those who report good public transport. Figure 5:11 illustrates how the likelihood of starting to feel under strain is affected by public transport rating.

Starting to feel under strain is considerably more likely for those who stop cohabitating with a partner or move out of work into unemployment or long-term sickness. The likelihood is considerably higher for people with mobility and memory impairments, and for women and working age adults.

[40] See 35.
[41] Rating of local public transport was not obtained in 2013-14, so responses in 2014-15 have been used in the regression models for changing strain state.

Figure 5:11 Predicted likelihoods of starting feeling under strain



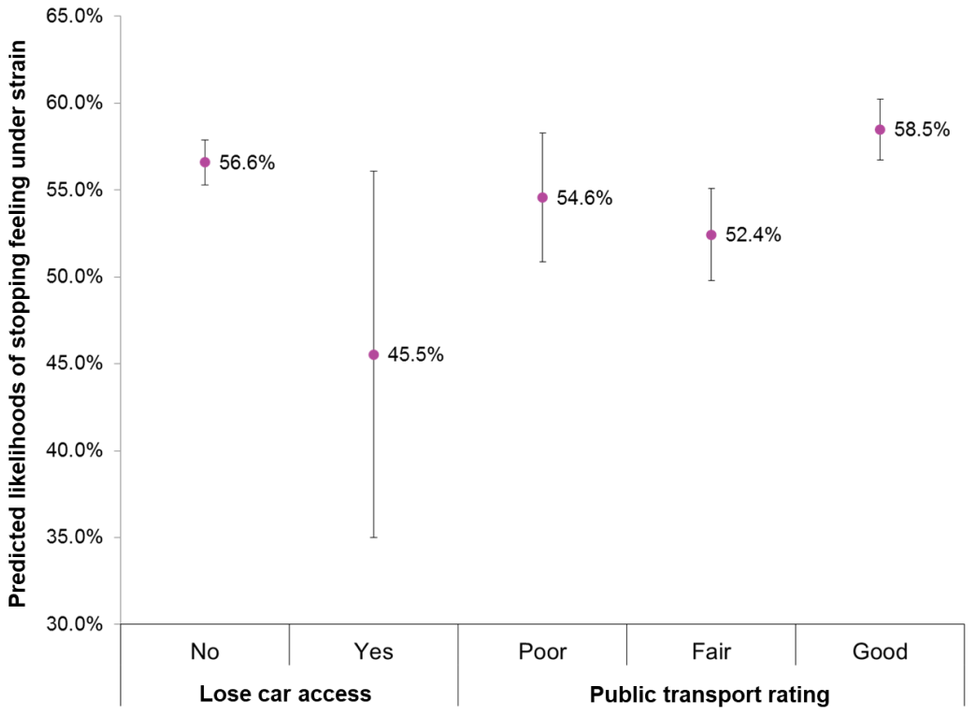
Source: Understanding Society, 2013-14 and 2014-15, N=17,461

Transport and accessibility also have a limited role for stopping feeling under strain as can be seen from Appendix table B:14. People who lose car access between 2013-14 and 2014-15 are less likely (0.6 times) to stop feeling under strain. People who report good public transport are more likely (1.2 times)[42] to stop feeling under strain than those who report poor public transport. Figure 5:12 illustrates how the likelihood of stopping feeling under strain is affected by car access and public transport rating.

Stopping feeling under strain is less likely for those who acquire a health impairment and those who stop cohabitating with a partner. It is considerably more likely for those who move out of unemployment into work and it is less likely for people with mobility, continence and memory impairments in 2013-14 and for women and adults aged under 60. This reflects the previous finding that working age adults report feeling under strain more than those of retirement age.

[42] Rating of local public transport is not quite statistically significant at 95% level (p=0.060) in the regression model for ending feeling under strain but has a plausible and opposite relationship to the regression model for starting feeling under strain.

Figure 5:12 Predicted likelihoods of stopping feeling under strain



Source: Understanding Society, 2013-14 and 2014-15, N=5,539

5.4 Mental health

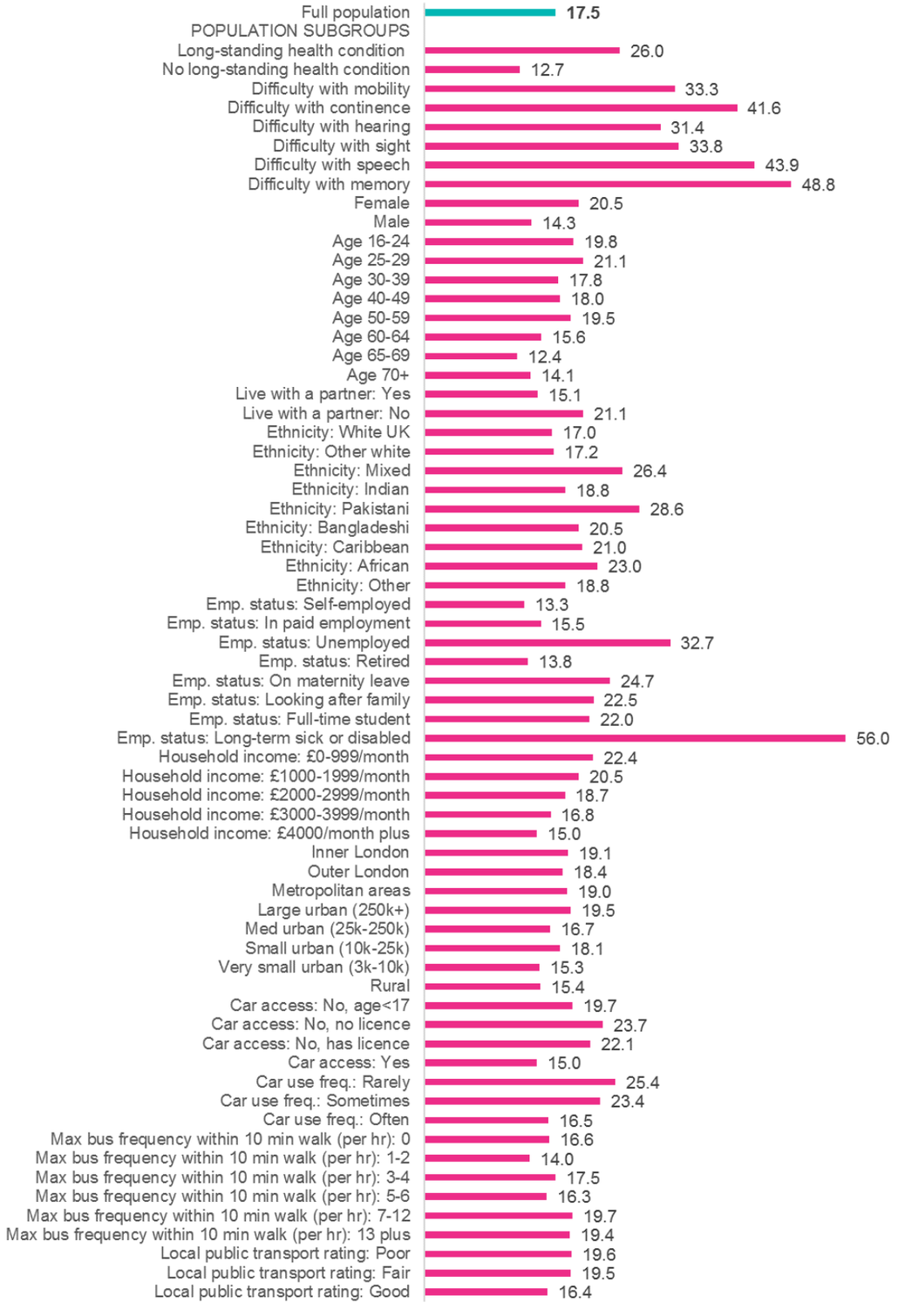
Just under one in five Understanding Society participants living in England in 2014-15 are classified as having poor mental health[43] (4,939 (18.1%) of 27,251 responses) based on their responses to the General Health Questionnaire component of Understanding Society. It is estimated that this applies to 17.5% of the English population.

5.4.1 Factors associated with poor mental health

As shown in Figure 5:13, poor mental health is more prevalent for those who have health-related impairments, who are women, who are aged 16 to 29, who are unemployed, on maternity leave, looking after their family or a full-time student and who do not have car access.

[43] Identified through the concept of 'psychiatric caseness' which is measured based on responses to General Health Questionnaire (GHQ-12) where a score of 0 or 1 is assigned to responses to each of 12 questions and if the total score is more than 3 then the person is classified in 'psychiatric caseness' status. As an example, for the question 'Have you found everything getting on top of you?', 'not at all' is scored as '0' , 'no more than usual' is scored as '0', 'rather more than usual' is scored as '1' and 'much more than usual' is scored as '1'.

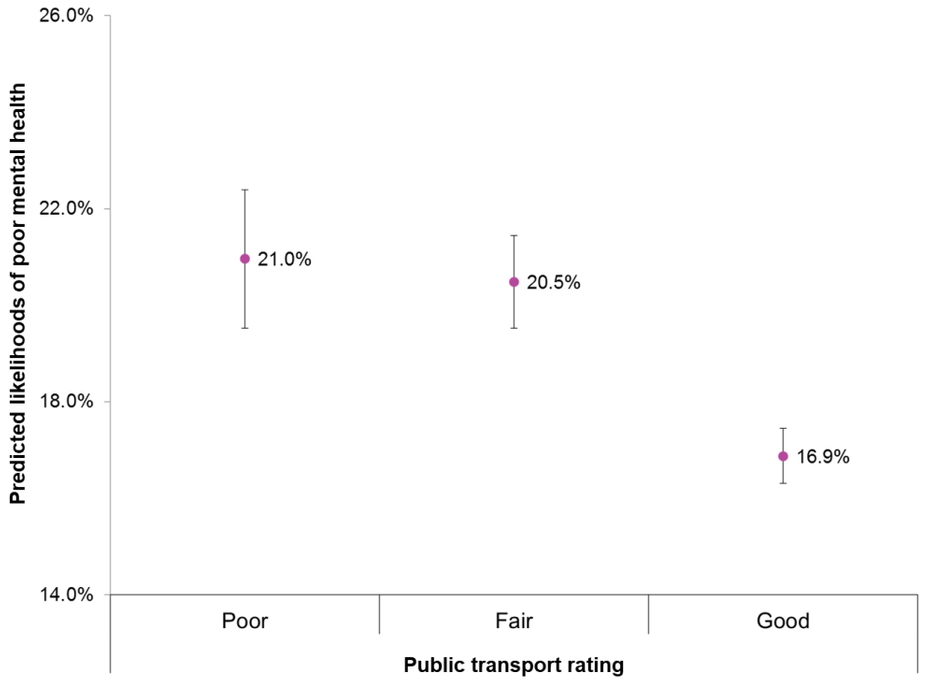
Figure 5:13 Percentage with poor mental health amongst population sub-groups



Source: Understanding Society, 2014-15, N=27,251 (see Appendix table B:1)

After controlling for other factors[44] (see Appendix table B:15), it is apparent that poor mental health is more likely for those with health impairments and those who are female, younger than 60, of mixed, Indian or Pakistani ethnicity, do not have a partner, rent their home, have a degree qualification, are unemployed, looking after family/home, a full-time student or long-term sick or disabled. The results indicate that people who rate public transport as poor are nearly one-and-a-half (1.4) times as likely to have poor mental health as those who rate it as good. Figure 5:14 illustrates this. The role of public transport rating is not found to vary for different groups in the population.

Figure 5:14 Predicted likelihoods of poor mental health



Source: Understanding Society, 2014-15, N=27,250

Further analysis showed that a one-way commute duration between 31 and 45 minutes is associated with greater likelihood of poor mental health than a one-way commute duration of between 1 and 15 minutes. However, a significant difference was not found for other commute duration categories, including commutes of over one hour.

5.4.2 Factors associated with changes in mental health

Factors associated with changes in mental health were examined through an analysis of the sample of Understanding Society participants that had valid responses to the General Health Questionnaire component of Understanding Society in 2013-14 and 2014-15. This sample included 22,889 participants with 18.9% of these (4,336 out of 22,889) indicating a change in mental health state:

[44] See 31.

- 10.6% (1,960) of the 18,441 participants who were not in poor mental health in 2013-14 were in poor mental health in 2014-15
- 53.4% (2,376) of the 4,448 participants who were in poor mental health in 2013-14 were not in poor mental health in 2014-15

An initial examination of the extent to which changes in mental health state occur in association with different life events (see Appendix table B:16) gives an indication of life events that affect mental health. For example, those people who indicated that they were not in poor mental health in 2013-14, but who stopped cohabitating with a partner by 2014-15, were more likely to indicate poor mental health in 2014-15.

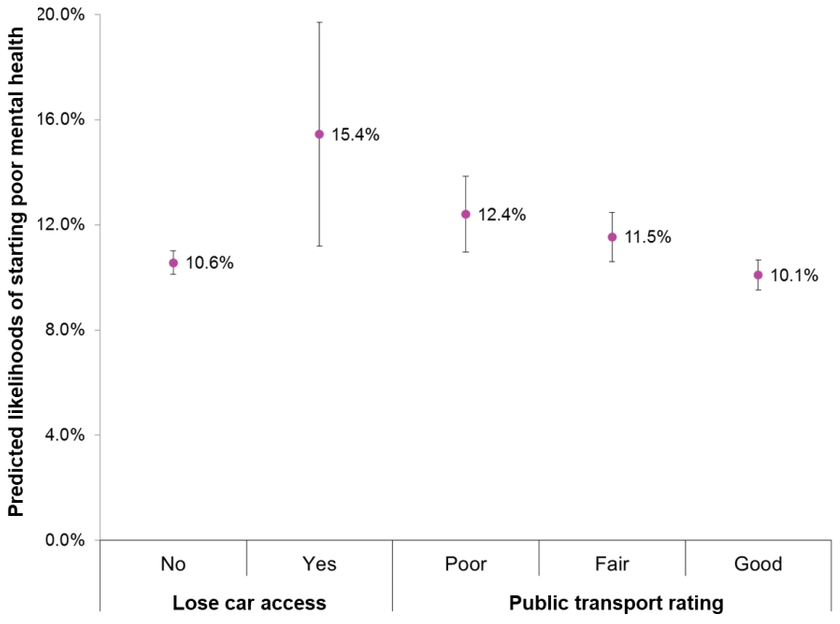
After controlling for other factors[45], the likelihood of moving into poor mental health is considerably higher for those who stop cohabitating with a partner or move out of work into unemployment or long-term sickness (see Appendix table B:17). It is also considerably higher for those that have mobility impairments in 2013-14 or acquire them between 2013-14 and 2014-15. The likelihood is also higher for people with other health impairments in 2013-14 or who acquire them between 2013-14 and 2014-15 and for women and those aged under 30. Those who are retired have lower likelihood of starting poor mental health, and those with jobs with more responsibility and temporary jobs are associated with greater likelihood of starting poor mental health.

With respect to transport, the likelihood of moving into poor mental health is over one-and-a-half (1.6) times as large for those that lose car access between 2013-14 and 2014-15 and losing car access is over two-and-a-half (2.6) times as important for those with mobility impairments. People reporting poor public transport are more likely (1.3 times) than those reporting good public transport of moving into poor mental health. When considering if this depends on gender, it is found this only applies to men. Figure 5:15 illustrates how the likelihood of moving into poor mental health is affected by car access and public transport rating.

The likelihood of moving out of poor mental health is considerably higher for those who move out of unemployment or long-term sickness into work and those who retire (see Appendix table B:18). It is much lower for those who move from work into long-term sickness or who have mobility impairments in 2013-14 or acquire them between 2013-14 and 2014-15. It is also lower for those with memory impairments in 2013-14 and for women and higher for those aged 70 and above. With respect to transport, people who report good public transport are more likely (1.3 times) to move out of poor mental health compared to those who report poor public transport. Figure 5:16 illustrates this.

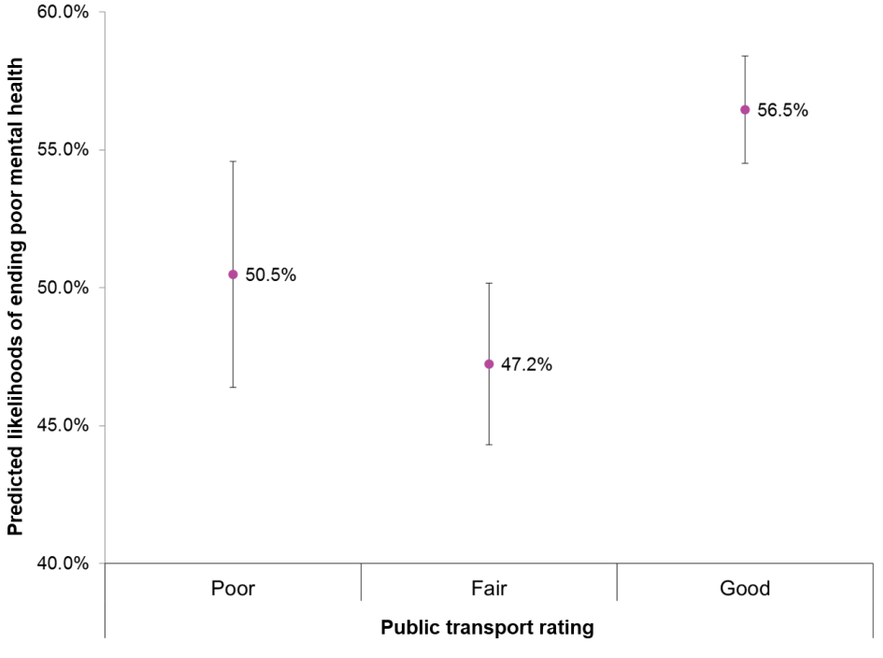
[45] See 35.

Figure 5:15 Predicted likelihoods of starting poor mental health



Source: Understanding Society, 2013-14 and 2014-15, N=14,829

Figure 5:16 Predicted likelihoods of ending poor mental health



Source: Understanding Society, 2013-14 and 2014-15, N=4,445

5.5 Life satisfaction

Understanding Society participants are asked:

"How dissatisfied or satisfied are you with your life overall?"

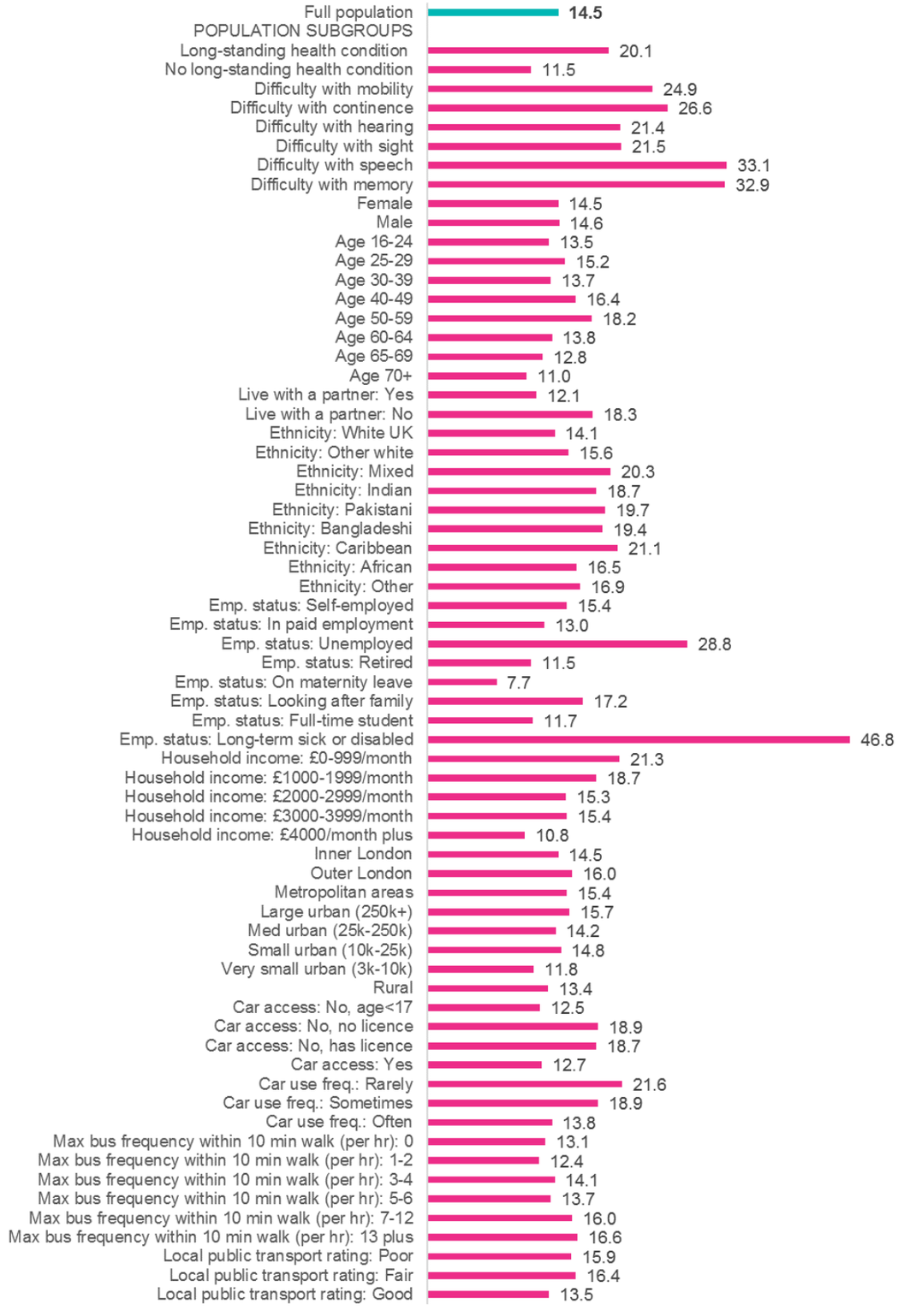
About one in seven of Understanding Society participants living in England in 2014-15 reported life dissatisfaction (4,075 (14.9%) of 27,406 responses)[46]. It is estimated that this applies to 14.5% of the English population.

5.5.1 Factors associated with life dissatisfaction

As shown in Figure 5:17, life dissatisfaction is notably more prevalent for those who have health-related impairments, who are aged 50 to 59, BME, who are unemployed, who have low household income and who do not have car access.

[46] This is a combined total of those saying 'somewhat dissatisfied' (2,103), 'mostly dissatisfied' (1,446) and 'completely dissatisfied' (526).

Figure 5:17 Percentage life dissatisfaction amongst population sub-groups



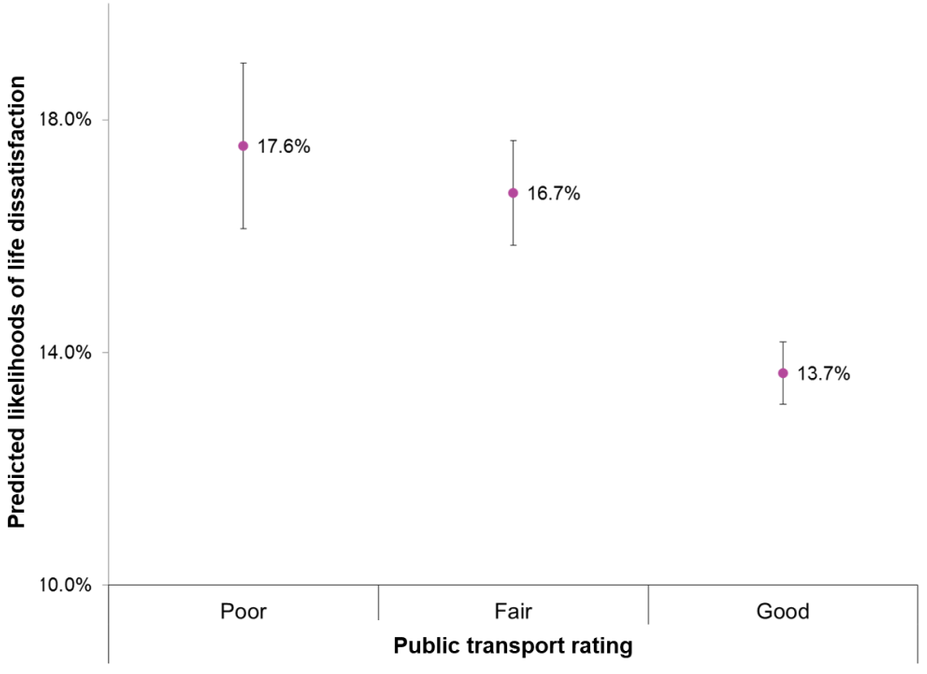
Source: Understanding Society, 2014-15, N=27,406 (see Appendix table B:1)

After controlling for other factors[47] (see Appendix table B:19), it is apparent there is greater likelihood of life dissatisfaction for those with health impairments and those who are aged 30 to 64, of mixed ethnicity, of Indian ethnicity, do not have a partner, rent their home, have A-level qualification, are self-employed, are unemployed, are long-term sick or disabled or have less than £4,000 gross household income per month. Life dissatisfaction is associated with:

- Number of cars per adult –living in a household with more than one car per adult (5% of the sample) makes it less likely (0.7 times) that someone reports life dissatisfaction than living in a household with no cars.
- Rating of local public transport – rating public transport as poor makes it more likely (1.4 times) that someone reports life dissatisfaction than rating it as good.

Figure 5:18 illustrates how the likelihood of life dissatisfaction is affected by public transport rating.

Figure 5:18 Predicted likelihoods of life dissatisfaction



Source: Understanding Society, 2014-15, N=27,390

These results suggest that car availability and perception of public transport contribute to a modest extent to life satisfaction. Studies reviewed in chapter 2 provide evidence that lower levels of mobility are associated with reduced subjective wellbeing and these findings are in line with this. Investigations to see if the role of the number of cars per adult or rating of public transport varied for different groups in the population showed no statistically significant differences.

[47] See 31.

The association between frequencies of using different transport modes and life dissatisfaction was examined. This revealed that sometimes using train and sometimes using bicycle are associated with lower likelihood of life dissatisfaction, after accounting for other factors such as household income. This gives a tentative indication that the opportunity to travel by rail and to cycle supports a more satisfying life.

5.5.2 Factors associated with changes in life satisfaction

Factors associated with changes in life satisfaction were examined through an analysis of the sample of Understanding Society participants that had valid responses to the life satisfaction question in 2013-14 and 2014-15. This sample included 22,995 participants with 18.5% of these (4,246 out of 22,995) indicating a change in life satisfaction state:

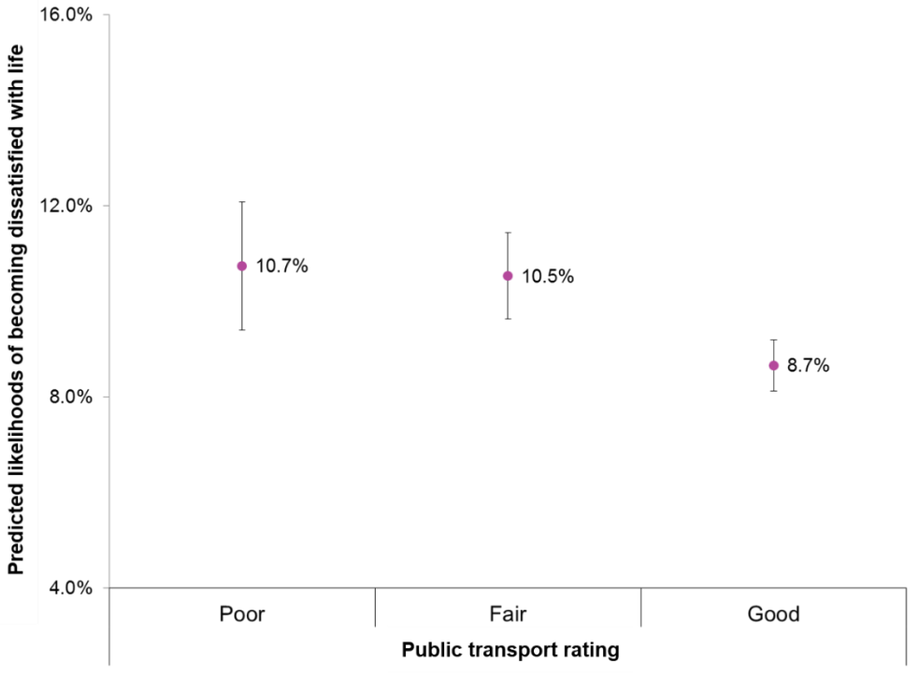
- 9.4% (1,777) of the 18,938 participants who were not in life dissatisfaction state in 2013-14 were in life dissatisfaction state in 2014-15.
- 60.9% (2,469) of the 4,057 participants who were in life dissatisfaction state in 2013-14 were not in life dissatisfaction state in 2014-15.

An initial examination of the extent to which changes in life satisfaction occur in association with different life events (see Appendix table B:20) gives an indication of life events that affect life satisfaction. For example, those people who indicated that they were not dissatisfied with life at 2013-14, but who moved from paid employment to unemployment by 2014-15, were more likely to be dissatisfied with life at 2014-15.

After controlling for other factors[48], the likelihood of becoming dissatisfied with life is considerably higher for those who do not have a partner in 2013-14 or stop cohabitating with a partner and for those who are unemployed in 2013-14 or move out of work into unemployment (see Appendix table B:21). It is also higher for those that have mobility impairments in 2013-14 or acquire them. People who report poor public transport are more likely (1.3 times) to become dissatisfied with life than those reporting good public transport. Figure 5:19 illustrates this.

[48] See 35.

Figure 5:19 Predicted likelihoods of becoming dissatisfied with life

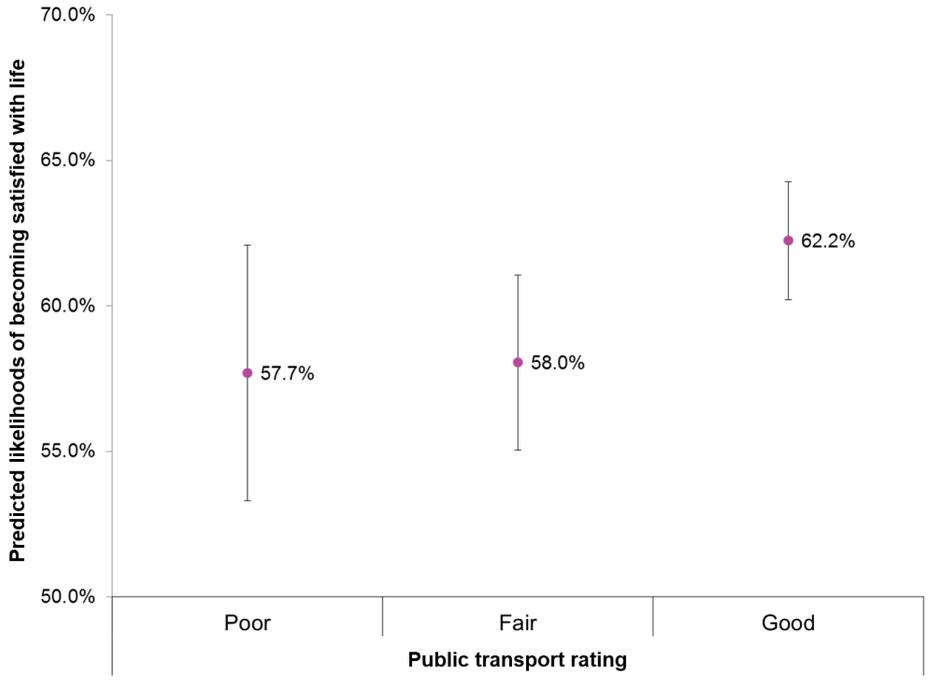


Source: Understanding Society, 2013-14 and 2014-15, N=18,925

The likelihood of becoming satisfied with life is more likely for those in 2013-14 who are aged 70 and over, live with a partner, work part-time or have a high household income. It is less likely for those who have mobility impairments or are unemployed at 2013-14 (see Appendix table B:22). It is more likely for those reporting good public transport compared to those reporting poor public transport[49] and Figure 5:20 illustrates this.

[49] Rating of local public transport is not quite statistically significant at 95% level (p=0.063) in regression model for becoming satisfied with life but has a plausible and opposite relationship to the regression model for becoming dissatisfied with life.

Figure 5:20 Predicted likelihoods of becoming satisfied with life



Source: Understanding Society, 2013-14 and 2014-15, N=4,053

5.6 The older population and loneliness

The results of the analysis of English Longitudinal Study of Ageing (ELSA) data are summarised in this section. Transport availability amongst people aged 50 is considered first, before examining the determinants of loneliness amongst the older population and the role of transport and accessibility for this.

5.6.1 Transport availability

ELSA participants are asked:

"Do you have use of a car or van when you need one (either as a passenger or driver)?"

The majority of ELSA participants (6,160 (88.4%) out of 6,965 responses) reported having use of a car when needed in 2016-17 (wave 8). It is estimated from the data that this applies to 86.9% of the English population aged 50 and over[50]. Figure 5:21 shows how levels of car access vary across different population groups. Lower levels of car access (relative to the population average) are found amongst: the unemployed,

[50] Applying the appropriate sample weights.

those in the bottom two equivalised income quintiles[51], those who do not live with a partner, those living in the more urbanised areas, older age groups (people aged over 80) and women.

ELSA participants are also asked:

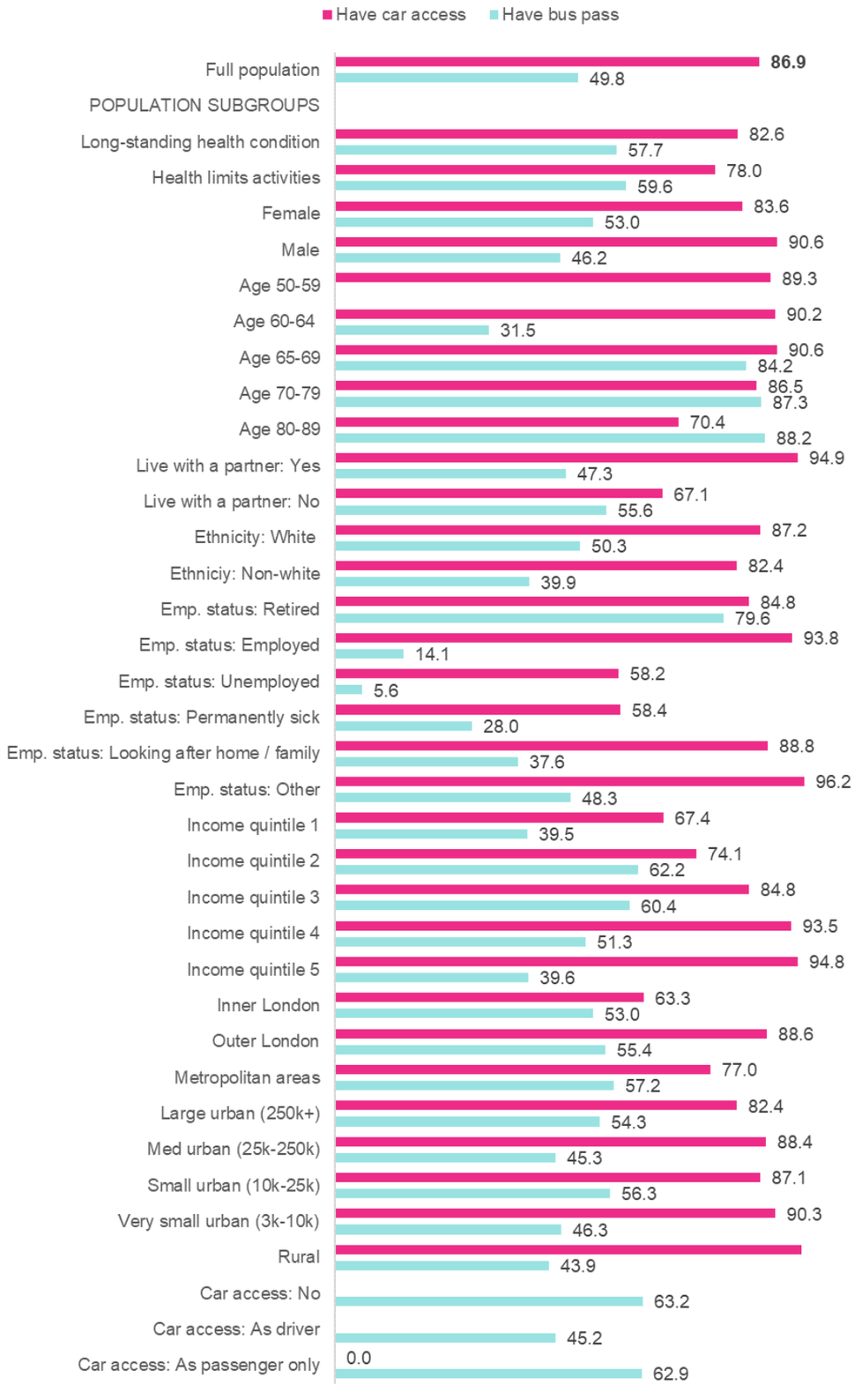
"Do you have a concessionary travel bus pass issued by your local authority?"

Around 6 in every ten ELSA participants (4,341 out of 6,695 responses) reported having a concessionary bus pass in 2016-17. It is estimated from the data that this applies to 49.8% of the English population aged 50 and over. Figure 5:21 also shows how bus pass holding varies across different population groups. A higher prevalence of concessionary bus pass availability is found amongst: the oldest age groups and retired people, those who do not have access to a car or access to a car only as passenger (63% as compared to 45% for those with car access as a driver), those who are in equivalised income quintiles two to four (i.e. there is a lower prevalence of concessionary bus pass holding amongst the bottom (39.5%) and top (39.6%) income quintiles), and those with health-related impairments.

The relationships between transport availability and loneliness amongst the older population are examined next.

[51] Equivalised income quintiles are calculated at benefit unit level where a benefit unit is a single adult or a married or cohabiting couple, plus any dependent children (generally equivalent to a household unit). Equivalised income refers to the total benefit unit income divided by the number of benefit unit adults (weighted by age).

Figure 5:21 Percentage transport access amongst population sub-groups



Source: ELSA, 2016-17, N=6,695 (see Appendix table B:2)

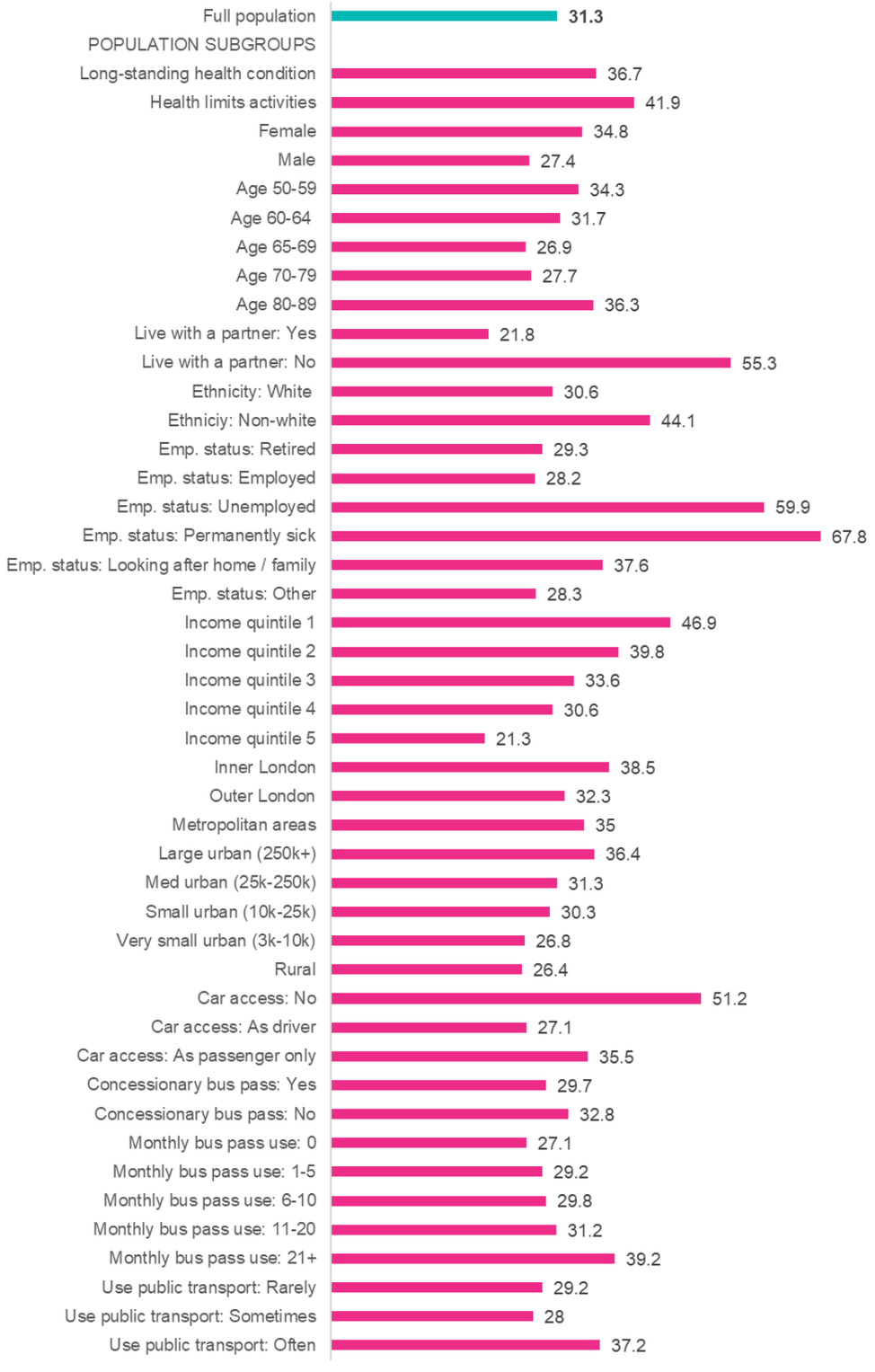
5.6.2 Factors associated with loneliness

ELSA participants are asked:

"How often do you feel lonely? (hardly ever or never, some of the time, often)?"

Around one in three ELSA participants (1,990 out of 6,965 responses) reported feeling lonely some of the time or often in 2016-17. It is estimated that this applies to 31.3% of the English population aged 50 and over, but levels of loneliness vary for different groups in the population, as shown in Figure 5:22. The highest prevalence of self-reported loneliness is found amongst people that are unemployed or off work due to sickness, people that do not live with a partner and, notably with respect to transport, people that do not have car access. A slightly higher prevalence of loneliness (compared to the population average) is also found amongst people living in more urbanised areas, and people making more frequent use of public transport.

Figure 5:22 Percentage loneliness amongst population sub-groups

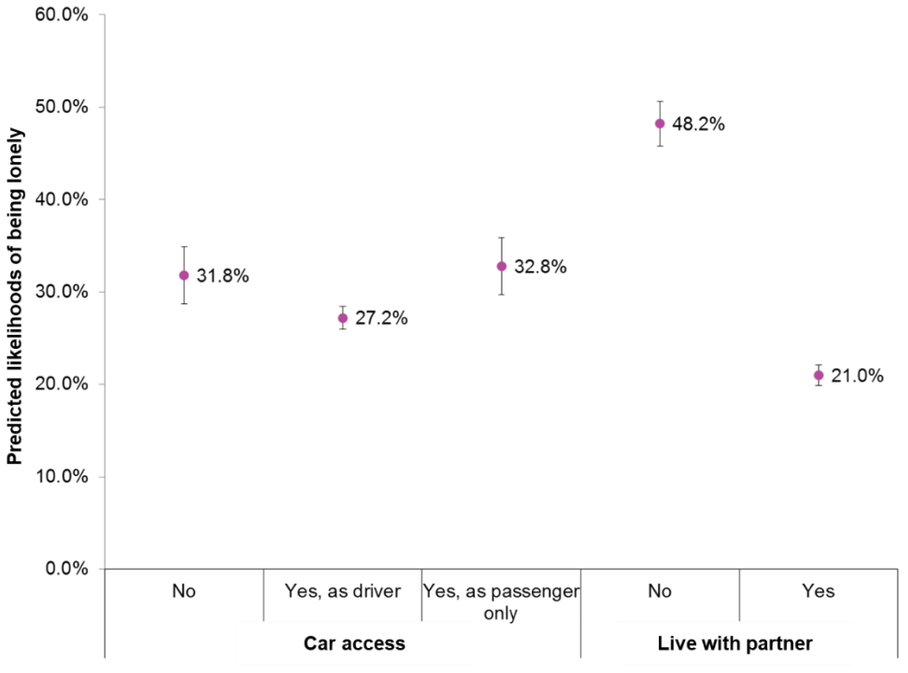


Source: ELSA, 2016-17, N=6,695 (see Appendix table B:2)

The observed higher prevalence of loneliness amongst particular population groups may be explained by other factors. Indeed, after controlling for other factors, **loneliness is found to be predominantly determined by people's life situation and health** (see Appendix table B:23). Being lonely is most strongly associated with not living with a partner, having a health impairment and not being in employment due to sickness or looking after the home (relative to being retired). Transport availability plays a more limited role**,** as discussed next:

Having access to a car as a driver is associated with a lower likelihood of loneliness (by 0.8 times) when compared to having no access to a car. But, the size of the association is small when compared with other factors like living with a partner. This is illustrated in Figure 5:23 which compares how the likelihood of being lonely is affected by car access and living with a partner:

Figure 5:23 Predicted likelihoods of being lonely



Source: ELSA, 2016-17, N=6,964

The relationship between car access and loneliness is different for men and women, but not for other population sub-groups[52]. For men, having access to a car as passenger only increases the likelihood of loneliness compared to having no access to a car. This counter-intuitive result does not apply to women. Possible explanations are that men without access to a car are more accustomed to low levels of car access than men with access to cars only as passenger. Alternatively, having access to a car as passenger only is a socially undesirable situation for men who previously had full access to a car as driver.

[52] The relationship was tested by including an interaction term between car access and gender. Interaction terms for car access with health condition, age group and settlement type were also tested but not found to be significant.

Loneliness is not found to be associated with having a concessionary bus pass[53], frequency of use of public transport, and the nature of where people live (as indicated by settlement type, proximity to amenities and employment and proximity to bus stops and services). However, the higher prevalence of loneliness amongst frequent public transport and concessionary pass users (shown in Figure 5.22) suggests that public transport might play an important supporting role in the lives of lonely people. Further research is recommended to explore (i) why lonely people use public transport more frequently than other groups; and (ii) the role of public transport in their lives.

5.6.3 Factors associated with changing loneliness

Factors associated with moving into and out of loneliness between 2014-15 (wave 7) and 2016-17 (wave 8) were examined through an analysis of the sample of ELSA participants aged 50 and over in 2014-15 that had valid loneliness responses in both 2014-15 and 2016-17. This sample included 6,320 participants and about one in six of these (1,004 out of 6,320) changed loneliness state between 2014-15 and 2016-17:

- 11.5% (527) of the 4,604 participants who reported not feeling lonely in 2014-15 reported feeling lonely in 2016-17.
- 27.8% (477) of the 1,716 participants who reported feeling lonely in 2014-15 reported not feeling lonely in 2016-17.

An initial examination of the extent to which changes in loneliness occur in association with life events is presented in Appendix table B:24. This reveals a much higher prevalence of becoming lonely amongst the group of people that stopped cohabiting with a partner (64.6% of this group became lonely, compared to 11.5% for the sample as a whole) (see Appendix table B:24).

Indeed, as was found to be the case for being lonely (at a single point in time), becoming lonely is most strongly associated with people's cohabitation and health status (after accounting for other factors - see Appendix table B:25[54])**.** For example, stopping cohabiting with a partner increases the likelihood of becoming lonely by about 19 times (a factor of 18.6 - see Appendix table B:25). It is notable that socio-demographic characteristics such as age, gender and income are not found to be associated with becoming lonely. Similarly, most of the measures of transport availability tested are not found to be significant, with the exception of car access – having access to a car as a driver in 2014-15 is marginally associated with reduced likelihood of becoming lonely (by 0.7 times) by 2016-17. The temporal sequence observed here provides an indication that car access can act to prevent the onset of loneliness, although the relationship is not as strong as those for cohabitation and health status[55]. Changes to car access from one period to the next are also not found to be significant. This implies more fundamental (non-transport) changes in people's lives are the most important determinants of becoming lonely (in particular cohabitation and health changes).

[53] Jackson et al. (forthcoming) report a statistically significant association between holding a concessionary bus pass and lower likelihood of being lonely, based on an analysis of ELSA data for 2012-13. The direction of association is the same in this present study, but the result is not found to be statistically significant at the 90% significance level, given a similar model specification. The reason for the different levels of statistical significance are unclear, although the present study employs a different measure of loneliness and is based data for 2016-17 rather than data for 2012-13.

[54] This included variables statistically significant at 95% level.

[55] i.e. statistically significant at 95% level, rather than 99% level

None of the measures of transport availability tested were found to be associated with ending a period of loneliness. Ending loneliness was again found to be most strongly associated with cohabitation status and changes to this (see Appendix table B:26[56]). For example, living with a partner in 2014-15 is associated with twice the likelihood of ending a period of loneliness by 2016-17. Ending a period of loneliness is also associated with being employed (relative to being retired) in 2014-15, while not being in employment due to sickness or disability in 2014-15 is associated with reduced likelihood of ending a period of loneliness. In contrast to factors associated with becoming lonely, age was found to play a role - being aged 70-79 increases the likelihood of ending a period of loneliness (relative to being aged 50-59). This could potentially be explained by an unmeasured change in circumstances (e.g. moving closer to relatives) or a change in expectations at this life stage.

5.7 Conclusions

Table 5:1 summarises the evidence for the role of transport and accessibility presented in this chapter.

Table 5:1 Findings on role of transport and accessibility for social opportunities and personal wellbeing

	Car access	Public transport rating	Urban form[57]
Access to services	**High importance** • Cross-sectional and longitudinal evidence • Especially for those with mobility impairments and living in rural area	**High importance** • Cross-sectional and longitudinal evidence	**Moderate importance** • Cross-sectional evidence (for travel time to town centre)
Go out socially	**High importance** • Cross-sectional and longitudinal evidence • Especially for those with mobility impairments and living in rural area	**Minor importance** • Cross-sectional evidence	**Minor importance** • Cross-sectional evidence (for settlement type)
Feeling under strain	**Minor importance** • Longitudinal evidence	**Minor importance** • Cross-sectional and longitudinal evidence	**No importance**
Mental health	**Minor importance** • Longitudinal evidence	**Moderate importance** • Cross-sectional and longitudinal evidence	**No importance**
Life satisfaction	**No importance**	**Moderate importance** • Cross-sectional and longitudinal evidence	**No importance**
Loneliness of those aged 50+	**Moderate importance** Cross-sectional and longitudinal evidence	**No importance**	**No importance**

There is strong evidence from both cross-sectional and longitudinal analyses that personal car access contributes positively to being able to access services and participate in social activities. This applies particularly strongly to those living in rural areas and with mobility impairments. Personal car access is not found to play a major role for the measures of personal wellbeing examined. For those aged 50 and over there is evidence that having personal car access as a driver makes it less likely that someone feels lonely. These results suggest that cars play an important role for many people in accessing services and social opportunities.

[56] This included variables statistically significant at 95% level.
[57] Examined in relation to settlement type, population density and travel times to services.

Perceptions of public transport are found to be more important in explaining access to opportunities than the objective measures of bus access tested in this study. A positive rating of local public transport is associated with an improved ability to access services, as are shorter journey times by public transport to the nearest town centre. A positive rating of local public transport is also associated with better mental health and life satisfaction and, to a lesser extent, with reduced strain in people's lives and participation in social activities. Having a concessionary bus pass and public transport use is not found to affect loneliness. However, loneliness is more common amongst frequent bus users, with 39% of frequent bus users reporting feeling lonely compared to 31% on average in the over 50s age group. This suggests that although bus use may not change feelings of loneliness, it allows people the opportunity to interact with others and may help to alleviate social isolation.

Most of the evidence presented in this chapter is new and there are no similar results from other studies with which to make comparisons. The results on access to services are in line with the finding in the 2003 'Making the Connections' report (Social Exclusion Unit, 2003); that people without cars find it more difficult to get to services such as hospitals and supermarkets. As the analysis in this report is based on a large, representative sample and on longitudinal evidence, it provides credible evidence on the importance of personal car and public transport access for accessing services.

The results on participation in social activities contribute new knowledge as the indicator considered has not been analysed in this way before. The results for loneliness are consistent with those from a study in the Netherlands (Weijs-Perrée et al., 2015) but provide specific evidence for those aged 50 and over.

Research conducted in Australia (Delbosc and Currie, 2011a) did not show a clear link between transport disadvantage and subjective wellbeing, except for a vulnerable/impaired group in their survey sample. In contrast, the findings in this chapter show a positive perception of public transport is associated with reduced strain, better mental health and higher life satisfaction and there are some positive associations with car access. It would be valuable to investigate the role of public transport further, especially if research could be conducted to see if major improvements in the local area lead to improved subjective wellbeing. This would also be useful for other improvements to local transport such as to walking and cycling environments.

6 Employment participation and income

The existing literature explored in Chapter 2 indicates that lack of personal transport and poor public transport are barriers to labour force participation, but this has not been investigated for the English population as a whole. This chapter explores associations between transport access and employment status, job security and income. The research questions investigated in this chapter are:

- To what extent is access to a car or public transport associated with employment participation, job security and income?
- How do the relationships between transport availability and employment participation, job security and income differ for different groups in the population?
- To what extent are changes in car or public transport access associated with employment participation, job security and income?

These questions are answered with a combination of descriptive analysis and regression analysis (that includes a range of explanatory factors[58]) using Understanding Society data collected in the 2012 and 2013 calendar years (wave 4) and the 2014 and 2015 calendar years (wave 6) for adults living in England of working age (18-64)[59].

Summary of key findings

Personal car access plays an important role when it comes to accessing employment:

- Having personal car access makes it 3.8 times more likely that someone is employed rather than unemployed (compared to not having car access). Indeed, using longitudinal data to look at changes in circumstances across time, for those unemployed, continued car access makes it 2.2 times more likely that someone unemployed moves into employment two years later (compared to not having car access). Furthermore, gaining car access makes it 1.7 times more likely that someone moves into employment two years later (comparing to not having car access).
- Having personal car access has greater importance in relation to being employed for men than women, and for those living outside London and Metropolitan areas. The role of personal car access in relation to accessing employment is the same for all age groups and is not altered by having health-related mobility impairments.
- For those in paid employment, personal car access does not make any difference to whether people think they might lose their job within the next 12 months.

There is also a relationship between personal car access and income:

- Having personal car access is associated with a 19% higher personal income (in 2014-15) compared to not having car access.

[58] Please refer to individual sections for more information regarding covariates.
[59] When analysing monthly personal income as an outcome of interest, the natural logarithm of income is used. The natural logarithm form of income is more normally distributed and less likely to skew the results. However, for ease of interpretation, income is reported in its common form (i.e. non-logarithm) in text and graphs.

Summary of key findings

- For those without personal car access, acquiring personal car access is associated with an 11% larger increase in personal income over a two-year period (compared to not having car access).
- Having continued car access is associated with a 25% larger increase in personal income over a two-year period, compared to not having car access.

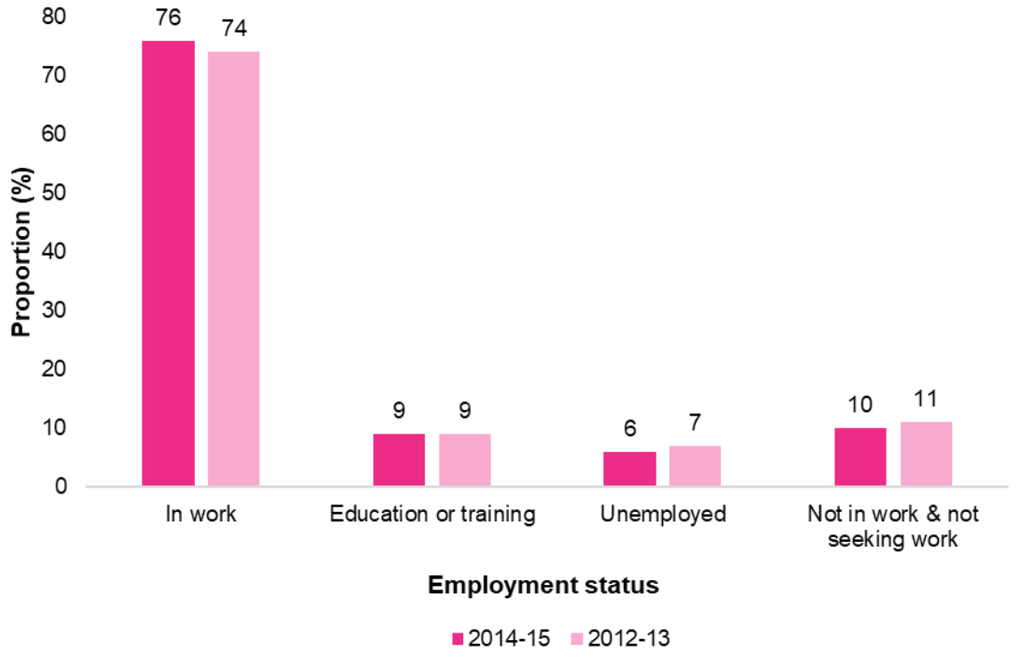
Previous research has shown that higher incomes enable people to acquire cars and it also appears that having car access boosts the rate at which personal income grows over time. This could be related to increased labour market mobility. On the other hand, not having car access is unusual and there may be other factors that explain income suppression amongst this group that were not possible to examine in the Life Opportunities study. This is an area that warrants further research.

6.1 Employment Status

6.1.1 Factors associated with being in work

The proportion of people in work is relatively stable between 2012-13 and 2014-15. Approximately three-quarters (74% and 76%) of the working age population were in employment (See Figure 6:1). This is relatively consistent with estimates from other national statistics (72% and 74%, ONS, 2019).

Figure 6:1 Employment status in 2012-13 and 2014-15



Source: Understanding Society (See Appendix Table C:1)
Unweighted base (aged 18-64): 28,543

However, relative levels of employment vary substantially between groups. Education, household composition and social class are all associated with the likelihood of being in work (Appendix Table C:1). Some of the biggest determinants of labour market participation are explored below.

Gender

Although female labour force participation rates have been rising in the UK for several decades, there are still notable differences in the proportions of men and women in work. In 2014-15, four-fifths (81%) of men aged 18-64 were in work, compared with seven-in-ten (71%) women (Appendix Table C:1).

However, this difference is driven primarily by greater levels of economic inactivity amongst women. This can, in part be explained by the gender differences in the burden of childcare activities. Over nine-in-ten (93%) fathers were in work in 2014-15, compared with four-fifths (78%) of men without children. Similarly, three quarters (77%) of women without children were in work, but only two-thirds (68%) of mothers were.

Age

Age is strongly associated with employment status. On average, three-quarters (77%) of those aged between 25 and 64 are in work, with the proportion peaking for those aged between 40 and 49 years old (84%, Appendix Table C:1). Younger people are much more likely to be in education or training, compared to older people. A third (31%) of those aged 18-24 were in full-time education or training in 2014-15, with only a nominal proportion in older age groups. Unemployment is also highest amongst the young, with one-in-ten of those aged 18-24 (11%) and 25-29 (8%) not working but looking for a job.

Health-related mobility impairments

The relationship between ill-health and working patterns is well known. In recent years, a great deal of emphasis has been placed on understanding work and health transitions. This analysis focuses on health-related mobility impairments, as transport access is likely to be an important factor in influencing the employment prospects of this subgroup.

Four-fifths (81%) of people without mobility impairments were in work in 2014-15, almost twice the proportion of people with mobility issues (45%, Appendix Table C:1). Mobility impairments are significantly associated with economic inactivity, with over two-fifths (44%) of this group not in work and not looking for work.

Urbanity

Consistent with previous research (Department for Environment, Food & Rural Affairs, 2018), the proportion of people in work in rural areas is higher than that of urban areas. Four-fifths (82%) of people living in rural areas[60] are in work, compared with three-quarters (75%) of those in urban areas (see Appendix Table B:1).

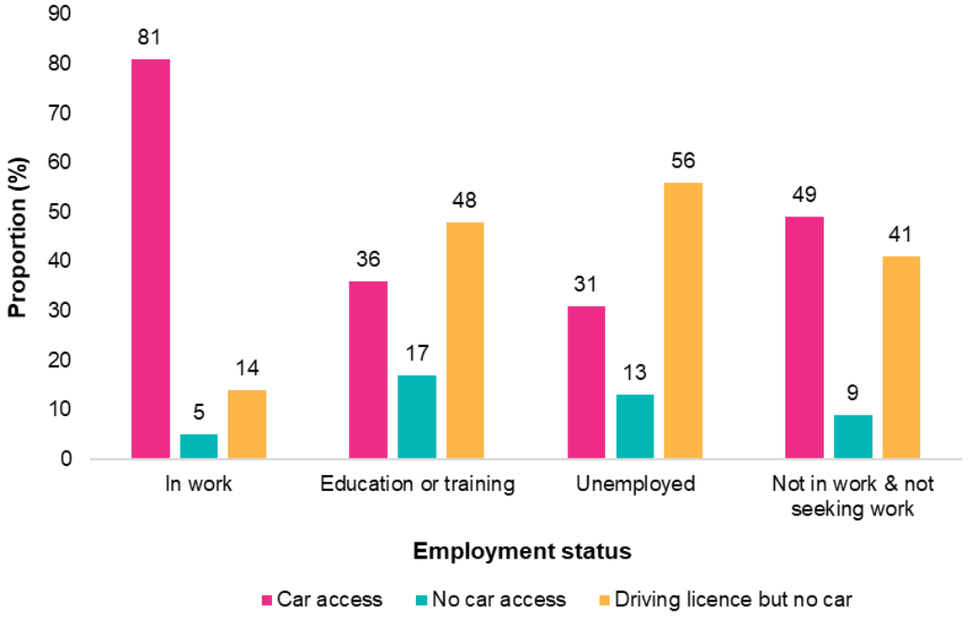
[60] The collapsed version of settlement type is defined as “Urban”; London or a Metropolitan area, “Small Urban”; a large/medium/small urban area or “Rural”; a very small urban (less than 10,000 residents) or rural area.

6.1.2 Role of transport

Car access

Car access is defined in Understanding Society in terms of a person having a driving licence and normally having access to a car or van that they can use whenever they want. Some individuals have a driving licence, but no access to a car, whilst others have no licence and no car access.

Figure 6:2 Employment status by car access in 2014-15



Source: Understanding Society. Appendix Table C:1
Unweighted base: 28,543

Car access has strong associations with employment status (see Figure 6:2). Four-fifths (81%) of people in work had access to a car in 2014-15. This compares with approximately one-third (31%) of unemployed people and half (49%) of those not in work and not seeking work.

Some of these differences could be attributed to other characteristics, such as those discussed in Chapter 4. However, car access is strongly associated with greater likelihood of employment even when these factors are taken into account in a multiple regression model[61] (see Figure 6:3 and Appendix Table C:2). Note that in regression analysis, car access is collapsed into two categories: having or not having access to a car.

[61] Multiple logistic regression model results (without weighting) based on Understanding Society 2014-15 sample of all adults aged 18-64 in GPS, EMBS and BHPS samples living in England who answered car access question. Covariates included age, gender, number of children, ethnicity, mobility impairment status, educational attainment, frequency of bus services, settlement types, MSOA population density.

Figure 6:3 Relative likelihood of not being in work by car access

Source: Understanding Society – 2014-15, Appendix Table C:2. Risks relative to being in employment.
Unweighted Base: 23,180

Figure 6:3 indicates the relative risk of being in each of the respective employment categories relative to being in work if an individual does not have access to a car or does not have a driving licence. The reference group is people in work and consequently no Relative Risk Ratios (RRRs) are produced for these people.

People with car access are much more likely to be in work than those without. In particular, people with access to a car are much less likely to be unemployed[62] and are also less likely to be in full time education or inactive. However, it is important to note that these estimates are indicative only of associations and cannot be used to establish causality. A person may have access to a car and therefore be able to access a wider pool of employment opportunities (which could increase both the quantity and quality of available work) or access to a car is a requirement of the job itself. On the other hand, a person may be less able to afford to purchase a car and pay for other associated costs such as insurance, MOTs and Road Tax unless they are in work.

In areas with very high bus service frequency (13 or more services each hour), people were significantly less likely to be economically inactive, though they were significantly more likely to be in full-time study or unemployed[63]. This may reflect the fact that higher bus service frequencies are usually found in urban areas, where full-time students are more prevalent.

Gender
Sub-group analysis shows that car access is more important for men than women for being in employment. For example, the association between car access and being unemployed is larger for men than women[64] (Appendix Table C:3).

Age
Employment status varies significantly by age, even when comparing people with the same transport access. In particular, younger people are significantly more likely to be

[62] RRR of 0.26 or 74% less likely
[63] RRR of 0.71, 1.47 and 1.38 respectively
[64] RRR of 0.22 and 0.30 respectively

in education or training and less likely to not be working and not looking for work relative to older people. However, the relationship between car access and employment participation does not vary systematically with age (Appendix Table C:4).

Mobility impairment
Car access increases the likelihood of being in work relative to being unemployed for the general population and this applies no differently to those with a mobility impairment (Appendix Table C:5).

Urban and Rural
Consistent with the findings in Chapter 4, people in small urban and rural areas are less likely to be unemployed than people in urban areas (Appendix Table C:6). Having access to a car is associated with a lower likelihood of unemployment and the effect is greater for those living in small urban and rural areas relative to living in urban areas.

6.1.3 Changes in car access and employment transitions

Transitions in and out of work can occur for several reasons. In recent years, much of the focus has been on the interactions between health and work, but this is only a single element of a complex picture. This section explores how changes in transport access, amongst other factors, impact on transitions into work.

Table 6:1 shows the transitions into and out of work between 2012-13 and 2014-15[65]. There is high stability of those in work, with just one-in-twenty (5%) of those in work in 2012-13 moving out of employment by 2014-15.

Of those who were unemployed in 2012-13, two-fifths (43%) moved into employment by 2014-15, with just over a third (35%) still looking for work and one-fifth (19%) still not working but no longer looking for a job. People who were not in work and not looking for work in 2012-13 were likely to have the same employment status in 2014-15 (68%), with just one-fifth (19%) taking up work and one-in-ten (11%) not working but actively seeking employment.

Table 6:1 Employment transitions 2012-13 to 2014-15

2012-13	**2014-15**			
Employment status	**In work (%)**	**Full-time student (%)**	**Unemployed (%)**	**Not in work and not looking for work (%)**
In work	95	1	2	3
Full-time student	39	49	10	2
Unemployed	43	3	35	19
Not in work and not looking for work	19	1	11	68

Source: Understanding Society
Base (Aged 18-64): 24,673

[65] A two-wave gap is necessary as some of the outcomes and covariates are not collected in every wave of the Understanding Society survey.

Half (49%) of people studying full-time in 2012-13 were still studying in 2014-15. However, two-fifths (39%) had gone on to find work, with just one-tenth (10%) not finding work but still actively seeking it. Those studying full-time in 2012-13 were also the least likely to neither be in work or actively seeking work in 2014-15.

Table 6:2 shows the transition into and out of car access between 2012-13 and 2014-15. There is a high stability among those with car access, with just one-in-thirty (3%) of those with car access in 2012-13 losing it by 2014-15.

Changes in car access were more likely to be seen amongst people without car access despite having a driving licence. In fact, four-in-ten (39%) of those gained car access in 2014-15. Conversely, most of the adults (89%) without a driving licence in 2012-13 still did not obtain a driving licence in 2014-15.

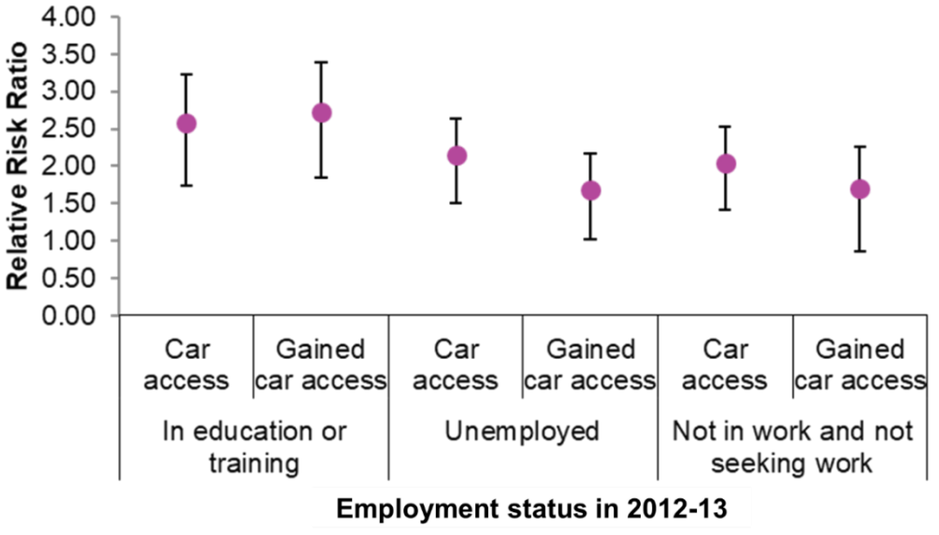
Table 6:2 Car access transitions from 2012-13 to 2014-15 (%)

2012-13	**2014-15**		
	Car access	No, has driving licence	No, no driving licence
Car access	97	3	0
No, has driving licence	39	60	2
No, no driving licence	8	4	89

Source: Understanding Society
Base: 35,455

Longitudinal analysis of those not in work in 2012-13 (i.e. full-time students, the unemployed and those not in work and not looking for work) and car access indicates that having access to a car or gaining access to a car is significantly associated with a higher likelihood of moving into work, whilst controlling for other factors (see Figure 6:4, Appendix Table C:7). Other factors associated with these transitions included gaining qualifications and household composition.

Figure 6:4 Change in car access and likelihood of moving into employment



Source: Understanding Society (Appendix Table C:7)
Unweighted Base (Aged 18-64, not in work in 2012-13): 6,313

Figure 6:4 indicates the relative risk of moving into work dependent on access to a car. The first category indicates the likelihood of moving into work associated with having access to a car in both 2012-13 and 2014-15, whilst the second category indicates the likelihood of moving into work associated with gaining car access between 2012-13 and 2014-15. For all three groups, moving into employment is more likely for those with continued car access over the two-year period and gaining car access over the period.

Continued car access is associated with over twice the likelihood[66] of moving from unemployment into employment compared to not having car access. This provides compelling evidence that car access influences employment prospects as the car access situation precedes the change in employment status. Gaining car access is associated with 1.7 times the likelihood of moving from unemployment into employment compared to not having car access. In this case, it is not certain that the change in car access preceded the change in employment status. A car could have been acquired following the offer of a job or starting the job.

Gender

Sub-group analysis by gender shows that gaining car access makes it more likely only for men to move from economic inactivity to employment (see Appendix table C:8). Also, continued car access is more important for men moving from unemployment into employment than women.

Sub-group analysis could not be constructed for the longitudinal employment models for the remaining three sub-groups in this study[67].

[66] RRR of 2.2
[67] The models could not converge based on the model specification due to low cell counts amongst the sub-groups of interest when interacted with car access.

6.2 Job Security

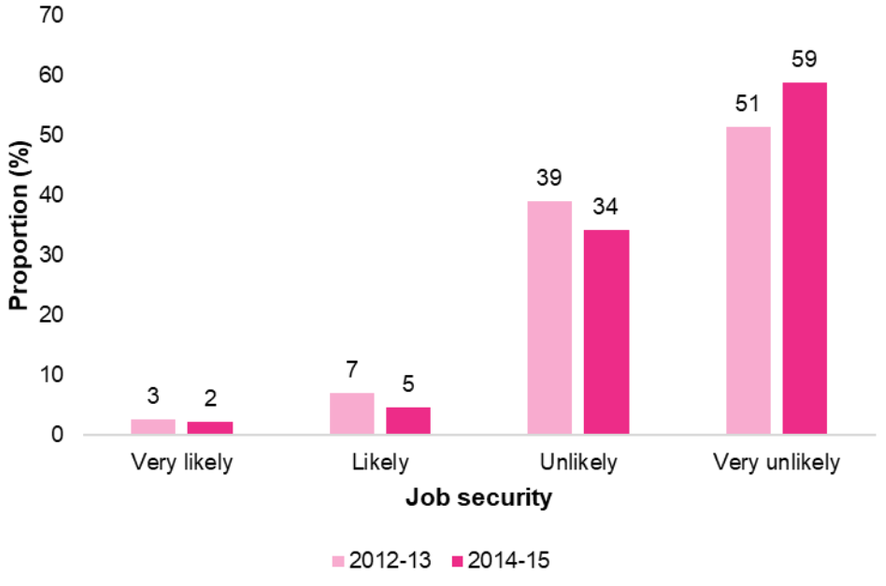
6.2.1 Factors associated with job security

Transport issues are intimately related to the nature and location of employment. Comprehensive and reliable transport gives access to more areas and can help individuals access and sustain more secure jobs (Crisp, et al., 2018). It is interesting therefore to examine whether having access to a car can help workers feel more secure in their jobs.

Understanding Society asks employed people how likely they feel they will lose their job within the next 12 months[68]. Using descriptive and regression analyses, this section seeks to understand who the people with low job security are, and whether access to transport affects how secure they feel about their jobs.

Figure 6:5 shows that people's job security remained relatively stable between 2012-13 and 2014-15, although there is a slight increase in the proportion of people who felt they were very unlikely to lose their job.

Figure 6:5 Likelihood of losing your job within the next 12 months



Source: Understanding Society, Appendix Table C:9
Unweighted Base: 14,815 (2012-13), 12,336 (2014-15)

In 2014-15, job security was also relatively similar across men and women. There was also no difference in job security across levels of educational attainment (see Appendix table C:9).

However, relative levels of job security vary across other socio-economic variables (see Appendix table C:9). Further descriptive analysis indicates that higher proportions of people feeling insecure about their jobs are found among:

[68] There are four possible responses: very likely, likely, unlikely, very unlikely. These have been collapsed to likely and unlikely for the purpose of these analyses.

- Older people. This could be because older people tend to be more easily excluded from jobs (Thomson, n.d.).
- Those in semi-routine jobs
- Those living in London

6.2.2 Role of transport

The next section looks at the relationship between car access or bus provision and job security across four main subgroups: age, gender, mobility impairment, and urbanity. Job security is predominantly associated with factors such as temporary employment, memory impairments and age (see Appendix table C:10). These factors appear to be more predictive determinants of job security than car access. There were no associations between job security and car access or evidence that these relationships are dependent on age, gender, mobility status or urbanity (see Appendix table C:11 to C:14).

However, living in areas with more frequent bus services (13 or more per hour) is significantly associated with greater job security relative to those in areas with less frequent services (1 or 2 per hour).

6.2.3 Changes in car access and job security transitions

Change in job security can occur for several reasons. Although cross-sectional analyses indicated no significant association between job security and car access at one point in time, it is possible that a change in car access could have different impacts on how job security evolves over time. For example, losing access to a car could be associated with less subjective job security.

Table 6:3 shows the transition from feeling secure to feeling insecure about one's job between 2012-13 and 2014-15 and vice versa. There is a higher stability for those who already felt it was very unlikely they would lose their jobs in 2012-13; just 29% felt more insecure about their job in 2014-15.

Those who felt very insecure in their jobs in 2012-13 were more likely to experience a change in job security. Almost half (48%) of those who felt like it was very likely they'd lose their jobs in 2012-13 reported feeling very secure about their jobs in 2014-15. In general, more people were likely to report an improvement in how secure they felt about their jobs in 2014-15 when compared to 2012-13.

Table 6:3 Job security transitions from 2012-13 to 2014-15 (%)

2012-13	**2014-15**			
Job security	Very likely	Likely	Unlikely	Very unlikely
Very likely	9	11	32	48
Likely	3	16	45	35
Unlikely	2	5	44	48
Very unlikely	2	2	25	71
Base	271	582	4,371	7,927

Source: Understanding Society
Base: Aged 18-64

Analysis controlling for a range of characteristics that could influence job security[69], found no association between job security and car access or bus service frequency (see Appendix table C:25). Similarly, the sub-group analysis found no evidence of any differences in changes to job security and transport access (see Appendix table C:26 to C:28). Sub-group analysis could not be constructed for the longitudinal employment models for the mobility impairment sub-group in this study.[70]

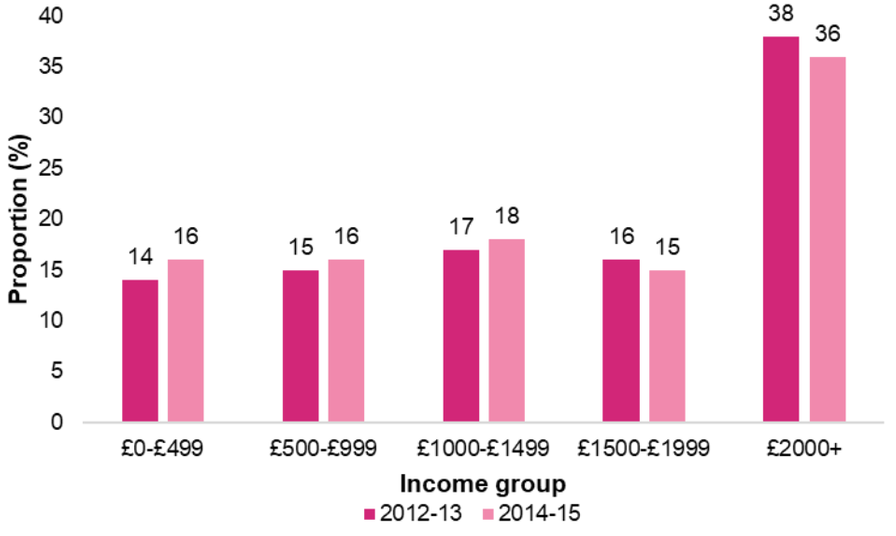
6.3 Income

The following analysis uses a sample of people who were of working age (18-64) and were employed at the time of the interview. The analyses use people's gross personal monthly income.

6.3.1 Who has low personal income?

On aggregate, people's personal income remained relatively stable between 2012-13 and 2014-15. Approximatively one-in-twenty people (16% and 14%) of the working age population and who were in employment were in the lowest income groups. Around half of the working age population were in the two highest income groups (51% in 2012-13 and 54% in 2014-15) (See Figure 6:6).

Figure 6:6 Monthly gross personal income group in 2012-13 and 2014-15



Source: Understanding Society (Appendix Table C:15)
Unweighted Base (aged 18-64): 19,467 (2012-13); 16,927 (2014-15)

[69] Covariates included age, gender, number of children, change in the number of children, ethnicity, relationship status, change in relationship status, mobility impairment status, change in mobility impairments, educational attainment, change in educational attainment, number of bus stops, frequency of bus services, settlement types, MSOA population density.
[70] The models could not converge based on the model specification due to low cell counts amongst the sub-groups of interest when interacted with car access.

People with low personal income tend to (see Appendix table C:15):

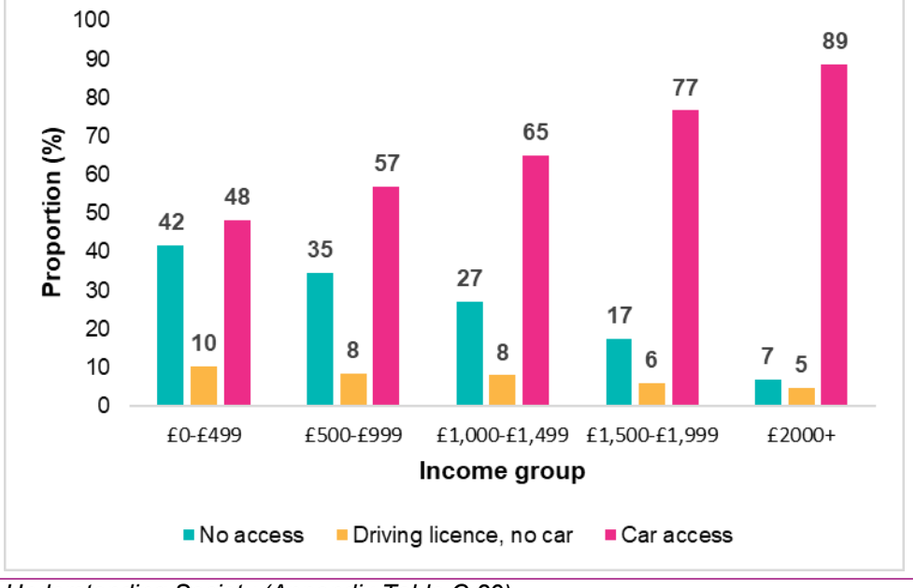
- **Have lower educational attainment**
- **Not have access to a car**. As an illustration, less than half of the people (41%) in the lowest income group have access to a car whilst 9 in 10 people (91%) in the highest quintile do
- Take the **train and car less frequently but take the bus more often** than people with higher incomes
- **Be single**
- **Be female**

Income is well known to be strongly related to travel behaviour. People with low incomes tend to travel less than those with high incomes (DfT, 2018a). Part of this report shows that people in the lowest income quintiles tend to live in more urban areas and take the bus more often; whereas people in the highest income quintiles tend to live in rural areas and take the train and car more often. This section investigates next the role of transport in improving personal income prospects across employed people in England.

6.3.2 Car access

Figure 6:7 shows a clear **income gradient with car access**. Nine-in-ten (89%) people in the highest quintile have access to a car, whilst four-in-ten of people in the lowest quintile do. In fact, whilst four-in-ten (42%) of those in the lowest quintile do not have a driving licence, only 7% of people in the highest quintile do not.

Figure 6:7 Monthly gross personal income by car access in 2014-15



Source: Understanding Society (Appendix Table C:29)
Unweighted Base (aged 18-64): 16,927

This difference in car access across income could be explained by other characteristics, such as type of employment and education. Indeed, research on how

income affects car access is more common and tends to show that higher incomes are associated with higher car ownership levels and increases in car ownership (Dargay, 2001, Clark et al., 2016).

The focus of this analysis is the effect of car ownership on income, but it is important to consider potential reverse causality when interpreting these findings. After controlling for socio-economic and geographical factors[71], **car access is still strongly associated with personal income**. Those who have car access earn on average 19% more than those without. There is no evidence to suggest an association with bus service frequency and income (*Appendix table C:16[72]*).

Sub-group analysis indicates that the income gains from car access are highly gendered. Car access is associated with higher income for men, but this effect is weaker for women (*Appendix table C:17).* Additionally, individuals living in rural areas with access to a car earned on average 11% more than people living in similar areas with no car access. No other differences between sub-groups were detected (see Appendix table C:18-C:19).

6.3.3 Changes in car access and personal income

Changes in personal monthly income can occur for many reasons, including change in employment status as seen in previous sections (see section 6.1.3). However, it is also likely to be influenced by other factors, such as car access which may improve access to local labour markets. This section examines whether gaining or losing access to a car impacts on the likelihood of experiencing a change in personal monthly income.

Table 6:4 indicates that around half of people do not transition to another income group between 2012-13 and 2014-15. It is even more the case for people in the highest income group, with eight-in-ten (83%) of them still earning more than £2,000 per month.

Table 6:4 Income groups transitions from 2012-13 to 2014-15

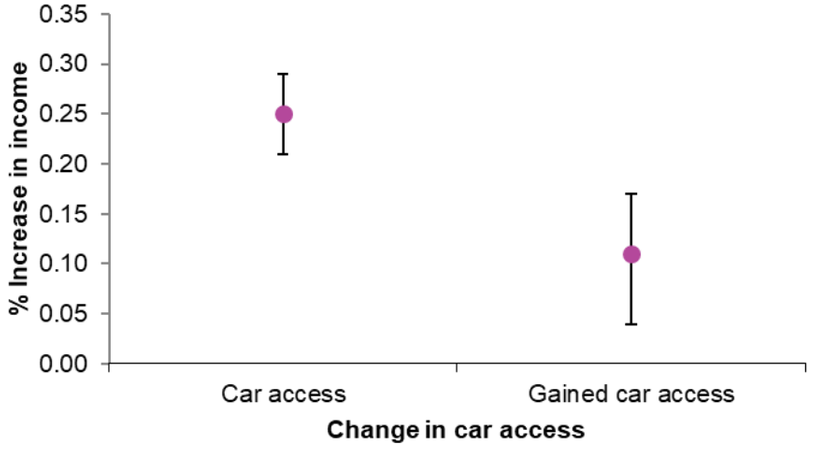
2012-13	**2014-15**				
Personal monthly income groups	£0-£499	£500-£999	£1,000-£1,499	£1,500-£1,999	£2,000+
£0-£499	48	24	14	7	7
£500-£999	14	41	27	10	8
£1,000-£1,499	7	14	42	25	12
£1,500-£1,999	5	6	14	0	35
£2,000+	2	3	4	8	83

[71] Covariates include: age, gender, number of children, ethnicity, relationship status, health, educational attainment, job security, job type (NS-SEC), and objective measures of transport poverty such as type of settlement area and frequency of bus services within 10-minutes walk of the LSOA centroid, and MSOA density.
[72] Uses the log transform of monthly personal gross income and coefficients should therefore be interpreted as percentage changes in income.

On average, around a fifth (18%) of people transitioned from one income group to the next highest income group between 2012-13 and 2014-15. Conversely, around one-in-ten (9%) people transitioned to the next lowest group.

Analysis that controls for a range of characteristics that could influence income was conducted. Time invariant characteristics, such as sex and ethnicity, are included at 2012-13, whilst time-varying factors such as education, relationship status and the number of children, were included both as baseline measures and change measures[73].

Figure 6:8 Percentage difference in income associated with change in car access from 2012-13 to 2014-15[74]



Source: Understanding Society (see Appendix Table C:20)
Unweighted Base (aged 18-64): 12,883

Having car access in 2012-13 is associated with an increase in income growth of 25% from 2012-13 to 2014-15. Gaining access to a car (having not previously had access to a car) is associated with smaller increase in income growth, of 11%. On the other hand, bus service frequency is not associated with changes in income over time, when controlling for other factors (see Appendix table C:20).

Whilst these findings are indicative of an association between car access and change in personal income, it cannot establish causality. In fact, it might be that an individual's income increased, which improved their chances of getting a car. It also does not account for other potential factors that could also affect changes in personal income, such as gaining a qualification.

Sub-group analysis indicates that both men and women receive income gains from car access. The associated premium is 40% for men who had car access in 2012-13 and 20% for those who subsequently gained car access. Women gaining car access from 2012-13 to 2014-15, had an associated income increase of 8% (see Appendix table C:21). On average women's income and the associated benefits of gaining car access

[73] Further covariates included were baseline income, whether has long-standing illness or disability, frequency of bus services, settlement type, and MSOA population density. This analysis used a sample of only those in work in both periods.
[74] Percentage difference in having a car access in 2012-13 should be interpreted in comparison to the reference category: No car access in 2014-15. Gaining and losing car access should be compared to their reference category: No change.

were lower relative to men. Other sub-group analysis (by age, mobility impairment and urbanity) found no evidence of any differences in changes to personal income and transport access (see Appendix table C:22 to C:24).

6.4 Conclusions

Whilst most of the current literature focuses on the determinants of having access to a car and good access to transport in general, analysis in this chapter explored whether access to transport is a key determinant in improving economic opportunities, including employment status, job security and personal income.

Car access is an important determinant of employment status. People without access to a car are more likely to study full-time, be unemployed or economically inactive. Similarly, car access is an important factor in employment transitions. People are more likely to move into work if they have access to a car or acquire access to a car, regardless of whether they are studying full-time, unemployed or inactive. Having personal car access has greater importance in relation to being employed for men than women, and for those living outside London and Metropolitan areas. Its importance does not vary with age or with having health-related mobility impairments.

Similarly, there is an increase in income associated with car access. Longitudinal analysis indicates that there is a large income gain associated with people who did not previously have car access but subsequently acquire access to a car. This premium is particularly strong for men, although a smaller income gain is also found for women.

Neither car access nor bus service frequency was associated with job security. Similarly, the longitudinal analysis found no evidence that a change in car access affects job security.

Overall, this analysis indicates that access to transport is closely associated with labour market outcomes. Car access has been found to be linked to moving into employment from unemployment and economic inactivity with the longitudinal relationships identified giving confidence that relationships are causal.

7 Summary and conclusions

This study addressed the following overarching question:

“What is the relationship between access to transport and life opportunities (such as employment, health care, education, relationships and community) across the lifecycle and for different groups?”

Most of the previous evidence on this relationship has been qualitative in nature and applied to selected locations and population groups in England. There was a lack of evidence for what this meant for the population in general. In this study, the role of transport for life opportunities is examined for large, representative samples of the population of England. The two data sets used (Understanding Society and English Longitudinal Study of Ageing) are longitudinal and track the same individuals over time, thereby increasing the confidence of identifying causal relationships. This data has been supplemented with objective measures of bus access, constructed at a small geographical level, using data provided by the Department for Transport.

Transport access and use

The study adds to what is known on how transport access and use varies across the population. The research question was:

- How does access to transport (private and public) and use of different transport modes vary by different groups in the population?

Overall findings are:

- The majority (69%) of the population have personal access to cars and an even larger proportion of the population (87%) are frequent (weekly) car users. This means, however, that a significant minority – nearly a third of the population (31%) - do not have personal car access and are reliant on public transport or other modes to support their lives.
- Personal car access is less prevalent amongst young people, those with health-related mobility impairments, those who are unemployed and those with low income. It is also less prevalent for those people living near frequent bus services, implying that good public transport access may reduce the need for personal car access.
- As expected, people living in London and other large cities have more frequent bus services near their home, relative to the rest of the population. Bus service availability is therefore better for those groups in the population that are highly concentrated in urban centres (e.g. BME groups, renters and the unemployed).
- People’s rating of local public transport is strongly linked to bus service availability. Over three-quarters (77%) of those served by more than one bus every five minutes rate public transport as good compared to only 36% of those served by buses once or twice per hour.

The following notable key findings have been found for specific population groups:

- Adults under the age of 30 have more limited car access and lower car use than other age groups but better bus access and make greater use of buses, trains and bicycles.
- Older people (aged 70 and over) have more limited car access and lower car use than adults aged 30-69, the same bus access as other age groups, but rate local

public transport more highly and use buses more and trains and bicycles considerably less frequently.

- Women have more limited car access than men but use cars as frequently. They use buses more frequently and trains and bicycles less frequently
- People from Asian backgrounds have more limited car access than those of white ethnicity, although their car use is similar. People from Black backgrounds have more limited car access and lower car use than those of white ethnicity and use buses and trains more often.
- People with health-related mobility impairments have more limited car access and lower car use than those without mobility impairments. They use buses as frequently as the general population but not as much other people with similar characteristics (in terms of age, etc.), which implies they experience barriers to using buses. They use trains and bicycles considerably less frequently than the rest of the population.
- People with personal incomes in the lowest quintile have considerably more limited car access but only slightly lower car use than people with higher incomes and make greater use of buses but less use of trains. Their frequency of bicycle use is similar to those with higher incomes.

Social participation and wellbeing

The research questions were:

- To what extent does transport availability (private cars and public transport) affect access to services, social connections and wellbeing?
- Are there differences in the importance of transport by gender, age, disability and where people live?

Both personal car access and public transport access are important for being able to access services (healthcare, food shops and learning facilities).

- Having personal car access makes it twice (2.0 times) as likely that someone can access services. It has greater importance in relation to accessing services for those with health-related mobility impairments and those living in rural areas. Losing car access makes it three times (2.9 times) as likely that someone becomes unable to access services.
- Rating local public transport as good, rather than poor, makes it nearly three times (2.8 times) more likely that someone can access services. Short journeys by public transport to town centres (10 minutes or less) make it 1.7 times more likely that someone can access services (compared to journeys of over 30 minutes).

Both personal car access and public transport access are also important for being able to go out socially.

- Having personal car access makes it 1.7 times more likely that someone can go out socially. It has greater importance in relation to going out socially, for those with health-related mobility impairments and those living in rural areas. Acquiring personal car access makes it 1.7 times more likely that someone becomes able to go out socially. Losing personal car access makes it 2.3 times more likely that someone becomes unable to go out socially.
- Rating local public transport as good, rather than poor, makes it 1.4 times more likely that someone can go out socially.

Transport access plays a more minor role for the measures of personal wellbeing examined in this study. Rating local public transport as good, rather than poor, makes it less likely that someone feels under strain, has poor mental health or reports being dissatisfied with life.

Amongst the older population aged 50 and over, having personal car access as a driver makes it less likely (by 0.8 times) that someone reports feeling lonely. Having a concessionary bus pass and using public transport are not found to affect loneliness. While loneliness is more common amongst frequent bus users (with 39% of frequent bus users reporting feeling lonely compared to 31% on average in the over 50s age group), it is important to consider other factors in interpreting this finding; for example, frequent bus users are also more likely to live alone and be retired.

Employment participation and income

The research questions were:

- To what extent is access to a car or public transport associated with employment participation, job security and income?
- How do the relationships between transport availability and employment participation, job security and income differ for different groups in the population?
- To what extent are changes in car or public transport access associated with employment participation, job security and income?

Personal car access plays an important role when it comes to accessing employment:

- Having personal car access makes it 3.8 times more likely that someone is employed rather than unemployed (compared to not having car access). Indeed, using longitudinal data to look at changes in circumstances across time, for those unemployed, continued car access makes it 2.2 times more likely that someone unemployed moves into employment two years later (compared to not having car access). Furthermore, gaining car access makes it 1.7 times more likely that someone moves into employment two years later (comparing to not having car access).
- Having personal car access has greater importance in relation to being employed for men than women, and for those living outside London and Metropolitan areas. The role of personal car access in relation to accessing employment is the same for all age groups and is not altered by having health-related mobility impairments
- For those in paid employment, personal car access does not make any difference to whether people think they might lose their job within the next 12 months.

Personal car access is also associated with higher income:

- Having personal car access is associated with a 19% higher personal income (in 2014-15) compared to not having car access.
- For those without personal car access, acquiring personal car access is associated with an 11% larger increase in personal income over a two-year period (compared to not having car access.
- Having continued car access is associated with a 25% larger increase in personal income over a two-year period, compared to not having car access.

Previous research has shown people on higher incomes are more likely to buy cars (Clark et al., 2016, Dargay, 2001) and the results above indicate that having car access

boosts the rate at which personal income grows over time. In this study, it was not possible to investigate possible reasons for this such as increased labour market mobility.

Study limitations and further research

Data was not available to allow an assessment of the role of walking and cycling to life opportunities and wellbeing. These are clearly equally important modes in providing access to local destinations and should be considered in relation to investment decisions and as an avenue for further research.

It was also not possible to comprehensively assess the role of all forms of public transport. Through data linking, objective measures of bus access have been included in this analysis, and it would be possible to generate similar measures for rail, metro and tram access. Bus use is more prevalent than rail, metro and tram access and places with good bus access often have good public transport access in general, but it is possible that access to longer distance, faster or higher capacity public transport has some significance to life opportunities.

The study was primarily designed to identify population-level evidence as a starting point for investigation. Further research would now be valuable to examine the specific circumstances of population sub-groups. To some extent this could be achieved by using Understanding Society and conducting separate analyses for selected sub-groups. As a starting point, those individuals without personal car access could be selected and analysis conducted to see if better bus access or more frequent bus use makes a greater difference to their life opportunities than for those with car access. Research could also be taken forward by collecting new primary data (e.g. questionnaire surveys, in-depth interviews) for the specific purpose of investigating how transport access affects population sub-groups.

Personal car access is less common among the current generation of young adults than previous generations, and the implications of this for education, training, employment and other life opportunities are not well understood (Chatterjee et al., 2018). There is the possibility with Understanding Society to assess whether transport access, starting from the age of 10 (young people aged 10-15 complete a youth questionnaire), has long-term impacts on outcomes and choices in early adulthood.

A forthcoming study also commissioned by the Department for Transport explored the relationship between transport use and health in older people. It found that impairments, rather than health conditions themselves, are most strongly associated with transport use. Impacts of transport access on those people aged 50 and over could be explored further by extending the analysis of ELSA data conducted in this study. The main indicators of life opportunities and wellbeing available in Understanding Society have been analysed, but there is scope for further indicators in ELSA to be considered, and to explore more comprehensively how transport access affects those aged 50 and over.

Significance of the research

This research has involved a systematic investigation of how access to transport (in terms of both private transport and public transport) affects economic and social opportunities and subjective wellbeing. Through the combination of cross-sectional analysis, looking across the population, and longitudinal analysis, examining change in individual experience over time, it has allowed more credible assessments of causality

than previously available. This has added substantially to existing evidence in showing a positive role of both private transport and public transport.

Overall, the study reveals that having personal car access opens up life opportunities, including employment, access to services and social participation. Indeed, this may partly explain why the majority (69%) of the population now arrange their lives such that they have personal access to cars and why an even larger proportion of the population are frequent (weekly) car users (87%). It also highlights the risk of economic and social exclusion for those with no personal access to cars – nearly a third of the population. Lack of car access is more common amongst young adults, those in BME groups, those with impairments, the unemployed and those with low incomes. Given the benefits of personal car access, it is important that barriers to car access are not disproportionate for those who are more reliant on cars, for example, those living in small towns and rural areas, with mobility impairments and on low incomes.

At the same time as acknowledging the benefits of personal car access, it is important to recognise that not everyone is able to drive or wishes to drive and this study revealed how frequent local bus services provide a valuable mobility option. For example, those without personal car access make more frequent use of public transport, particularly buses. Positive opinions of public transport (which are linked to living close to good public transport services) are associated with better access to services and increased social participation. Hence access to life opportunities can be enhanced for some groups through public transport systems, with this potentially including innovative forms of personalised or public transport such as car clubs or the bringing together of different transport options through Mobility as a Service (MaaS). These systems may be more flexible in time and space, offering transport opportunities that are similar in scope to those provided by personal cars.

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