


Valuing the social impacts of public transport

Final report

March 2013

Department for Transport

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Mott MacDonald

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Content

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Executive Summary

Mott MacDonald, supported by the Institute for Transport Studies at the University of Leeds, and Accent Marketing and Research, was appointed by the Department for Transport in January 2012 to carry out research into valuing the social impacts of public transport.

The following text is taken from the Department's brief for the project and sets out the motivation for the work in more detail:

"*There is an economic, environmental and social rationale for Government intervention in the bus market. Economically, supporting buses increases the attractiveness of bus travel relative to car travel which helps alleviate congestion. Environmentally, the increased attractiveness of bus travel relative to car travel helps reduce pollution. Socially, the existence of a bus service increases the accessibility of non-car owners to social services and employment opportunities.*

Whilst established methodologies exist to quantify and monetise the impacts of bus policy on the economy and the environment, relatively little is known about the value of social benefits – such as increased accessibility – that result from supporting buses. In this context, we define accessibility as the value bus users enjoy from accessing particular services that they would not otherwise have had easy access to. There is a large qualitative consensus on the types of social benefits that exists but very little evidence which quantifies and monetises these impacts.

The aim of this project is to produce a quantitative methodology and set of values for comprehensively valuing the social impacts of local public transport access that will enable all three objectives to be assessed consistently alongside one another. In particular, we would like this research to determine an appropriate monetary value (or set of values) that can be applied in cost-benefit analysis. This monetary value (or values) will give an indication about the potential social benefit derived from any particular bus intervention."

Definition of social benefits

In the context of transport scheme appraisal, the term "social benefits" can have a number of distinct meanings. For this project we have used the definition set out in the brief of "…the value bus users enjoy from accessing particular services that they would not otherwise have had easy access to".

This is not the same definition that some economists would use, which would equate social costs/benefits with external costs, i.e. the costs the traveller imposes on the rest of society.

Similarly, it is not as broad a definition as all the impacts listed under the Social heading in the August 2012 version of the WebTAG Appraisal Summary Table (AST). “Access to services” is just one impact listed there, along with benefits such as travel time savings to non-business users, and accident reductions.

Structure of project

The project was carried out in three distinct phases:

- Phase 1 of the project was primarily concerned with reviewing relevant evidence on the social impacts of public transport.
- Phase 2 comprised initial data collection, comprising a number of focus groups and a stated preference (SP) pilot.
- Phase 3 consisted of a full scale stated preference survey and the analysis of the data collected.

Methodology

The main focus of the project was to conduct a large-scale stated preference (SP) survey to collect data relating to the value that bus users place on the activities they undertake at the destination of their trips. This involved establishing what they would do in the absence of a bus service, and understanding how much less attractive the current bus service would need to be before they stopped using it.

Results

Analysis of the stated preference data from Phase 3 resulted in recommended values for the social benefit per return bus trip of £3.84 for concessionary travel pass holders and £8.17 for other bus users (in 2010 prices).

These values only apply to that subset of travellers who would choose to not make the trip if bus was not available (or had an unacceptable level of service), rather than switch to an alternative mode.

As noted above, we equate the social impact with the value that travellers place on the activity that they undertake at the destination of their trip. In terms of the impact of bus services, the social benefit only accrues to those who would not make the trip at all in the absence of bus. Bus travellers who would use a different mode in the absence of bus would still participate in the activity and receive the associated social benefit. For this latter group the provision of bus services is primarily an economic benefit in that it affects their travel time and/or their out of pocket expenses (public transport fares or car-related costs).

A separate model has been estimated that enables the size of that subset to be calculated. This can be applied to any intervention that affects the number of people travelling by bus. This model, combined with the values per trip, allows the monetary value of the social benefit of bus trips to be included in the appraisal of any scheme or policy that affects bus users.

WebTAG generally requires the user benefits of transport schemes to be calculated using a method known as the “rule of a half”. One consequence of the particular formula used is that it is not possible to claim additional benefits through the use of the above values. However, they can be used to disaggregate the benefits calculated using the rule of a half. This enables a better understanding of the social impacts of schemes that affect bus travel, and therefore provides more information for the decision making process.

The values presented here represent only the direct social benefit to the individual, based on their willingness to pay. There are likely to be external social benefits to the wider society and further work would be required to quantify these.

1. Introduction

1.1 Overview

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> *Whilst established methodologies exist to quantify and monetise the impacts of bus policy on the economy and the environment, relatively little is known about the value of social benefits – such as increased accessibility – that result from supporting buses. In this context, we define accessibility as the value bus users enjoy from accessing particular services that they would not otherwise have had easy access to. There is a large qualitative consensus on the types of social benefits that exists but very little evidence which quantifies and monetises these impacts.*
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> *The aim of this project is to produce a quantitative methodology and set of values for comprehensively valuing the social impacts of local public transport access that will enable all three objectives to be assessed consistently alongside one another. In particular, we would like this research to determine an appropriate monetary value (or set of values) that can be applied in cost-benefit analysis. This monetary value (or values) will give an indication about the potential social benefit derived from any particular bus intervention.*"

1.2 Definition of "social" benefits

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Similarly, it is not as broad a definition as all the impacts listed under the Social heading in the August 2012 version of the WebTAG Appraisal Summary Table (AST)[1]. "Access to services" is just one impact listed here, along benefits such as travel time savings to non-business users and accident reductions.

[1] http://www.dft.gov.uk/webtag/documents/project-manager/unit2.7.2.php

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1.3 Structure of this report

The project went through three distinct phases. This is reflected in the structure of this report.

Phase 1 of the project was primarily concerned with reviewing relevant evidence on the social impacts of public transport. This is reported in Chapter 2.

Phase 2 comprised initial data collection, comprising a number of focus groups and a stated preference (SP) pilot. This is reported in Chapter 3.

Phase 3 consisted of a full scale stated preference survey and the analysis of the data collected. This is reported in Chapter 4.

2. Phase 1

2.1 Literature review: methodological

2.1.1 Introduction

The purpose of this part of the review is:

- To identify how previous researchers have sought to quantify the social impacts of public transport, identifying the strengths and weaknesses of the methods used
- To identify any monetised values that have been produced

The review of who is affected by the social impact of public transport (PT), and in what ways, is contained in Section 2.2.

In keeping with the requirements for the project, this review is a relatively brief overview of key papers and concentrates on drawing out the most pertinent points, rather than providing a detailed description of each and every paper.

The following sections summarise what the literature tells us in general terms. This is followed by a brief discussion of particular papers.

2.1.2 Appraisal framework

Some of the papers reviewed consider the social impacts of PT within a wider evaluation framework. These frameworks can be broadly categorised in two ways:

- Whether they are "pure" cost-benefit analysis (CBA), or part of a multi-criteria framework
- Whether the evaluation is ex-ante or ex-post

In a pure CBA only those impacts with a monetary value are considered. These may be marketed, like scheme investment costs, or non-marketed, like the value of time. Such frameworks make it extremely important to place monetary values on all impacts of a transport scheme; otherwise they simply won't be considered in the appraisal.

Multi-criteria frameworks on the other hand allow monetised and non-monetised impacts to be considered at the same time. WebTAG[2] is, the most familiar and relevant framework in the context of transport scheme appraisal.

The other dimension mentioned above is ex-ante or ex-post. In other words, whether the impacts are used to justify investment in a transport scheme, before the decision to invest is made, or whether the impacts are evaluated after the scheme is in operation.

One difference in application between ex-ante and ex-post is in the source of the data used in the appraisal. For example, consider the appraisal of a road scheme. An ex-ante appraisal of, for example,

[2] http://www.dft.gov.uk/webtag/index.php

travel time savings within the WebTAG framework would normally be based on outputs from a traffic model. An ex-post appraisal, also based on WebTAG (such as the Highways Agency's post-opening project evaluation (POPE[3])) would use observed journey times. But both would use the same values of time. The implication of this for the current project is that ex-ante or ex-post isn't a major issue for the methodology which we need to develop for the estimation of the value of social impacts (though we acknowledge that the main application will be in ex-ante evaluations).

2.1.3 Approach to quantification

One of the most relevant aspects of the papers for our study is the approach that was used to quantify the social impacts. Not all papers sought to do this but, broadly speaking, there are two approaches, willingness to pay/accept and social return on investment.

2.1.3.1 Willingness to pay (WTP) and willingness to accept (WTA)

WTP is well-established as a tool for putting monetary value on non-market goods and is a key plank of the current WebTAG appraisal framework. Perhaps the most notable example is as a means for valuing travel time savings for people not travelling in work time[4]. It has also been used to derive option values for public transport[5].

WTP is usually established through the use of stated-preference (SP) surveys[6]. Typically this involves presenting survey subjects with a series of two-way choices and asking them which they prefer. In the context of travel time savings this might involve different permutations of bus fare and travel time, from which it is possible to infer the value they place on travel time savings. Alternatively, participants may be asked to rank three or more alternatives in order of preference.

WTA is subtly different from WTP. WTP is usually based on establishing the value people are prepared to pay for an improvement to the current situation, such as reduced travel time. WTA is about the compensation people would be prepared to accept in return for a deterioration, such as higher travel time. The distinction is important because there is some evidence that people value gains and losses differently, e.g. a reduction in travel time of five minutes might be valued less than an increase of five minutes[7].

SP is different from revealed preference (RP) as it is based on asking people what they *would* do in a given situation, rather than directly observing what they actually do.

[3] http://www.highways.gov.uk/roads/18348.aspx

[4] The current DfT values are set out in http://www.dft.gov.uk/webtag/documents/expert/unit3.5.6.php and are based on P.J Mackie, M. Wardman, A.S Fowkes, G. Whelan, J Nellthorp and J Bates, Institute for Transport Studies, University of Leeds (2003), Values of Travel Time Savings in the UK.

[5] http://www.dft.gov.uk/webtag/documents/expert/unit3.6.1.php explains that 'An option value is the willingness-to-pay to preserve the option of using a transport service for trips not yet anticipated or currently undertaken by other modes, over and above the expected value of any such future use.'

[6] Some of the literature refers to contingent valuation (CV) which is a particular type of SP survey.

[7] This is not a finding that is universally accepted. For example, see the discussion in Mackie, P.J., Wardman, M., Fowkes, A.S., Whelan, G., Nellthorp, J. and Bates, J. (2003) Values of Travel Time Savings UK. Working Paper. Institute of Transport Studies, University of Leeds , Leeds, UK.

2.1.3.2 Social Return on Investment (SROI)

Whereas WTP typically focuses on the benefit to individuals, SROI tends to look at the wider benefits to society. It aims to place a monetary value or the wider social impacts, or at least those which are reasonably tangible. For example, a scheme aimed at helping the unemployed back into work might consider the gain to the individual (net salary minus any reduction in benefits) and to the state (gain in taxes and reduced expenditure on benefits).

The disadvantage of this approach within the context of the current project is that it tends to focus on impacts that are readily monetised, as in the above example, and therefore are more likely to be economic, rather than social, benefits. It risks missing the more intangible benefits which we are aiming to quantify (such as the benefit of being in work over and above the wage received, such as effect on self-esteem).

2.1.4 Summary of papers reviewed

Table 2.1 summarises the papers reviewed. Not all of the papers seek to put a monetary value on the social impacts of public transport. Amongst those that do, a number deal only with option values and non-use values which are outside the scope of the current project as they are already monetised within WebTAG. Of those that do include potentially relevant monetised values we make the following observations:

The MVA work focuses on the willingness to accept the loss of a specific current tram service in Nottingham. This means it would be difficult to generalise the values to use elsewhere. Furthermore the work concentrates on specific mobility-impaired groups. Nevertheless, the results will provide a useful comparison of the values produced by our own proposed SP study. It is worth noting that the values vary considerably between people with different types of mobility impairment, implying we will need to pay careful attention to the appropriate segmentation in our survey.

The Bristow work is now over 20 years old. It includes use and non-use values. As noted above the latter are outside the scope of our current study. The use values will provide a useful comparison for our own results.

The Marston work focuses on one specific group, i.e. the visually impaired. Again the values obtained can be compared with our own results.

Studies using the social return on investment (SROI) method tend to focus on the more tangible economic benefits of getting out of work people into employment, based on net changes in wages, tax revenues and benefits, to both the individual and the state.

Stanley's work looks at the value of additional trip making by looking at the implied trade-off between trip making and household income in a model that predicts the risk of an individual being socially excluded. The values produced do not differentiate by mode. There is no segmentation of values by trip purpose or personal characteristics, except as a function of household income.

The highest values obtained are from the Stanley studies. AUS$20 is just under £14 at current exchange rates. The Marston study provides the next highest value at US$5 (about £3) per day per person with visual impairment. UK studies such as those by Bristow et al and MVA have produced much lower values, typically less than £1 per trip (or per day). (Some caution is needed in comparing outputs between studies as the data is of varying age, and therefore in various price bases, as well as different currencies. The

figures are discussed here to indicate the possible range of values that we might expect to obtain from our proposed SP.)

2.1.5 Conclusion

There are no monetary values available "off the shelf" from the literature that fulfil all the requirements of the current project. Some previous studies provide relevant values, but tend to focus just on specific groups such as people with impaired vision or mobility. Conversely, some studies produce values that are too broad and are not segmented by different social groups. Values from both types of study could provide a useful comparison with those that we will produce later in this project.

A willingness to pay/accept approach based on the results of stated-preference is the most promising method to employ in the estimation of a monetary value for the social impacts of PT. Some caution will be needed concerning possible differences obtained from using WTA or WTP.

Careful consideration will need to be given to the level of segmentation in the survey as the literature review suggests there are wide variations between different social groups. Individuals who experience particular benefits from local PT are not a homogenous group; for example, the level and type of impacts on someone who is mobility impaired are likely to differ considerably from those of someone from an ethnic minority background or living in an area of high deprivation. The next section explores these groups and the specific impacts in more detail.

Table 2.1: Summary of papers in methodological literature review

Author	Date	Title	Objective	Methodology	Results (inc. any monetary values)
Atkins	2008	Assessing Social and Distributional Impacts in Transport Scheme Appraisal and Evaluation	Provided an assessment of Social Distributional Impacts (SDI) methodology for the DfT	Atkins recommends a combined qualitative and quantitative approach and the use of a primary research to quantify travel behaviour and transport needs. This is purely an **assessment of SDI methodology**, rather than an application of this method.	N/A
Beecham, P. & Associates	2005	Transport solutions: the benefits of providing transport to address social exclusion in rural areas	Examined transport initiatives aimed at reducing social exclusion in rural areas	This method employed extensive **consultation to gather qualitative data** while compared total fares gathered from a bespoke transport scheme to the initial cost of said scheme as quantitative data.	The authors admitted their 'lack of capability' in terms of awarding quantitative monetary values and did not make any recommendations of how this should be done.
Bristow, A. L., Hopkinson, P. G., Nash, C. A., and Wardman, M.	1991	Use and Non-Use Benefits of Public Transport - development of a survey methodology, application of the method	To estimate non-use values of public transport	Went through several stages to create a comprehensive interview technique that involved **stated preference** and **willingness to pay** questions in a travel diary and face to face consultation format.	Assigned WTP values (in 1991 prices) to various journey purposes such as access to education (**10p**), work **(£1.50**), shopping (**90p**), visits (**62p**) and personal business (**47.5p**) Found average willingness to pay in non-use value of £**1.10 per week**, or **£57 per year** (in 1991 prices) amongst non-users of the services, and **43p per week**, or £**22 per year** amongst users (in 1991 prices).
Cascajo, R	2004	Socio-Environmental Benefits of Rail Urban Projects	To establish the social, economic and environmental benefits of rail projects in Europe	Covers **cost benefit analysis** and explains its shortfall as a tool to fully evaluate social impacts of public transport. Continues to develop a new version of **multi-criteria analysis** and uses this to and compare the socio-economic and environmental benefits of 7 European Rail projects.	This methodology was not used to establish 'standard' costs for social impacts of these schemes
Forkenbrock, D. J., Benshoff, S. and Weisbrod, G. E.	2001	Assessing the Social and Economic Effects of Transportation Projects	To create a guidebook for the Transportation Research Board on how to evaluate social and economic impacts of transport schemes at a community level.	Forkenbrock et al argue that community cohesion be analysed through **interviews**, **focus groups and surveys** in order to gather primary data rich in detail. They do not include an actual application.	N/A

Author	Date	Title	Objective	Methodology	Results (inc. any monetary values)
Humphreys, M, Fowkes, A.S	2006	The significance of indirect use and non-use values in transport appraisal	To establish new method of valuing non-use values after assessing previous attempts to do so.	**Stated Preference** games and **Contingent Valuation** questions used to assess the scale of indirect use and non use values for the Edinburgh – North Berwick rail service. The method included focus groups and surveys, and data was analysed with a binary logit model.	Option values obtained ranged from £150 per person per year for rail users to £172 per person per year for rail non-users. Comparable figures for total non-use values were £167 and £145 respectively. Households were found to be willing to pay between **£2** and **£4** per week to ensure that the rail survey was not withdrawn. A 30 minute interval bus service available is valued at **£57 per household** per year by non-users.
James, N., Waldron, C.	2011	Research in Transportation Business & Management	To evaluate the benefits of the Access Alliance Programme (AAP) by the SROI method	Used the **Social Return on Investment** Method (SROI) previously used by Wright et al. AAP seeks to provide transport links to enable residents to access employment and training.	Used existing estimate of benefit of £9k per person obtaining employment at minimum wage. Estimated a total annual benefit of £2.8m - a return on the initial total investment of £1.1 m over the four-year lifetime of the AAP. The added value per client receiving support equates to £**5431**; the social rate of return ratio is **2.56**.: for each £1 of AAP investment, approximately £2.56 worth of social benefit is generated.
Lucas, K.; Tyler, S.; Christodoulou, G.	2008	The value of new transport in deprived areas: Who benefits, how and why?	To assess what happened in four deprived areas of the UK when new public transport initiatives were introduced.	Focuses on the **qualitative aspects** of valuing transport impacts, however there were no suggestions on how to relate these qualitative findings to a tangible figure.	N/A
Marston, J.	2002	Empirical Measurement and Modelling of Access to Urban Opportunities for those with Vision Impairments, Using Remote Infrared Audible Signage'	To measure the value of social benefits of public transport to visually impaired individuals	Used the **contingent valuation** approach in order to analyse the benefits that severely vision-impaired people place on their ability to reduce travel time, stress, apprehension or fear from a journey. Asked participants how much they would pay/be willing to forego in order to meet their goals of using public transport	Study found a yearly benefit of over $20 million to San Francisco residents and over $134 million for the entire Bay Area, based on WTP of $5/day. This benefit, for those with some type of vision limitation, would be over $**562 million for the entire Bay Area.**

Author	Date	Title	Objective	Methodology	Results (inc. any monetary values)
MVA consultancy	2007	Understanding the true benefit of improved Public Transport	To estimate monetary values for public transport schemes to the mobility impaired	This presentation used various valuation approaches including transparent **willingness to pay** and **willingness to accept** methods, **contingent valuation** and **stated preference**	This report found mean WTA values for the loss of a local tramway service for wheelchair users (**£406** per annum), those with difficulty walking (**£318** per annum) and those who are temporarily impaired (**£272** per annum). By comparing the mean WTA/WTP values, the NET tram service has the supposed monetary value to the following groups: wheelchair users (**£224** per annum), those with difficulty walking (**£192** per annum) and those with a temporary impairment (**£171** per annum).
Root, A	2003	Delivering Sustainable Transport: A Social Science Perspective	To identify issues in current approach to transport schemes - important social aspects often lacking	Evaluates the flaws in **Cost Benefit Analysis**; citing that it often relies on 'flawed' assumptions.	N/A
Seddon, D	2003	Social Aspects of Transport	To review the social impacts of transport on various societal groups.	Seddon identifies social groups that would be affected most by changes to transport schemes and explains the flaws in past attempts to value social impacts through methods such as **willingness to pay**. However Seddon does not actually recommend a method of converting these social impacts.	N/A
Stanley, J.	2006	The Value of Mobility	To assess impacts of public transport initiatives on social inclusion in Australia	Uses **logit modelling** to develop a model to predict the risk of an individual being socially excluded. Since the model includes the number of trips made and household income, it is possible to value additional trips by looking at the implied trade-off between trip making and income. Applies across all modes, not just PT.	**Additional trips** at average income levels valued at **$A19.30** in 2008 prices and **$A20** in 2010 prices.
Stanley, J, Hensher, D., Stanley, J., Currie, G., Greene, W. and Vella-Brodrick, D.	2010	Social Exclusion and the Value of Mobility	To build on Stanley's original paper assessing impacts of public transport initiatives on social inclusion in Australia	Used of non-linear specification of household income enables derivation of marginal **WTP** for daily trip rates as a function of household income. Used to identify the Marginal Rate of Substitution, ie the trade off between income and number of transport units (trips) purchased.	Resulted in confirmation of the relationship between income, social exclusion and transport (the more income a person has, the more they can afford to travel and less likely to suffer from social exclusion). Mean daily household income that an individual is willing to pay is up to **$A19.30 for an additional trip**. This paper does not however put a price on social benefits from public transport.

Author	Date	Title	Objective	Methodology	Results (inc. any monetary values)
Webb, E., Netuveli, G., Millett, C.	2011	Free bus passes, use of pubic transport and obesity among older people in England	To examine the impact of the free bus passes for over 60+ policy on public transport use, a mode of active transport and levels of obesity.	Described the population in terms of age, gender, public transport use, free bus travel eligibility and obesity and used **logit regression** to predict the influence of eligibility for free travel on bus travel usage. Also incorporated problems with activities of daily living (ADL), car ownership and financial circumstances into the model to improve accuracy.	Results show **those who use public transport have 25% lower odds of being obese** than those that do not use public transport; found a definite relationship between public transport and less chance of obesity, thereby showing one potential social benefit from public transport
Wright S, Nelson JD, Cooper JM, and Murphy S	2009	An economic analysis of the Transport to Employment (T2E) scheme in Highland Scotland using Social Return on Investment	To calculate the *social* return on investment for a public transport scheme.	The **SROI** approach captures the economic value of social benefits by translating social objectives into financial measures of benefit. Comparing this value to the investment made produces an SROI ratio.	Analysis revealed that the measurable social benefits outweigh the investment by more than **3:1** for current usage patterns. The value added that the project has created through its activities is equivalent to **£4,500 per client**.

2.2 Literature review: social groups, impacts and benefits

2.2.1 Introduction

It is an established priority of the current government to ensure that local transport networks, and local public transport provision, meet two key government objectives: to help create growth in the economy, and to tackle climate change by cutting carbon emissions.

But it has also long been established that local public transport can, should and does have wider benefits than simply providing low carbon access to jobs. The wider social benefits of local public transport are widely acknowledged and successive studies (including studies undertaken by DfT) into the impacts of local public transport provision have revealed that a wide range of social groups benefit from access to local public transport, primarily in the form of buses and light rail provision. In addition the type and extent of social benefits (and costs) associated with transport undoubtedly vary depending on the social group analysed.[8] Certain sections of the community have a higher predisposition to use public transport due to their socio-economic and demographic background, their geographic location, their physical mobility or financial independence.

The objectives of this section are two-fold:

1. To understand in more detail the ***social groups*** which are particular beneficiaries of local public transport. This is essential to informing the methodology as the approach may need to assign different values to different groups.

2. To identify the types of ***benefits*** that arise from providing access to public transport so that the valuation methodology can, where appropriate, seek to quantify them.

Key groups identified in the DfT and other studies as potentially benefiting from local pubic transport provision include the following:

- **People on low incomes** and **unemployed people**, including people working part time and those claiming state benefits
- People living in **remote areas**, such as **rural areas** or urban peripheries
- **Disabled people**, including people with mobility limitations, sensory disabilities and people with mental wellbeing disabilities
- **Older people**, including retired people (aged 60/65 and over) and, potentially, older working aged people (aged over 55)
- **Younger people** and **children**, including younger adults aged 16-24
- Gender groups, and **women** in particular

[8] For example see Seddon, D. (2008): 'Social aspects of transport'

- People from **Black, Asian and minority ethnic** (BAME) communities
- **Single parents**

Importantly, many people possess more than one of these characteristics and in many areas, their effects can be multiplied. A young, single parent from a BAME community and on a low income does not mean that benefits from a local public transport intervention will be four-fold and the methodological approach adopted must mitigate against the risk of double-counting. However, the overlapping characteristics will mean that different types of benefits or, indeed, extent of benefits will be experienced as compared to those who fall into fewer social groups.

The review of literature which follows below provides the rationale for each of the above social groups that are identified as principal beneficiaries of local public transport schemes and also describes the types of impacts they will experience as a result.

2.2.2 People on low incomes and unemployed people

2.2.2.1 Why are people on low incomes and unemployed people beneficiaries?

People on low incomes, including unemployed people and other claimants of health and work-related benefits are particularly reliant on local public transport services. A study by the British Market Research Bureau in 2004 identified that adults in lower socio-economic groups use public transport more frequently than those in higher socioeconomic groups.[9] The most recent DfT National Travel Survey (NTS) (2011) found that 49% of households in the lowest income quintile do not have access to a car or van compared to the national average of 25% and 9% for the top income bracket.

Indeed, the previous Social Exclusion Unit, in its 2003 study recognised that:

> *The majority of people on low incomes do not have access to cars and rely in particular on walking and buses. They face a number of barriers in accessing work, learning, healthcare and other activities that relate both to problems with travel and the location of services.*[10]

Bus travel is particularly important for people on low incomes. The 2011 NTS confirmed that people in the lowest income bracket make ***almost four times more journeys by bus*** than people in the highest income bracket.[11] A study conducted by Duffy in 2000 found that bus services were more important to respondents in deprived areas compared with those in non-deprived areas, and that improving bus services was seen as a relatively high priority in deprived areas compared to other, more affluent, areas.[12]

Increased dependence on local public transport also equates to a vulnerability to the problems associated with it. The costs of public transport can be a particular difficulty for people on low incomes, though lack of available, adequate services have been identified by a range of studies as a greater obstacle.[13]

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[9] Campaign for Better Transport (2011): 'Buses Matter'

[10] Social Exclusion Unit (2003): 'Making the Connections', p.37

[11] DfT (2011): 'National Travel Survey 2011'

[12] Duffy, B (2000): 'Satisfaction and expectation: attitudes to public services in deprived areas'; Centre for Research in Social Policy (2007): 'Evidence Base Review on Mobility: Choices & Barriers for Different Social Groups'

[13] See, for example: Centre for Research in Social Policy (2007): 'Evidence Base Review on Mobility: Choices & Barriers for Different Social Groups'

Finally it is relevant to consider those people who are in employment but who are working non-peak hours. This group can face significant accessibility barriers if they choose not to, or are unable to travel by private transport.

2.2.2.2 Benefits experienced by people on low incomes

The key benefits experienced by people on lower incomes are:

- Access to employment
- Access to education
- Access to health services
- Improvements in health (direct and indirect benefit)
- Reduced risk of social and economic exclusion
- Increased opportunities for socio economic mobility for children from low income families

Direct benefits

- **Access to employment**

  One of the first considerations when embarking on a job search is accessibility. Transport plays a major role in the decision making process about whether to apply for, accept or stay in employment. Around 40% of jobseekers say that a lack of personal transport or poor public transport is a key barrier preventing them from getting a job.[14] In a number of studies, unemployed people – and long term unemployed people in particular – have been found to be by far the most alienated from public transport provision.[15] Key accessibility issues identified by surveys of job seekers and incapacity benefit claimants[16] included a general lack of provision of off-peak travel, particularly at night, which inhibited them from taking part time employment.

- **Access to education**

  It is worth noting that public transport accessibility can be especially important for *children* from low income families. In 2007 CBT reported that some children from poor families are put at further disadvantage because their parents cannot afford bus fares to get them to schools and colleges. Whilst children are entitled to free transport to school if it is more than three miles away from home (or two miles for children under 8 years old) this only applies to their 'nearest suitable school'. Low-income families are therefore more likely to have no choice but to send their children to their closest school, which may be poorer performing than others in their local area.

[14] Passenger Transport Executive Group (2011): 'Total Transport'; Social Exclusion Unit (2003): 'Making the Connections: Final Report on Transport and Social Exclusion'; Department for Transport (2000): 'Social exclusion and the provision of public transport'

[15] Department for Transport (2000): 'Social exclusion and the provision of public transport'

[16] Undertaken, in this case, by the Kent Jobcentre Plus District Implementation Team. See: Kent Jobcentre Plus District Implementation Team (2010): 'Existing evidence and measures to tackle accessibility problems'

Evidence shows that children from low income families travel a shorter distance to school than their high-income counterparts. Parents who live in social housing are one and a half times more likely to cite travel convenience as a reason for choosing a school than owner-occupiers. [17] In summary, children from low income families face higher risks of low access to education, and subsequent low attainment, if affordable transport is not available.'[18]

- **Access to health services**

Lack of private transport can present difficulties for those on low income groups in accessing other public services. Some 44% of people without access to a car find it difficult to get to the doctors or to hospital, meaning public transport (or in some cases transport provided by Primary Care Trusts [PCTs] or the NHS), is very important.[19] Inability of those experiencing socio-economic deprivation to reach healthcare facilities presents particular concerns given this group tend to have poorer health than those from wealthier backgrounds. The Marmot Review in 2010 suggested a causal link between social position and health levels, firmly attributing responsibility for the latter to the former:

'Health inequalities result from social inequalities … There is a social gradient in health – the lower a person's social position, the worse his or her health.'[20]

- **Improvements in health**

Research conducted by the Victoria Transport Policy Institute[21] indicates that through enhancing accessibility to health facilities public transit improvements can provide often overlooked health benefits. People who live or work in communities with high quality public transportation tend to drive significantly less and rely more on alternative modes (walking, cycling and public transit) than they would in more car-oriented areas. This reduces road accidents and pollution emissions and increases physical fitness and mental health. Given their traditionally lower levels of health, these direct health benefits will be particularly experienced by people from socio-economically deprived areas.

[17] Social Exclusion Unit (2003): 'Making the Connections', p.13

[18] Campaign for Better Transport (2007): 'Buses Matter'

[19] DEFRA (2009) 'Sustainable Development Indicators in your Pocket'

[20] Marmot, M. (2010): 'Fair Society, Healthy Lives – The Marmot Review'

[21] Victoria Transport Policy Institute (2010): 'Evaluating Public Transportation Health Benefits'

Indirect benefits

- **Reduced risk of social and economic exclusion**

  There have been several studies undertaken that reveal close links between transport and social inclusion. The high costs of motoring are well documented (as early as 2003, motoring made up on average a quarter of household expenditure[22]) and the risk of increased social exclusion as a consequence of people choosing not to travel by car is significant. High quality bus services therefore have a significant role to play. Lucas et. al. undertook a study in 2009 intended to identify the social exclusion impacts of projects designed to provide bus services or support use of existing bus services in deprived areas in the UK. The study concluded that:

  … public transport services are a vital component in both the social inclusion of individuals and the vitality and vibrancy of low-income neighbourhoods. Smaller initiatives offering individuals travel training and advice and help with their travel costs are also an important [element] for encouraging socially excluded people to use public transport more.[23]

- **Increased opportunities for socio-economic mobility for children from low income families**

  Transport affordability and availability were identified by the Department for Education and Skills (now the Department for Education) as significant barriers to continuing in education for some young people – particularly those in rural areas and in areas of low affluence. As such, identifying transport needs, and reducing the gaps in transport provision, particularly through the delivery of high quality local transport services, has the potential to have a significant impact on participation in education at the post-16 stage and, as such, to facilitating social mobility in younger people from low income families.[24]

2.2.3 People living in remote and rural areas

2.2.3.1 Why are people living in remote and rural areas beneficiaries?

Provision of public transport is often limited in rural and remote areas and, because of this, cars tend to be a key feature of rural life and adults in rural areas are more likely to own and use private transport than those in urban areas. Without owning or having use of a car ownership, access to everyday opportunities and services can be very challenging.

[22] Social Exclusion Unit (2003): 'Making the Connections: Final Report on Transport and Social Exclusion', p.3

[23] Lucas, Tyler and Christodoulou (2009): 'Assessing the 'value' of new transport initiative in deprived neighbourhoods in the UK' in Transport Policy 16(3), pp.115-122

[24] See: Coleman N. Thornthwaite S, Gleave, Steer Davies & Gleave (2003): 'Tackling social exclusion due to poor access in urban and rural areas' in proceedings of the European Transport Conference. As a result of their findings, the Department for Education and Skills established Pathfinder projects - £9m of 'pump prime' funding to identify transport needs, and reduce gaps in transport provision; to encourage post 16 participation in education and promote social inclusion.

Public transport is, therefore, a vital part of safeguarding accessibility for people in rural areas, especially those who display many of the other characteristics covered in this study, such as older people, disabled people, children and people on low incomes. A report by Strategic Promotion of Ageing Research Capacity (SPARC) notes that the impact of the unavailability of buses is acutely felt by those living in rural areas.'[25]

However, it is often the case that rural communities suffer from buses that are infrequent, expensive, and in some areas nonexistent.[26]

Each year the National Travel Survey asks respondents how near they live to a bus service. The minimum criterion for the government's 'bus availability indicator' is that a household should be within 13 minutes' walk of a bus stop with an hourly or better service.[27] The 2010 survey found that between 1998/00 and 2008, the proportion of households in rural areas that met this criterion increased from 45% to 58%. In small urban areas (including urban peripheries) the proportion of households with this access increased from 74% to 88% over the same period. Bus travel in small urban and rural areas has however remained relatively unchanged.[28]

2.2.3.2 Benefits experienced by people living in remote and rural areas

The key benefits experienced by people living in remote and rural communities are:

- Access to employment
- Access to other public services and amenities
- Reduced risk of social and economic exclusion, and community severance

Direct benefits

- **Access to employment**

  People living in remote or rural areas require access to employment in the same way that people living in urban areas do. However, without the same levels of public transport provision, those without a car can often find themselves unable to access employment which in turn can lead to unemployment, worklessness and poverty. A 1999 study by the Joseph Rowntree Foundation found that transport problems affect many aspects of rural life. Where settlements are dispersed and populations are sparse, both jobs and homes are scattered. The study found that frequently people could not get to work because they did not have access to a car and public transport was inadequate or non-existent. In consultation with users it found that people were often caught in a vicious circle of needing a job in order to afford a car. It was revealed that some firms provide works buses which offered people a solution to a lack of transport but that this could limit people's range of job opportunities and led to dependence on an employer.[29]

[25] Strategic Promotion of Ageing Research Capacity (2007): 'Older People and Transport: Integrating Transport Planning Tools with User Needs'

[26] Campaign for Better Transport (2007): 'Buses Matter'

[27] Though it should, of course, be noted that even a 13 minute walk may be extremely challenging for some users, particularly those with mobility limitations such as older people and some disabled people.

[28] Department for Transport (2010): 'National Travel Survey: Rural-Urban Travel Fact Sheet'

[29] Joseph Rowntree Foundation (1999): 'Finding work in rural areas: barriers and bridges'

The Campaign for Better Transport also noted that rural buses are important for the local (and national) economy. Many small businesses set up in the countryside or market towns, and need good public transport to ensure accessibility for their employees.[30]

- **Access to other public services and amenities**

  Like many of the groups considered in this study, people living in remote or rural areas are at significant risk of social exclusion and isolation. The Campaign for Better Transport produced a report in 2007 which explained that rural buses are vitally important to combating social exclusion, enabling non-drivers to access, shops, education, training and services. Many of these services have been centralised and satellite remote facilities closed.

Indirect benefits

- **Reduced social and economic exclusion, and community severance**

  In providing access to essential services – from employment and training, to shops and leisure activities – high quality public transport can help to reduce social and economic exclusion and combat community severance in rural areas. The report developed by the Campaign for Better Transport also pointed to the potential for rural buses to encourage visitors and tourists, making non-urban areas accessible to a wide range of people and income groups, including people without cars. This is beneficial in terms of social inclusion and diversity.[31]

2.2.4 Disabled people

2.2.4.1 Why are disabled people beneficiaries?

A number of studies have been published identifying disabled people as a key user group for local public transport. Studies undertaken by the DfT, Disabled Persons Transport Advisory Committee (DPTAC), the Campaign for Better Transport (CBT) and the Centre for Transport Studies (CfTS) have all indicated that disabled people are less likely to have access to car than non disabled people.[32] Some disabilities, such as visual impairments, mean that people do not have the option of driving and wider studies have shown that 60% of disabled people have no car in their household.[33] When asked by DPTAC about their local concerns, transport issues head disabled people's list, with around 48% expressing concerns regarding travel compared with around 38% of non disabled people.

[30] Campaign for Better Transport (2007): 'Buses Matter'

[31] Campaign for Better Transport (2007): 'Buses Matter'

[32] See, for example: Department for Transport (2007): 'Understanding the travel needs and aspirations of disabled people'; Department for Transport (2010): 'National Travel Survey: Business travel fact sheet'

[33] Disabled persons Transport Advisory Committee, (2009): 'Attitudes of disabled people to public transport'. See: http://dptac.independent.gov.uk/pubs/research/apt/pdf/apt.pdf

Disability surveys carried out in 1998 by the Office of Population Censuses and Surveys (OPCS – now the Office for National Statistics [ONS]) showed that as many as three million people in the UK cannot walk 200 yards without stopping and without severe discomfort and 2.3 million people cannot stand for five minutes without severe discomfort. People who have heart or breathing conditions may have a more limited ability to carry loads, to climb, or to walk easily (for example to and from bus stops) and around half a million people lose control of their bladder at least daily.[34] Such conditions can have a serious impact on ease of travel making local public transport interventions, which limit the need for pedestrian travel and expedite journeys from origin to destination, particularly important.[35]

Particularly important for disabled people are buses, which they tend to use more often than non disabled people. Findings from a 2009 poll, again commissioned by DPTAC showed clearly that disabled people are more dependent using buses approximately 20% more frequently than non disabled people.[36] Research by the Royal National Institute for Blind People (RNIB) shows that blind people in particular are active bus users, with 41% of blind and partially sighted people currently using bus transport;[37] due to this reliance on public transport RNIB runs a campaign for bus concessions for disabled passengers over and above the statutory minimum.[38]

In addition to ***availability*** of bus services, ***physical accessibility*** is important to disabled people. Disabled people often find public transport inaccessible. They can also experience a lack of flexibility in their travel choices: often travelling involves planning ahead (for example, booking assistance for rail travel, or booking community transport 48 hours in advance), making it difficult to be spontaneous.[39]

- Some disabled people may have difficulties getting on and off vehicles, up and down steps, and reaching handrails and bells.
- People with psychological disorders may suffer from conditions such as claustrophobia where public transport is crowded due to high demand.
- People with learning disabilities such as dyslexia may have problems reading timetables or signage correctly, a making bus and trams stops and stations difficult to negotiate.[40]

Reports by the DfT on social exclusion and the provision of public transport recognise that:

> *There seems to be general agreement among operators that the introduction of accessible buses provides a great stimulus to ridership. Pete's Travel, the third largest operator in the West Midlands … estimates that the introduction of a low-floor bus can very quickly boost patronage by more than*

[34] Department for Transport (2000): 'Social exclusion and the provision of public transport'

[35] Disabled persons Transport Advisory Committee (2001): 'Attitudes of Disabled People to Public Transport - Research Study'

[36] Disabled persons Transport Advisory Committee, (2009): 'Attitudes of disabled people to public transport'. See: http://dptac.independent.gov.uk/pubs/research/apt/pdf/apt.pdf

[37] See the Royal National Institute for Blind People (RNIB) website. See: http://www.rnib.org.uk/getinvolved/campaign/gettingaround/Pages/bus_passes.aspx

[38] See the Royal National Institute for Blind People (RNIB) website. See: http://www.rnib.org.uk/getinvolved/campaign/gettingaround/Pages/bus_passes.aspx

[39] Centre for Research in Social Policy (2007): 'Evidence Base Review on Mobility: Choices & Barriers for Different Social Groups'

[40] Department for Transport (2000): 'Social exclusion and the provision of public transport'

15% (which offsets the 10% premium on the cost of the vehicle). Other operators agreed with this estimate, some reckoning that the increase could be over 20%.[41]

2.2.4.2 Benefits experienced by disabled people

The key benefits experienced by disabled people are:

- Access to employment
- Access to healthcare facilities
- Access to shops, services and amenities
- Reduced risk of social and economic exclusion

Direct benefits

- **Access to employment**

  Good quality public transport can provide significant benefits for disabled people, who often face significant transport barriers to employment, in accessing employment opportunities,. The Office for Disability Issues 2011 'Life Opportunities Survey' asked people with disabilities about the barriers that they faced in accessing employment opportunities. 29% of adults with a disability who were seeking employment found that 'difficulty with transport' was a key barriers to taking up employment opportunities (compared with 24% of adults without a disability).[42] High quality public transport can help to reduce many of the barriers associated with transport in accessing employment.

- **Access to healthcare facilities**

  Public transport interventions can provide better access to healthcare facilities, which is important for many disabled people.[43] The ability to attend hospital and GP appointments and regular medical check-ups will lead to maintenance, management and improvement in health.

- **Access to other public services and amenities**

  The Office for Disability Issues 2011 'Life Opportunities Survey' found that many disabled people did not access public services or amenities, or take part in leisure activities as much as they would have liked to.[44] Difficulty with transport was reported as a barrier more frequently by adults with a disability than adults without a disability (13% and 5% respectively). The impact of high quality public transport has the potential to alleviate the transport barriers for disabled people.

[41] Department for Transport (2000): 'Social exclusion and the provision of public transport'

[42] Office for Disability Issues (2011): 'Life Opportunities Survey', p.64. See: http://statistics.dwp.gov.uk/asd/asd1/los/los_wave_one_200911.pdf

[43] American Public Transport Association (2002): 'The Benefits of Public Transportation: an overview'

[44] Office for Disability Issues (2011): 'Life Opportunities Survey', p.103

Indirect benefits

- **Reduced social and economic exclusion**
  Local public transport is extremely important for many disabled people so that they retain their independence. The passenger Transport Executive Groups noted in 2007 that services:

  > *… enable people to get out and about independently to shops, services and activities. Furthermore, they mean that vulnerable people can simply get out of the house and see other people, something that can make a big difference to a person's wellbeing and likelihood of keeping healthy.*[45]

  Loss or limited independence can often lead to social and economic isolation (and the associated exacerbation of mental and physical health problems that this can, in turn, cause).[46] For example, a study by Hine and Mitchell in 2003 indicated that people with health problems were considered to be particularly impacted by exclusion as a result of transport issues.[47] It was further noted by Bosnall and Kelly in 2005 that transport could change the behaviour of disabled people and people with long term health problems, for example restricting their access to facilities and services.[48]

2.2.5 Older people

2.2.5.1 Why are older people beneficiaries?

In their 2003 study, Hine and Mitchell highlighted that older people are likely to have to spend more time travelling as a result of having reduced access to personal transport. Their reliance on buses is a corollary of this. The National Travel Survey (NTS) conducted annually by the DfT confirmed that those aged over 60 were making around 100 trips per person per year in 2008 – making them the second highest users of bus services after women aged 17-20.[49]

The introduction of concessionary travel for those aged over 60 has substantially increased the use of buses by older people. According to NTS data the number of over-60s who have taken up concessionary travel passes has risen from 49% in 1998/1999 to 79% in 2011 and the proportion of people aged 60 and over who said they use a local bus at least once a week increased from 28% in 2005 to 40% in 2010.[50]

In addition, we live in an 'ageing society'. As the number of older people in the UK increases the potential impacts of local public transport services on this group are significant.[51]

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[45] Passenger Transport Executive Group (2011): 'Total Transport', p.18

[46] Passenger Transport Executive Group (2011): 'Total Transport', p.18

[47] Hine, J. and Mitchell, F. (2003): 'Transport Disadvantage and Social Exclusion: Exclusionary Mechanisms in Transport in Urban Scotland'; CfTS (2009): 'Treatment of SDIs in appraisals and evaluations'

[48] Bonsall, P. and Kelly, C. (2005): 'Road user charging and Social Exclusion: The impact on a range of charging schemes on at-risk groups' in *Transport Policy* 12(5); CfTS (2009): 'Treatment of SDIs in appraisals and evaluations'

[49] Department for Transport (2010): 'National Travel Survey: Business travel fact sheet'

[50] Department for Transport (2012): 'National Travel Survey'. See data: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/35625/nts0619.xls and https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/9961/nts0621.xls

[51] Department for Transport (2007): 'Understanding the travel needs, bahviour and aspirations of people in later life'

2.2.5.2 Benefits experienced by older people

The key benefits experienced by older people are:

- Access to public services and amenities
- Access to healthcare services
- Improved health
- Reduced social and economic exclusion
- Improved mental health and psychological benefits (indirect benefits)

Direct benefits

- **Access to public services and amenities**

  Research has also shown that many older people place particular value on 'local' and 'daytime' travel. They tend to use public transport to visit their families and friends, shopping, and going to localised entertainment facilities such as pubs, day clubs and similar activities depending on their level of independence.

- **Access to healthcare services**

  The Centre for Research in Social Policy noted that 'people over the age of 70 predominantly travel for shopping, personal business (notably healthcare) or to visit friends'.[52] Because older people are more likely to require access to health services than other sections of the population, the benefits of high quality and reliable public transport in providing this access are significant. Indeed, a key benefit noted by the Social Exclusion Unit in 2003 was the improved access to health centres and healthy affordable food for older people.[53]

- **Improved health (direct benefits)**

  As described above, implementation of public transport schemes can in itself encourage a more healthy lifestyle, with studies showing there to be a positive correlation between public transport usage and pedestrian activity directly contributing to health lifestyles.[54] This is a particularly benefit to older people who amongst those who are more susceptible to ill health. A recent study published in the Journal of Epidemiology and Community Health[55] highlighted that older people who use public transport were 25 per cent less likely to be obese than those who did not indicating that there are considerable health benefits of using public transport through encouraging outside activity and mobility.

[52] Centre for Research in Social Policy (2007): 'Evidence Base Review on Mobility: Choices & Barriers for Different Social Groups'
[53] Social Exclusion Unit (2003): 'Making the Connections: Final Report on Transport and Social Exclusion'
[54] Corpuz, G., Hay, A., Merom, D., (2007): 'Walking for Transport and Health: Trends in Sydney in the Last Decade'
[55] Webb, E., Netuveli, G. and Millett, C. (2011): 'Free bus passes, use of pubic transport and obesity among older people in England'

Indirect benefits

- **Reduced social and economic exclusion**

  The 2007 CRSP Evidence Base Review on Mobility indicated that older people 'predominantly travel for shopping, personal business (notably healthcare) or to visit friends. Maintaining independence and accessing essential services and social opportunities underpin older people's quality of life. A lack of transport can mean difficulty accessing essential services and facilities, such as pension services and medical services, and can lead to social isolation and loneliness. As such, transport is key to reducing the risks of social exclusion among older people.[56] A DfT study in 2000 showed that some older people considered buses to be a lifeline which stopped them from feeling isolated.[57] Those holding concessionary travel passes reported the satisfaction and comfort they took in being able to travel for shopping with their friends several times a week.[58] In the 2000 DfT study into the relationship between social exclusion and public transport, older were shown not a to have particular inclination to seek activities at any significant distance from their homes and many expressed little interest in travelling great distances in the evenings due to personal security concerns.[59]

- **Improved health (indirect benefits)**

  In terms of indirect benefits, research has shown that the positive impacts that local public transport schemes can deliver in terms of enhanced accessibility and retention of independence have knock-on effects in terms of older people's mental health and psychological stability; thereby prolonging self-sufficient living[60].

2.2.6 Younger people and children

2.2.6.1 Why are younger people and children beneficiaries?

Independent use of local public transport amongst younger people increases with age. As children progress through education, and become more independent, use of the bus to access education increases. According to the 2010 National Travel Survey, in 2010, 4% of primary school children used a local bus to access their school, however more than one in four, or 26% of secondary school children used a local bus service to access education. Younger people (falling within the 17-20 age group) make up the majority of bus users in the UK.[61]

[56] Centre for Research in Social Policy (2007): 'Evidence Base Review on Mobility: Choices & Barriers for Different Social Groups'

[57] Department for Transport (2000): 'Social exclusion and the provision of public transport'

[58] Department for Transport (2000): 'Social exclusion and the provision of public transport'

[59] Department for Transport (2000): 'Social exclusion and the provision of public transport'

[60] Webb, E., Netuveli, G. and Millett, C. (2011): 'Free bus passes, use of pubic transport and obesity among older people in England'

[61] Department for Transport (2011): 'National Travel Survey 2010'; Centre for Research in Social Policy (2007): 'Evidence Base Review on Mobility: Choices & Barriers for Different Social Groups';

2.2.6.2 Benefits experienced by younger people and children

The key benefits experienced by younger people and children are:

- Access to education
- Access to employment
- Access to social and recreational activities
- Increased educational attainment leading to increased future employment and economic activity (indirect benefits)
- Improved health and reduced childhood obesity

Direct impacts

- **Access to education**

  It has long been recognised that young people need affordable bus services in order to give them a chance to take up opportunities in education and work, and to increase their independence.[62] In spite of this, younger people report experiencing problems relating to public transport with regards to seeking and sustaining employment (a problem that has been worsened since the ending of the EMA and the shortfalls of the replacement bursary). In fact, 12% of respondents in a 2000 study listed 'lack of public transport' as a problem in seeking work.[63] Furthermore, the Social Exclusion Unit noted that 'whereas most school children receive concessionary fares or tend to travel relatively small distances to school, young people entering further education or training usually do not receive travel discounts and often travel longer distances.'[64] Indeed, further studies by the Campaign for Better Transport have shown that one in five students has considered dropping out of further education because of financial cost, and transport is the greatest cost of participation.[65]

- **Access to employment**

  Young people are recognised users of bus services to access employment opportunities.[66] In surveys undertaken by the DfT, young people tended to be willing to travel further, and make more complicated journeys to work, when they felt it would benefit their career prospects or entail better pay. As such, public transport played a significant role in accessing unemployment for this group and yield potential benefits. [67]

  Conversely, travel by public transport can be problematic for those young people claiming unemployment benefits where their allocated Jobcentre is far from their home or on an inadequate transport route. [68]

[62] Campaign for Better Transport (2007): 'Buses Matter'

[63] Bryson, A et al, (2000): 'New Deal for Young People: national survey of participants (Employment Service Research Report 44)'

[64] Social Exclusion Unit (2003): 'Making the Connections', p.13

[65] Campaign for Better Transport (2007): 'Buses Matter'

[66] Department for Transport (2007): 'Understanding the travel aspirations, needs and behaviours of young adults'

[67] Department for Transport (2007): 'Understanding the travel aspirations, needs and behaviours of young adults'. See: http://webarchive.nationalarchives.gov.uk/20091003125851/http://www.dft.gov.uk/pgr/scienceresearch/social/youngaspirations?page=3

[68] Department for Transport (2007): 'Understanding the travel aspirations, needs and behaviours of young adults'. See:

Indirect impacts

- **Increased educational attainment**

  As noted above with regards to young people from low income families, transport can have a positive impact on delivering access to education and can, therefore, indirectly support increased educational attainment. Identifying transport needs, and reducing the gaps in transport provision, particularly through the delivery of high quality local transport services, has the potential to have a significant impact on participation in education at the post-16 stage and on improving educational attainment.[69]

- **Improved health**

  When combined with active modes such as walking or cycling (which are often used to reach a public transport access point) high quality public transport provision can have a positive impact on health. In particular, it can contribute towards addressing the significant problem of one in ten children suffering from obesity, which is a key government priority.[70]

2.2.7 Women

2.2.7.1 Why are women beneficiaries?

Women are less likely to have access to a car, and are more likely to travel by bus, foot, community transport[71] or taxi than are men; women are also more likely than men to be responsible for childcare.[72] This is reflected in the results of the National Travel Survey, which notes that women are more likely to use local buses than men, stating that 'women make on average 83 local bus trips per year compared with 63 among men in 2008'.[73]

The Survey also shows that the uptake of concessionary travel passes among women aged 60 and over is higher than males. In 2008, 68% of men aged 60 and over had a concessionary travel pass compared to 78% of women in Great Britain.[74]

http://webarchive.nationalarchives.gov.uk/20091003125851/http://www.dft.gov.uk/pgr/scienceresearch/social/youngaspirations?page=3

[69] See: Coleman N. Thornthwaite S, Gleave, SD (2003): 'Tackling social exclusion due to poor access in urban and rural areas' in proceedings of the European Transport Conference. As a result of their findings, the Department for Education and Skills established Pathfinder projects - £9m of 'pump prime' funding to identify transport needs, and reduce gaps in transport provision; to encourage post 16 participation in education and promote social inclusion.

[70] See: http://www.dh.gov.uk/en/Publichealth/Obesity/index.htm

[71] Disabled Persons Transport Advisory Committee (2002): 'Attitudes of disabled people to community transport'

[72] Centre for Research in Social Policy (2007): 'Evidence Base Review on Mobility: Choices & Barriers for Different Social Groups'; Centre for Transport Studies (2009): 'Treatment of SDIs in appraisals and evaluations'; Disabled Persons Transport Advisory Committee (2002): 'Attitudes of disabled people to community transport'

[73] Department for Transport (2010): 'National Travel Survey: Use of public buses, Personal Travel Factsheet - March 2010'

[74] Take-up has increased across both genders from 2002 to 2008, coinciding with a rollout of statutory free local travel on buses. Department for Transport (2010): 'National Travel Survey: Use of public buses, Personal Travel Factsheet - March 2010'

However, as with some other social groups , despite women being high public transport users, interventions do not always meet their needs related in part to personal security concerns in using services (particularly after dark) and due to their role as primary carers of children and the journeys and tasks associated with this care[75]. These challenges are often compounded by the need to make complex trip chains in association with these roles, making bus travel difficult and inconvenient at times.

2.2.7.2 Benefits experienced by women

The key benefits that are experienced by women are:

- Access to employment and participation in the labour market
- Reduced risk of social and economic exclusion

Direct impacts

- **Access to employment**

  Lack of their own car and the common need to fit their lifestyle around childcare can preclude labour market participation. Local public transport schemes which are sensitive to these needs, and take into account regular off-peak as well as on-peak travel, could deliver employment benefits to those women who are not economically active or are presently reliant on part time work.

Indirect impacts

- **Reduced risk of social and economic exclusion**

  The Centre for Transport Studies concludes that women are at greater risk of social exclusion than are men due to their more limited access to private transport.[76] As such, high quality public transport can have a significant role to play in ensuring that exclusion is addressed.

2.2.8 People from Black, Asian and minority ethnic communities

2.2.8.1 Why are people from BAME communities beneficiaries?

Car ownership within households from different ethnic backgrounds varies considerably. The 2010 National Travel Survey showed that the proportion of adults (aged 17+) living in a household with a car was highest among those from White and Asian backgrounds, in particular, those from White British (83%), Pakistani (83%) and Indian backgrounds (81%). Adults from Black backgrounds were least likely to live in a household with a car (59%).[77]

[75] Department for Transport (2000): 'Social exclusion and the provision of public transport'

[76] Centre for Transport Studies (2009): 'Treatment of SDIs in appraisals and evaluations'; Hine, J. and Mitchell, F. (2003): 'Transport Disadvantage and Social Exclusion: Exclusionary Mechanisms in Transport in Urban Scotland';

[77] Department for Transport (2011): 'National Travel Survey 2010: Travel by car availability, income, ethnic group'

Although a similar proportion of adults from Asian and White backgrounds live in households with a car (78% and 82% respectively), a higher proportion of Asian adults were non-drivers (25%) compared with White adults (12%).[78]

The variation in car availability contributes to differing travel patterns across ethnic groups. In 2007, on average, adults from a White background made the most trips (1,023 trips per person per year), compared to 865 trips by those from an Asian background, and 859 trips by those from a Black background. As a result, people from Black, Asian and minority ethnic (BAME) communities and people from Black backgrounds in particular, are often higher than average users of bus services. Indeed, various studies have confirmed that bus use amongst non-White groups is proportionately high.[79]

Despite these needs, there is evidence to suggest that local public transport schemes are not presently meeting the needs of all BAME communities:

- Public transport planning in the UK has not necessarily kept pace with changing local communities, leaving some of the needs of BAME groups unmet.[80] In many cases, as communities have changed and the socio-demographic characteristics of different areas have developed, new local community facilities have emerged. These are often not well served by public transport; routes have tended to focus on getting people to and from town and city centres rather than being radial in nature and serving suburban areas.

- Members of BAME groups can sometimes face challenges in terms of language and their grasp of English (which can in some instances be partial or non-existent). Such barriers can occasionally make navigation of a public transport system extremely difficult, with timetables, signage, notifications, origin and destination information and fares hard to understand. DfT studies have revealed that small sections of different BAME groups also experience problems understanding and being understood by the driver, related both to language barriers, but also to local dialects and pronunciation difficulties.[81]

- There are large numbers of people from BAME communities for whom cost rather than culture is a bar to using public transport.[82]

- For some members of these groups, fear from racial attacks on public transport can also represent a key obstacle to mobility. Studies revealed a broad cross section of people from BAME communities who found public transport unpleasant because they had previously experienced racist abuse. [83]

There is the potential for public transport schemes to deliver significant benefits to some BAME groups. However, as with single parents and families with young children below, benefits will only be maximised if the local schemes are complemented by other measures, particularly in terms of addressing demand for new routes, language and security needs.

[78] Department for Transport (2011): 'National Travel Survey 2010: Travel by car availability, income, ethnic group'

[79] Centre for Research in Social Policy (2007): 'Evidence Base Review on Mobility: Choices & Barriers for Different Social Groups'; Owen, D. and Green A. (2000): 'Estimating Commuting Flows for Minority Ethnic Groups in England and Wales' in *Journal of Ethnic and Migration Studies'* 26(4); Department for Transport (2005): 'Transport Statistics Bulletin: National Travel Survey 2004'

[80] Centre for Research in Social Policy (2007): 'Evidence Base Review on Mobility: Choices & Barriers for Different Social Groups'

[81] Department for Transport (2000): 'Social exclusion and the provision of public transport'

[82] Department for Transport (2000): 'Social exclusion and the provision of public transport'

[83] Department for Transport (2000): 'Social exclusion and the provision of public transport'

2.2.8.2 Benefits experienced by people from BAME communities

The key benefits experienced by people from BAME communities are:

- Access to employment
- Access to local cultural and social facilities
- A more diverse and inclusive labour market (indirect benefit)

Direct impacts

- **Access to employment**

  In 2003 the Cabinet Office published a report into ethnic minority groups' labour market participation; this concluded that there are wide variations in the achievements of different ethnic minority groups and even those enjoying relative success (such as people from Indian and Chinese backgrounds) were not doing as well as they should be given their education profile.[84] The report highlighted poor transport as one of the barriers that needed to be overcome in order to redress disproportionately low participation rates. More recent research indicates that BAME groups depend more on public transport to travel to work than white adults[85] and that ethnic minorities are more geographically restricted in their job-seeking activities.[86] Both of these factors potentially limit the job opportunities available to them.

- **Access to local cultural and social facilities**

  If public transport interventions take into account new demographic patterns and needs, there is the possibility for schemes to deliver cultural and religious benefits to BAME communities by providing better access to facilities and venues. A public transport system that provides information and services which take account of the cultural and language profile of local communities, and operate at different times and in different ways[87] has considerable social value.

Indirect impacts

- **A more diverse labour market**
  As highlighted above, the enhanced accessibility that local public transport schemes can offer, therefore, offer considerable potential in terms of widening employment possibilities for members of BAME groups. Indirectly this could contribute to diversity within the local labour market and make it more representative of the local community.

[84] Cabinet Office (2003): 'Ethnic Minorities and Labour Market'

[85] The Scottish Government (2011) Source: 'http://www.scotland.gov.uk/Publications/2008/08/08123433/3'

[86] J.M. Thomas, 'Ethnic Variation in Commuting Propensity and Unemployment Spells: some U.K. Evidence'

[87] Newcastle Joint Strategic Needs Assessment (2010). Source: 'http://www.newcastlejsna.org.uk/node/636'

2.2.9 Single parents

2.2.9.1 Why are single parents beneficiaries?

Travel for parents of young children is often focussed around their care commitments with destinations including nurseries, childminders, grandparents and friends' houses. Particular problems that can be encountered when using public transport for these trips include:

- Problems with buggy-accessibility, resulting in a tendency to walk
- Insufficient time to embark and disembark safely with children
- Unwillingness of bus drivers to adapt for children, failing to stop for family groups, or refusing to wait for them to sit down
- High cost of travel once some of the children are at fare-paying age (such that taxi prices for a group are often comparable)
- Shopping and travelling with children, buggies etc, is very difficult. Children can be difficult to control on buses, especially on long routes.
- Single tickets are bought because cheap fare passes cannot be used at peak times.
- Problems of access to children's hospitals, clinics and other medical facilities[88]

In addition, journeys often tend to involve complicated chains of trips, which can be expensive, time consuming and arduous if travelling on public transport with pushchairs or toddlers. Parents are not usually making a simple return journey but travelling onwards to work, learning or leisure activities.[89]

Local public transport initiatives do have the *potential* to deliver accessibility benefits for single parents and families with young children to their various destinations, but at present services are not really meeting their multiple needs and do not necessarily respond to their complex journey requirements. As such, it is likely that the implementation of local public transport schemes would need to be accompanied by action on fare structures, physical accessibility measures and also driver awareness training for these benefits to be fully realised and for this group to become a primary beneficiary of investment.

[88] Department for Transport (2000): 'Social exclusion and the provision of public transport'; Social Exclusion Unit (2003): 'Making the Connections', p.13

[89] Social Exclusion Unit (2003): 'Making the Connections', p.104

2.2.9.2 Benefits experienced by single parents

The key benefits that *could potentially be* experienced by single parents are:

- Access to childcare
- Participation in the labour market

Direct impacts

- **Access to childcare**

For many single parents, the biggest barrier to economic and social participation is the provision of safe and reliable childcare and the physical ability to transport their children to these locations and also participate in the labour market.[90]

Indirect impacts

- **Participation in the labour market**

If local public transport can assist with the multiple demands of these groups (as set out above) there is the potential for social impacts in the form of reduced social inclusion and economic activity. Evidence shows that lone parents can find public transport service links limited, hindering them from attaining part time employment which can easily be combined with childcare commitments.[91]

[90] Social Exclusion Unit (2003): 'Making the Connections', p.104

[91] Kent Jobcentre Plus District Implementation Team (2010): 'Existing evidence and measures to tackle accessibility problems'

2.2.10 Summary

The social impacts of local public transport are likely to be felt by a wide range of social groups from children to older people; and from people living in inner city communities to rural villages.

The table below draws out:

- the main **groups** likely to experience social impacts of local public transport;
- the key reasons **why** they are likely to experience impacts; and,
- the **types** of impact that they are likely to experience.

Table 2.2: Social impacts by group

Group	Why is this a key social group?	Benefits
People on low incomes and unemployed people, including people working part time and those claiming state benefits	■ Travel is a significant determinant of employment horizons. ■ Inability of afford the running costs of private transport results in lower than average car ownership and higher reliance on pubic transport.	**Direct** ■ Access to employment ■ Access to education ■ Access to health services **Indirect** ■ Improvements in health (direct and indirect benefit) ■ Reduced risk of social and economic exclusion ■ Increased opportunities for socio-economic mobility for children from low income families
Disabled people, including people with mobility limitations, sensory disabilities and people with mental wellbeing disabilities	■ Lower levels of car ownership, as well as potentially reduced mobility. ■ Reliance on lifts from family and friends commonplace. ■ Particular access needs, potentially focussed around healthcare.	**Direct** ■ Access to employment ■ Access to healthcare facilities ■ Access to shops, services and amenities **Indirect** ■ Reduced risk of social and economic exclusion

Group	Why is this a key social group?	Benefits
Older people, including retired people (aged 60/65 and over) and, potentially, older working aged people (aged over 55)	▪ Lower levels of car ownership due to low income levels and health limitations (e.g. eyesight). ▪ Ability to use concessionary passes for local trips ▪ Access needs often locally focussed – local shops, post office, leisure activities	**Direct** ▪ Access to public services and amenities ▪ Access to healthcare services **Indirect** ▪ Improved health ▪ Reduced social and economic exclusion ▪ Improved mental health and psychological benefits (indirect benefits)
Younger people and children, including younger adults aged 16-24	▪ Car ownership not legal until the age of 17 in UK ▪ Comparatively low levels of car ownership amongst 17-25 year olds due to overall lower income status, participation in higher education and reliance on parents for transportation. ▪ Higher than average bus use amongst younger people, particularly for education trips.	**Direct** ▪ Access to education ▪ Access to employment ▪ Access to social and recreational activities **Indirect** ▪ Improved health and reduced childhood obesity. ▪ Increased education attainment. ▪ Reduced long-term employments and economic activity levels.
Gender groups, and women in particular	▪ Fewer women than men hold full drivers' licences and fewer women own cars. ▪ Women use buses more frequently than men. Young women make a significant number of trips by bus.	**Direct** ▪ Access to employment and participation in the labour market. **Indirect** ▪ Reduced risk of social and economic exclusion.
People from BAME communities	▪ Lower levels of car ownership amongst people from Black communities ▪ High levels of bus use amongst many BAME people. ▪ Existing challenges to bus use including social conventions, cost of travel, linguistic barriers, and personal security.	**Direct** ▪ Access to employment ▪ Access to local cultural and social facilities **Indirect** ▪ A more diverse and inclusive labour market.
Single parents	▪ High levels of bus use amongst women with young children. ▪ Bus use often difficult for single parents juggling children, buggies, shopping; existing services not meeting their needs. ▪ Large number of through trips involving children – 'drop offs' at nursery or school, and onward travelling to work, shopping, leisure.	**Direct** ▪ Access to childcare **Indirect** ▪ Participation in the labour market.

Group	Why is this a key social group?	Benefits
People living in remote areas, such as rural areas or urban peripheries	■ Levels and frequencies of public transport provision tend to be much lower. ■ Services and amenities tend to be centralised. ■ Public transport accessibility not increased at the same pace as in urban areas.	**Direct** ■ Access to employment ■ Access to other public services and amenities **Indirect** ■ Reduced risk of social and economic exclusion, and community severance

2.2.11 Conclusions

They key conclusions that can be drawn from this section are:

- **Social groups**: There are undoubtedly several social groups who disproportionately benefit from local public transport interventions. Amongst those discussed in this report the most significant benefits are likely to accrue for those on low incomes, older people, and younger people and, to a slightly lesser extent disabled people and those living in remote and rural areas. There are clear areas of overlap between many of these social groups, with the main common denominator being the tendency towards non-car ownership.

- **Direct benefits**: The most significant benefit of local transport provision is increasing accessibility for those people who, without a private vehicle, presently experience transportation barriers. Access to employment, education and labour market participation is a key benefit for many groups as is the ability to independently partake in social activities, shopping trips and get to other essential public services, especially healthcare. Through providing these links, local schemes can have a direct impact on health (as people integrate walking into their public transport trip) and, most notably on reducing social and economic exclusion.

- **Indirect benefits**: Alongside the direct benefits, there are some common indirect social benefits for which it is equally important to attribute a value. First, there is the contribution that access to employment and education can make to wider economic activity, employment rates and productivity in the local area. Second, there is the reduction of socio-economic deprivation in those areas in which local transport schemes are implemented. Third, are the improvements to the general health of the local population benefits which are realised due to better access to health facilities and leisure activities and also to the mental and psychological well-being of individuals due to increased opportunities for social interaction.

2.3 Groups benefiting from access to public transport: spatial analysis

2.3.1 Introduction

One of the uses of the results from the current project will be to look at bus policy at the national level, in relation to schemes such as concessionary travel passes, the bus service operators' grant (BSOG) and the government's response to the Competition Commission's report on the local bus market[92].

In that context it is worth understanding the current level of access to public transport in England. This section looks at accessibility as a two stage process:

- Firstly, the proximity of population groups to the network is critical. If reaching the public transport network is too arduous or not possible then the social benefits of local public transport are significantly reduced.

- Secondly, it is recognised that access to the network is not an end in itself. The network must provide accessibility to the key public services, employment sites and leisure activities that people need and

[92] http://www.competition-commission.org.uk/our-work/local-bus-services/final-report-and-appendices-glossary

want to reach. If the network does not serve the requirements of the population, the social benefits of local public transport are again reduced.

The following section looks at the first of these issues, i.e. access to the public transport network, broken down by various social groups. This is based on crow-fly distances to bus stops, where the locations of the latter are obtained from the National Public Transport Access Node (NAPTAN) database[93]. This is supplemented by various data sources on population including ONS mid-year population estimates, unemployment claimant counts from ONS, 2010 indices of multiple deprivation and 2001 Census data on household composition, ethnicity, car ownership and religion.

This is followed by an analysis that looks at access to key services, using data from the Core Accessibility Indicators on the DfT website[94], combined with the same population sources mentioned above.

2.3.2 Access to the network

The table below illustrates the percentage of people from different population groups who live in each of three distance bands from the public transport network. Of course, access to the network is only part of the picture and there may be other barriers such as the affordability and frequency of services.

Table 2.3: Access to the public transport network by group

All of England	All Population	Women	Over 65	Working Age (16 64)	Claimants (Dec 2011)	DLA May 2011	Households (2001)	No Car Households (2001)	Population (2001)	Black / Bangladeshi (2001)	Rural
Within 400m	81%	81%	78%	82%	89%	85%	82%	90%	81%	97%	36%
400m - 800m	11%	11%	13%	11%	7%	9%	11%	7%	11%	3%	35%
Outside 800m	8%	8%	10%	7%	4%	6%	8%	4%	8%	1%	29%
England (excluding London)											
Within 400m	79%	79%	76%	80%	89%	84%	80%	89%	80%	94%	36%
400m - 800m	12%	12%	14%	12%	7%	10%	12%	7%	12%	4%	35%
Outside 800m	8%	8%	10%	8%	4%	6%	8%	4%	8%	2%	29%

[93] http://www.dft.gov.uk/naptan/

[94] http://data.gov.uk/dataset/accessibility_statistics

Table 2.4: Access to the public transport network by IMD quintile

	Most Deprived	Second most deprived	Third most deprived	Fourth most deprived	Least Deprived
Within 400m	96%	91%	79%	70%	74%
400m - 800m	3%	6%	11%	17%	18%
Outside 800m	1%	3%	10%	13%	9%

Key Points

- 79% of England's population (excluding London) is within 400m of the public transport network and 92% is within 800m.
- Those figures are slightly lower for older people (those aged over 65) at 76% and 90% respectively. This is significant as older people have been shown to be both less physically mobile and more dependent on public transport than other sections of the general public.
- Unemployed people have greater levels of access to the public transport network than the working age population generally. This is most likely a product of the combined facts that unemployment tends to be higher in urban areas, where the public transport network is at its most extensive.

While this also suggests that accessibility to the public transport network may not be the key reason behind unemployment, there may be other, more significant issues at work. These other issues however may include: localised issues relating to pockets of poor access to the network (for example in some inner city housing estates, such as Chelmsley Wood in the West Midlands); routes not going to the correct places or servicing the employment most suited to local need; low frequency of routes – where some services simply do not run at the required times of day, or frequently enough to make public transport a viable option.

- 89% of households outside of London without a car are within 400m of the public transport network. It must be remembered, however, that in many areas, and in London in particular, there is low demand for car ownership and/ or no need to own a car due to access to the public transport network. Higher numbers of bus stops and higher numbers of no car households are likely to be in similar areas.

- 98% of England's Black and Bangladeshi population[95] outside of London live within 800m of the public transport network, a likely function of the concentration of members of these groups in urban areas, and particularly in large cities such as London, Birmingham and Leeds.

- As might be expected, the one section of the population outside of London with very poor access to the public transport network is those living in rural locations, where 29% live further than 800m from a public transport node.

- People living in lower super-output areas (LSOAs) that fall within the most deprived IMD quintile (See Table 2.4) have the greatest levels of access to the public transport network (99% live within 800m). As with unemployment, this is most likely a function of the high proportion of deprived LSOAs in urban areas where the public transport network is most readily available.

  However, the level of deprivation is not inversely proportionate to accessibility and the IMD quintile with the lowest accessibility are those living in LSOAs within the fourth most deprived quintile, where 70% are within 400m and 87% are within 800m of the network.

2.3.3 Access to services

Analysis of the various methodologies for assessing the social impacts of public transport, alongside the analysis of the various groups who benefit from local public transport provision (and are correspondingly vulnerable to problems with that provision) can be supplemented with analysis of those areas of the country where access to services is relatively poor. In general, public transport access in England and Wales is good, but certain areas experience accessibility challenges. Many are rural (though many are not) and many experience the same challenges regarding access to a whole range of goods and public services.

The matrix (Table 2.5) below indicates the social groups identified in the previous section and the key public services, employment centres and leisure facilities that each are ***disproportionately*** more likely to require access to[96].

[95] These two specific BAME groups are included here as they have the lowest levels of car ownership

[96] Access to social networks (friends and family) can also be an important benefit of access to public transport, but is not reported in the DfT data on which we have based our analysis in this section.

Please note that people living in rural locations are identified as requiring access to all of the services listed, not because they are disproportionately in need of all such services, but because their accessibility is a function of geography rather than social, economic or demographic status or requirements.

Table 2.5: Accessibility matrix

	Employment	Food Stores	GPs	Hospitals	Primary Schools	Secondary Schools	Town Centres
People on low incomes and **unemployed people**, including people working part time and those claiming state benefits	■						
People living in **remote areas**, such as **rural areas** or urban peripheries	■	■	■	■	■	■	■
Disabled people, including people with mobility limitations, sensory disabilities and people with mental wellbeing disabilities			■	■			■
Older people, including retired people (aged 60/65 and over) and, potentially, older working aged people (aged over 55)			■	■			
Younger people and **children**, including younger adults aged 16-24					■	■	■
Gender groups, and **women** in particular		■					■
People from **Black, Asian and minority ethnic** (BAME) communities	■						
Single parents		■			■	■	■
Those working **non-peak hours**, such as shift workers and those in 24 hour service industries	■						■

The remainder of this section uses socio-demographic and public transport access data to map the level of accessibility experienced by the groups identified in the left hand column in terms of the public services, employment and leisure activities identified across the top.

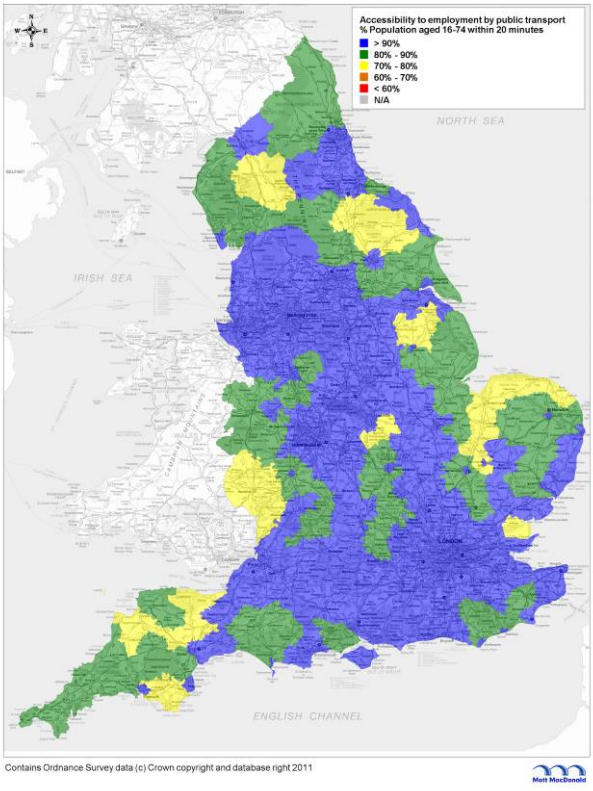
2.3.4 Employment

Access to employment is of particular concern to jobseekers, but the majority of people of working age potentially stand to benefit from public transport provision through access to their place of employment and ability of employed people to access better jobs, enhancing social mobility. In conjunction with this, many people on low incomes (such as those claiming Jobseeker's Allowance) cannot afford to run a car and as such are reliant on public transport.

In the majority of districts in England over 90% of the working age population are able to access employment by public transport within 20 minutes (Figure 2.2). The lowest levels of accessibility to employment by public transport in England are experienced by a number of rural districts in the North West (in the District of Eden in Cumbria specifically), Yorkshire, East and West Midlands, East of England and the South West. Within these districts between 70% and 80% of the working age population can access employment within 20 minutes by public transport.

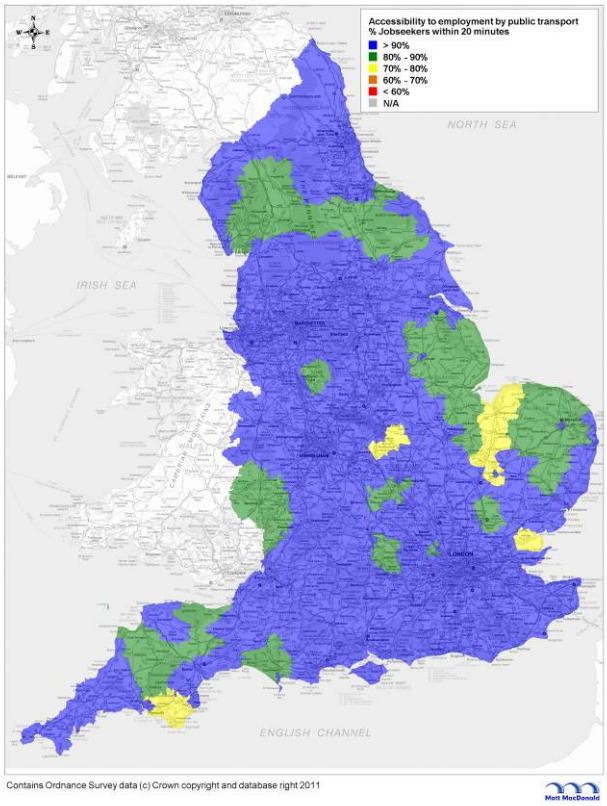
This trend is broadly similar for jobseekers, who may be particularly dependent on public transport for access to employment. In the vast majority of districts in England over 90% of jobseekers (those claiming Jobseeker's Allowance – JSA) are able to access employment by public transport within 20 minutes (Figure 2.12). The lowest levels of accessibility to employment by public transport are experienced by a small number of predominantly rural districts located in the East Midlands, East of England and the South West. Within these districts between 70% and 80% of jobseekers can access employment within 20 minutes by public transport – still a significant proportion of jobseekers.

Figure 2.1: Working Age Employment Accessibility



Source: Derek Halden / nomis

Figure 2.2: Jobseeker Employment Accessibility



Source: Derek Halden / nomis

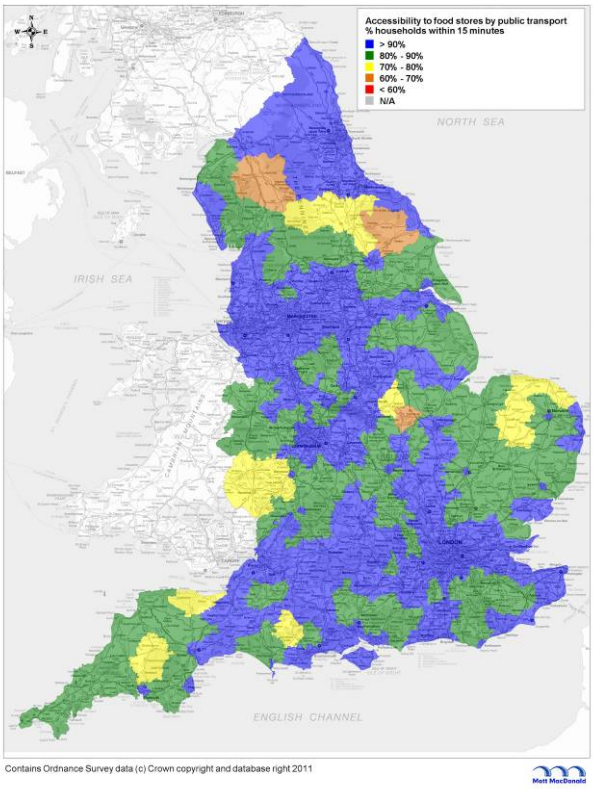
2.3.5 Food Stores

The entire population requires access to the means of subsistence on some level. However, access to retail outlets selling food and drink, tends to be particularly important to those tasked with the weekly shop. For many people who live alone (which may potentially include older people and disabled people) access to a food store will be important. For many families, the prevailing trend is still for the female partner to manage the household budget and to undertake the weekly food shop (see section 2.2.7). As a smaller proportion of women hold driver's licences and are therefore more likely to make use of public transport, accessibility via this mode is significant.

For the majority of districts in England over 90% of households are able to access food stores by public transport within 15 minutes (Figure 2.3). However, there are a significant number of districts with lower levels of accessibility. The lowest levels of accessibility to food stores are predominantly located in rural districts in the North West, Yorkshire and the Midlands. Within these districts between 60% and 70% of households are able to access food stores by public transport within 15 minutes.

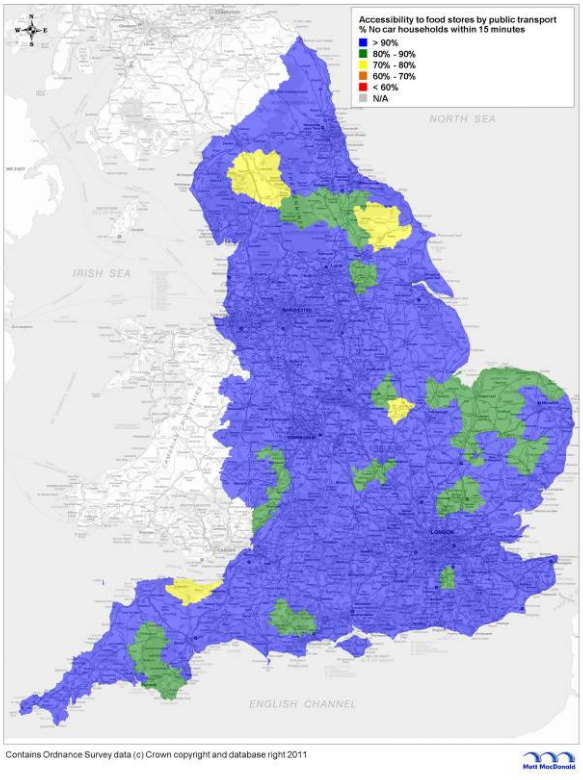
Food shopping for households without a car may be problematic. Accessibility to food stores by public transport for no car households is high for districts in England. In the majority of districts over 90% of no car households are able to access food stores by public transport within 15 minutes (Figure 2.4). The lowest levels of accessibility to food stores for no car households are found predominantly in rural areas in the Midlands, the North West, Yorkshire and the South West. Within these districts between 70% and 80% of no car households are able to access food stores by public transport within 15 minutes.

Figure 2.3: Accessibility to Food Stores



Source: DfT Website

Figure 2.4: Accessibility to Food Stores for No Car Households



Source: DfT Website

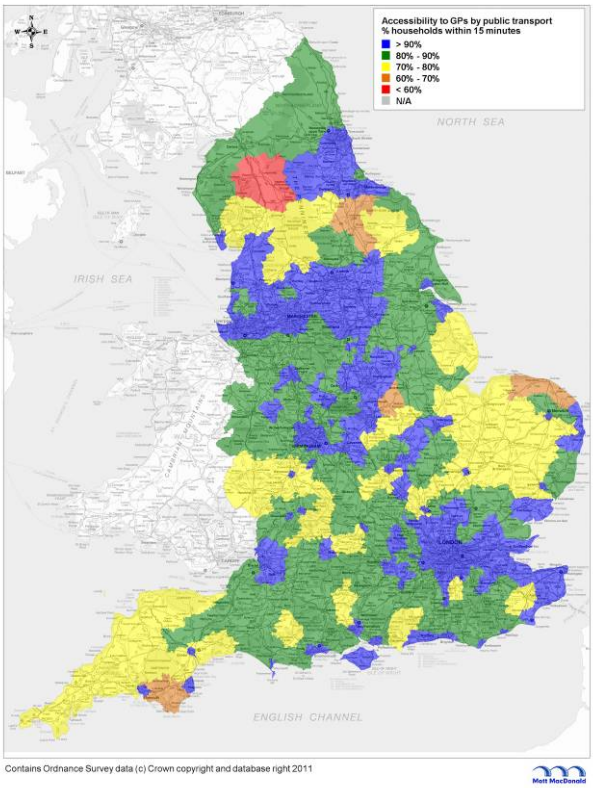
2.3.6 GPs

Studies of local public transport users frequently show that certain groups require access to healthcare more than others. In particular, those more likely to experience health problems (including disabled people, and older people both of whom may have recurring healthcare requirements) are likely to require access to their local GP. In common with other groups, disabled and older people are also proportionately likely to be amongst those making greatest use of public transport.

For the majority districts in England over 80% of households are able to access a General Practitioners (GP) within 15 minutes by public transport (Figure 2.5). However there are a significant number of districts that have lower levels of accessibility. Again these districts are generally in rural areas. This includes Eden in Cumbria, where fewer than 60% of households are able to access a GP in 15 minutes by public transport.

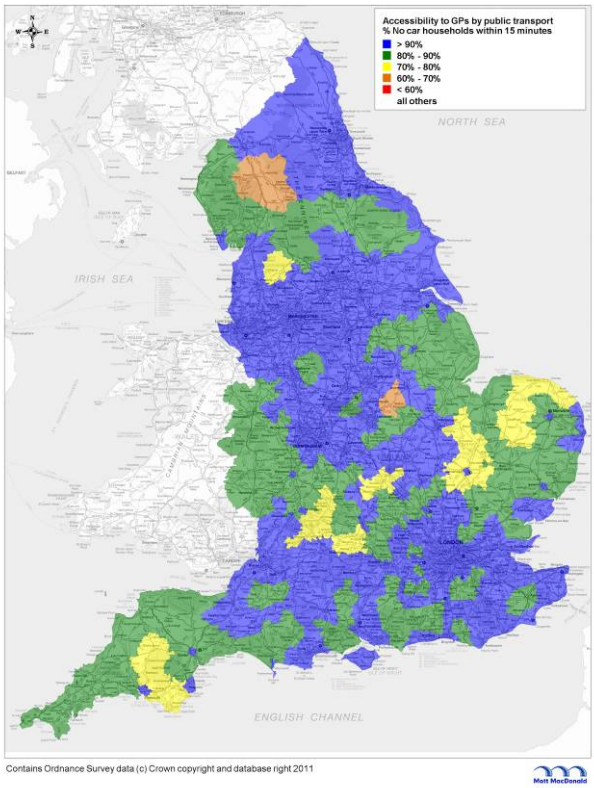
The proportion of households without a car able to access a GP in 15 minutes by public transport is generally high across most districts in England. For the majority of districts, over 90% of no car households are able to access a GP within 15 minutes by public transport. Some districts experience lower levels of accessibility to a GP for no car households. The lowest proportions of no car household's being able to access GP's by public transport within 15 minutes are between 60% and 70%. These districts are predominantly found in rural areas of the North West and the Midlands.

Figure 2.5: Accessibility to General Practitioners



Source: DfT Website

Figure 2.6: Accessibility to General Practitioners (GP's) for No Car Households



Source: DfT Website

2.3.7 Hospitals

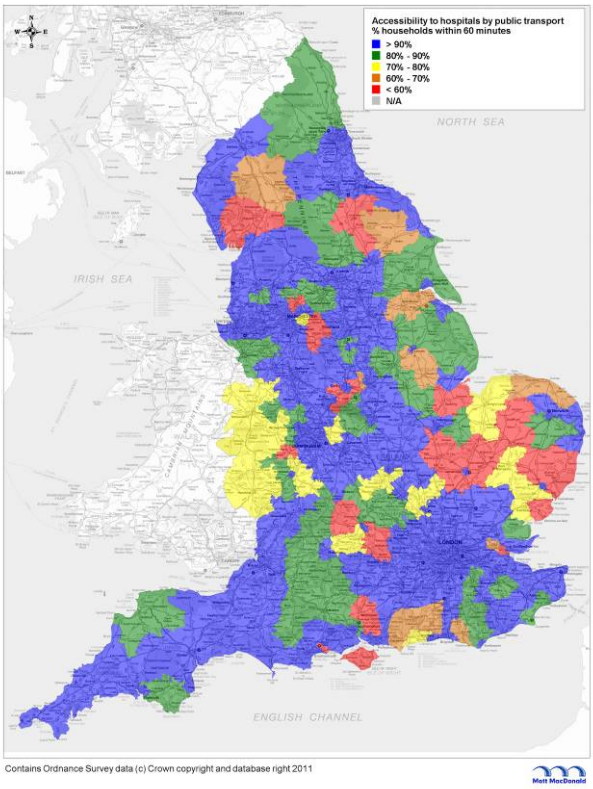
Similarly, the importance of access to healthcare may extend beyond the GPs surgery to a hospital[97]. While access to healthcare is a universal requirement, different groups are likely to require access more than others. Older and disabled people may require more regular hospital care than other sections of the general public, while younger people tend to be more likely to suffer trauma requiring accident and emergency services.

The majority of district in England have high proportions of households (over 90%) that are able to access a hospital within 60 minutes by public transport (Figure 2.7). However, a significant number of districts experience lower levels of accessibility. In a number of predominantly rural districts in England (such as South Lakeland in Cumbria, Hambleton in Yorkshire and West Oxfordshire) fewer than 60% of households are able to access a hospital within 60 minutes by public transport.

Similarly, the majority of districts in England have high proportions of no car households (over 90%) that are able to access a hospital by public transport within 60 minutes (Figure 2.8). However, again a significant number of districts experience lower proportions. In a number of predominantly rural districts across England fewer than 60% of households without a car are able to access a hospital within 60 minutes by public transport by household.

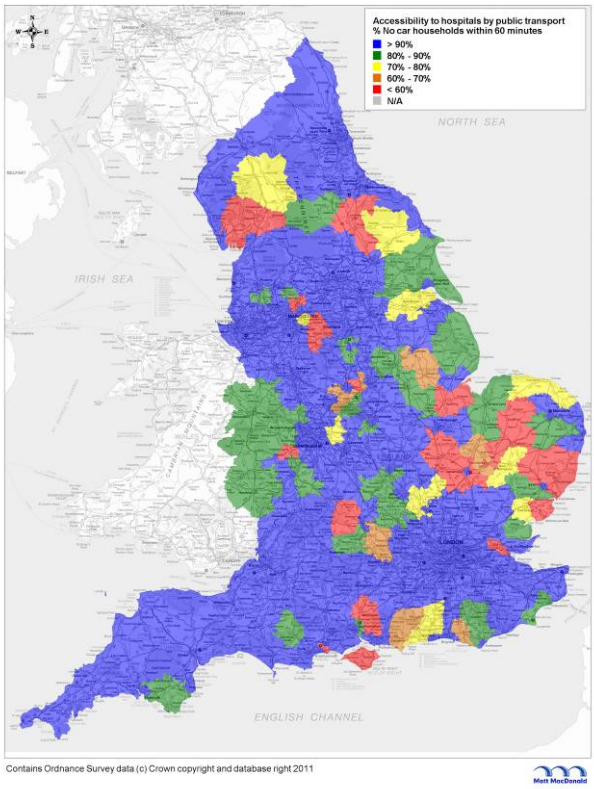
[97] Here understood as a hospital with 300 or more beds and either an A&E or outpatients department

Figure 2.7: Accessibility to Hospitals by Public Transport



Source: DfT Website

Figure 2.8: Accessibility to Hospitals by Public Transport for No Car Households



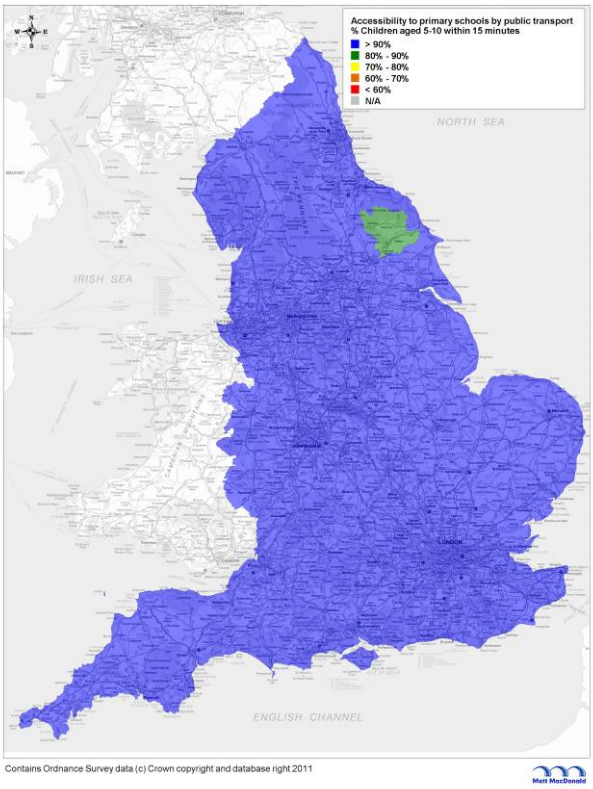
Source: DfT Website

2.3.8 Primary Schools

The travel patterns and access requirements of very young children are generally aligned to those of their parents or carers. Primary schools are a key destination for children under the age of 11 and it remains the case that their care (including meeting their travel and access needs) overwhelmingly falls to the female parent of mixed sex couples. Furthermore, there remains a tendency towards greater reliance on public transportation for many women, single parents and families with young children.

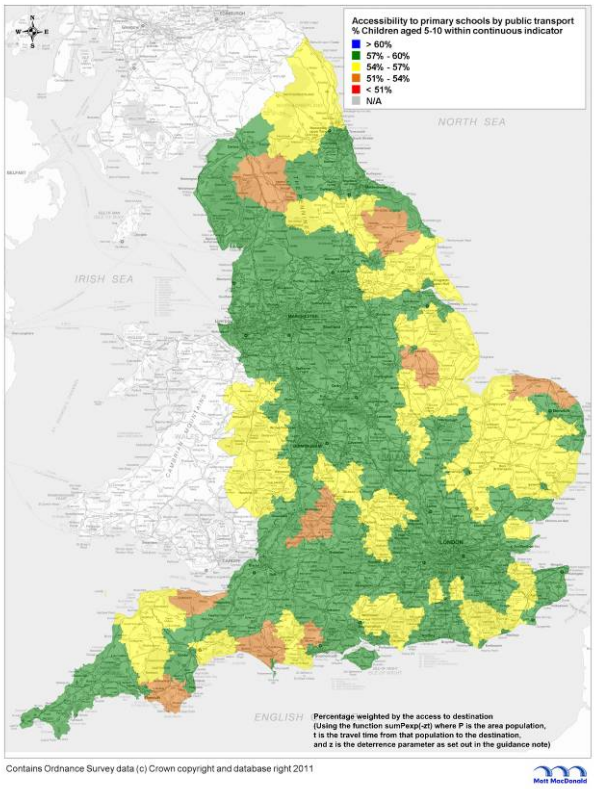
In all districts in England over 80% of children aged five to ten are able to access a primary school by public transport within 15 minutes (Figure 2.9). However, in order to determine a ***relative*** difference in accessibility between districts, Figure 2.10 weights accessibility scores by population in respect to travel time, while also taking to account possible deterrence. This indicates that a number of districts have relatively poorer levels of accessibility to primary schools. Most notably this includes some rural districts such as the district of Eden in the Cumbria, Rydale in Yorkshire, North Kesteven in the Midlands, as well as parts of Norfolk and the South West.

Figure 2.9: Accessibility to primary schools



Source: DfT Website

Figure 2.10: Accessibility to primary schools within a continuous indicator



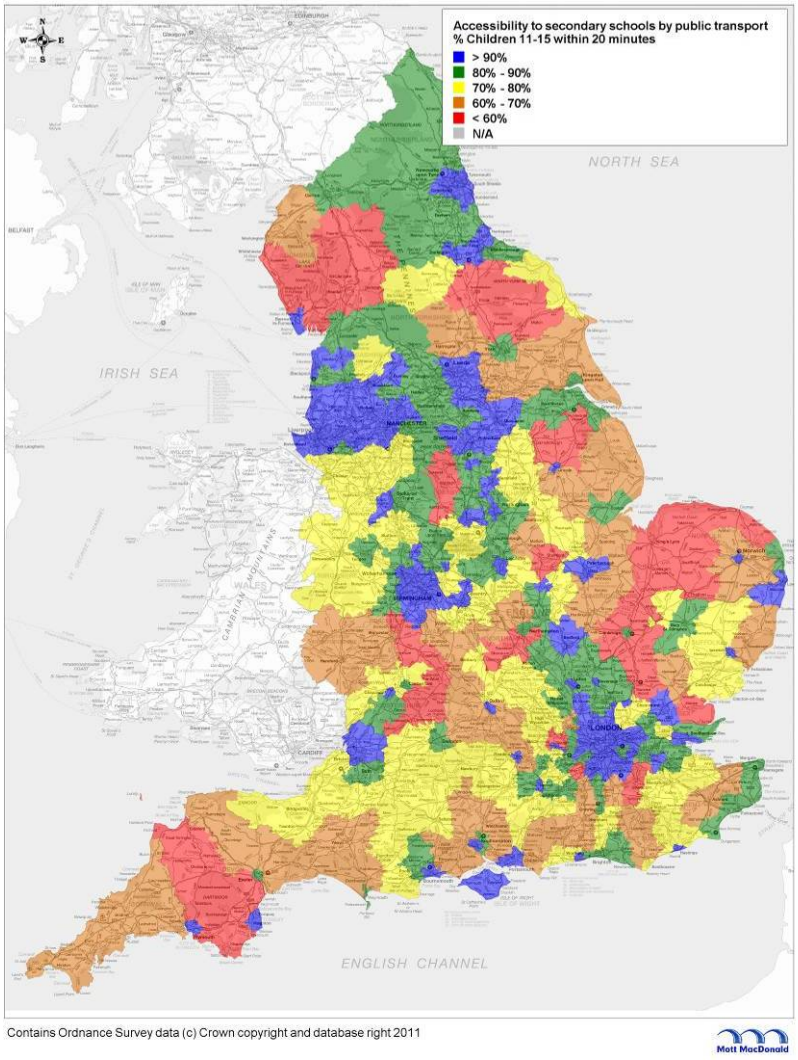
Source: DfT Website

2.3.9 Secondary Schools

While older children (aged 11-16 years old) are more independent than the very young, they still lack the legal ability to drive. As such they are completely reliant on other modes of transport, or on other members of their family or friends for lifts. Secondary school is the number one destination for this age group (see previous section) and their reliance on public transport is higher than for other age groups.

Accessibility by public transport within 20 minutes of secondary schools for 11 to 15 year olds is mixed across districts in England (Figure 2.11). Predominately, children in urban districts tend to have higher levels of access to secondary schools by public transport than their counterparts in rural areas. Over 90% of children in districts in London, Birmingham, Manchester, Leeds and other large cities have this level of accessibility. Conversely, a significant number of predominantly rural districts have lower proportions of children able to access secondary schools by public transport. Within many of these districts (including large parts of Cumbria, Yorkshire, Norfolk and Devon), fewer than 60% of 11 to 15 year olds are able to access a secondary school by public transport within 20 minutes.

Figure 2.11: Accessibility by Public Transport to Secondary Schools



Source: DfT Website

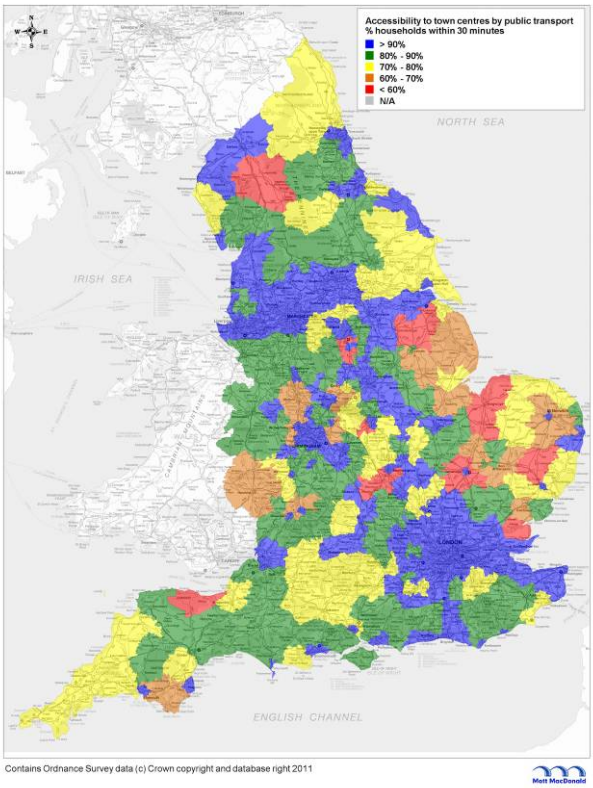
2.3.10 Town Centres

Town centres are key destinations for all social and demographic groups, as they tend to be to a concentration of public services, retail, employment opportunities, and leisure activities. The importance of access to town centres by local public transport cannot, therefore, be overstated. That access is particularly important for certain groups, however. These include who may be particularly reliant on access to their local town centre for employment (such as jobseekers), and those for whom it is a key destination to prevent social isolation (such as older or disabled people). As with other access considerations, many members of these groups have lower levels of private transport access compared with other sections of the general public.

Household access to a town centre within 30 minutes by public transport is extremely mixed for districts in England (Figure 2.12). Predominately urban districts tend to experience high proportions of households able to access town centres by public transport within 30 minutes. Again, this includes over 90% of households across districts in London, Birmingham, Manchester, Leeds and other large cities. Conversely, a significant number of predominantly rural districts across England (and more specifically in East Anglia, the East Midlands and Cumbria) have lower proportions of household accessibility to town centres. In some districts across England less than 60% of households are able to access a town centre within 30 minutes by public transport.

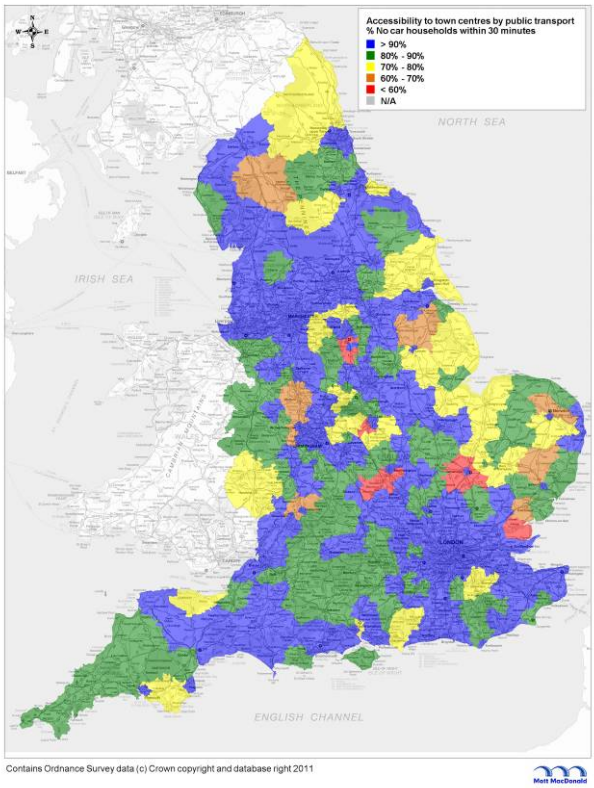
Conversely, in the majority districts in England over 90% of no car households can access a town centre within 30 minutes by public transport (Figure 2.13). However, a number of predominantly rural districts (again in East Anglia, the East Midlands and Cumbria) experience significantly lower levels of accessibility to town centres for no car households. In a number of districts in, for example, Northamptonshire and Cambridgeshire, less than 60% of no car households are able to access a town centre within 30 minutes by public transport.

Figure 2.12: Accessibility to Town Centres



Source: DfT Website

Figure 2.13: Accessibility to Town Centres for No Car Households



Source: DfT Website

2.3.11 Summary

Overall accessibility in England (excluding London) for the core indictors is strong, with high proportions (over 84%) of accessibility indicator populations able to access services within acceptable timeframes[98] (Table 2.6). It should be noted that modelling accessibility in this way does not provide any insight into whether the services to which people have access are their preferred choice or the most suitable to their specific needs. An example may be household access to a food store which does not disaggregate between the kinds of food store, and the preferred choice of the household based on budget, taste and other factors (for example, a greengrocer selling organic local produce or a large low cost supermarket).

Table 2.6: Accessibility for Core Indicators in England (excluding London)

Indicator	% of Indicator Pop
16-74 to Employment in 20 mins	95%
JSA to Employment in 20 mins	97%
5-10 to Primary Schools in 15 mins	99%
11-15 to Secondary Schools in 20 mins	84%
All Households to GPs in 15 mins	92%
No Car Households to GPs in 15 mins	96%
All Households to Hospitals in 15 mins	92%
No Car Households to Hospitals in 15 mins	95%
All Households to Food Stores in 15 mins	95%
No Car Households to Food Stores in 15 mins	98%
All Households to Town Centres in 15 mins	89%
No Car Households to Town Centres in 15 mins	94%

Source: DfT Website

Broken down to the district level, this trend is broadly similar for the levels of accessibility experienced by predominantly urban districts in England (excluding London), as outlined above. Accessibility by public transport in many rural districts is consistently lower for a number of the indicators. This is particularly the case for many districts in Cumbria, Yorkshire, Northamptonshire, Cambridgeshire, Norfolk, and Devon.

Accessibility for households without a car is generally high for all indicators. However, it is worth noting that these populations tend to be located in urban areas already well served by public transport.

[98] The isochrones for accessibility have been set by DfT. Source: DfT Website

3. Phase 2

3.1 Introduction

This part of the report presents the work undertaken in Phase 2 of the project. This consists of intermediate data collection, specifically:

- Undertaking a number of focus groups to gain a qualitative understanding of the social impacts of bus travel, and to test some of the proposed stated preference (SP) exercises. (section 3.2)
- Undertaking an SP pilot exercise to check that the proposed survey would be capable of providing data from which a value for the social impacts of bus travel could be estimated. (section 3.3)

3.2 Focus groups

3.2.1 Overview of the groups

Three focus groups were carried out, two in Liverpool (Speke) and one in Shrewsbury.

The Shrewsbury group consisted of people over 60. Both Liverpool groups comprised people under 60, with one group for people in employment who use the bus to get to work and the other group for people not in employment. All participants used the bus at least once a week.

Ten people were recruited in advance for each group, using a specialist recruiter. Participants were given a £25 cash incentive, payable at the end of the session. There were some “no shows”, with the result that two groups had nine participants and the other had eight.

The structure of the groups was similar in all cases. However, the group of employed people also focused on the importance of bus travel for being able to access employment.

The sessions started with probing people’s perception of their current bus service, whether positive or negative. They then talked about how they would respond to changes in various aspects of the bus service, and concluded with a preliminary pilot of some of the proposed SP exercises to see if they could be understood.

3.2.2 Summary of focus group findings

A detailed write-up of each group can be found in Appendix C. What follows is a summary of the groups as a whole.

3.2.2.1 Perceptions of buses

Participants across all three groups were asked to consider the benefits of bus travel.

All group members suggested that current services were generally frequent enough.

For employed participants, the service was seen as cheap when using day savers and season tickets. For the Shrewsbury group, the quality of drivers was seen as a positive aspect although for many in the

Liverpool groups this was seen as negative (driving too fast, taking short cuts, no change when paying for fares).

The bus was also compared to travelling by car. For the employed group (Liverpool), the bus provided a less stressful situation than driving in congested conditions. For the over 60s, the car was seen as too expensive an option for regular travel.

Anti-social behaviour, especially by school children, was reported as a significant disadvantage of the bus service in the Liverpool groups. Group members reported that often children would smoke on the bus, play loud music and use bad language.

Travelling on Sundays, in the evenings or on bank holidays was particularly difficult across all groups as services were either unreliable and infrequent or non-existent.

For all groups, services could sometimes be unreliable which impacted on participants' trips.

For the Liverpool groups, access to the hospital was seen as particularly difficult by bus.

3.2.2.2 What if there were no buses?

Across all groups, participants reported that they would be significantly affected if their service did not exist. In many cases, participants would walk where possible but this would limit their travel horizons. Commuters reported that they would have to rely on alternative modes and where this was not possible, they would have to look for employment closer to home, move house or buy a car. Many could use taxis but the cost would be prohibitive. Those in the unemployed group mentioned that they would find it difficult to apply for jobs without buses.

Across all groups, it would seem that overall travel horizons would be reduced as they could only travel to destinations they would reach on foot. This was more critical for the over 60s as they used the bus as a social meeting place and travelled on the bus mostly to meet people. Many reported that they would be isolated as they could not go out and they would be limited to local shops for shopping. This, they mentioned, could only get worse as they grew less able to walk.

3.2.2.3 Scenarios

Participants were talked through a series of scenarios and then asked what they would do in these situations. These were presented in terms of a worsening of one particular aspect of the service.

Walking time to and from bus stops

Most participants lived within five minutes walk, if not closer, to their local bus stop. At the other end of the journey, walk time from the bus stop to the destination was also under five minutes for most participants, although for the employed group it was more like ten minutes.

Generally, members across all groups were happy with the distance.

A walk which was ten minutes longer was generally considered to be acceptable. A walk of fifteen or twenty minutes or longer was more likely to be seen as unacceptable dependent on factors such as weather conditions or the amount of shopping to carry.

In response to an increase in walking times, unemployed participants reported they would look for alternative modes of transport while the employed group members said they would have to leave home earlier. The over 60s would mostly make their trips although some said they wouldn't make certain trips.

Bus frequency

Most participants were happy with their current frequency (mostly more frequent than hourly).

If the frequency were to be reduced to every hour, most participants said they would carry on making their trips but would have to plan more, allow for greater delay time and consult timetables more regularly.

Journey time

Participants' journey time on the bus varied depending on the groups and the destination. Generally, participants in the employed and unemployed groups were accepting of travelling for longer as they would have no other option but to make the journey. The over 60s group did not want to contemplate any change in journey time.

Bus fare

Group members in the employed and unemployed groups tended to purchase a variety of different day savers and season tickets, whilst all the over 60s had a concessionary travel pass.

Across all groups, an increase in fare was perceived negatively. The over 60s would not accept an increase of as little as 10 pence, while the employed and unemployed groups felt a £1 increase might result in a change of travel behaviour.

3.2.2.4 Stated preference exercises

SP1: Commuting

Participants were asked to consider what their alternative would be to the bus when commuting. Once identified, each participant was given a SP game which gave them the choice between going by bus and their stated alternative form of transport, with the various journey characteristics (fare, time, frequency etc.) stated for each. All participants could understand that the SP was describing two modes of transport for the same journey.

The employed group tended to lack awareness of the daily cost of bus travel as most usually purchased a season ticket.

SP1: Non-commuting

Participants were asked to consider all of the bus trips they made over the previous week, and how they would change if the costs of bus travel increased.

Participants found it difficult at first to calculate the number of trips they had made in the previous week for non work purposes. Some group members were not always making round trips as they may use a different form of transport to return: for example travel by bus to the supermarket and then return by taxi. Participants may also be making complex journeys using several bus services to make the journey.

However, participants were asked to complete the SP form with no explanation and the majority were able to do so.

A number of participants in the employed group did not make any non work bus trips so did not complete the form. A small number used a tick when they were required to state the number of trips they made, whilst one participant did not understand what was asked of them until a fellow group member explained it to them.

Issues for the unemployed group centred on the lack of regular trips and they struggled therefore to respond. It was suggested that more details of the specific trip they needed to consider would make the SP easier to complete.

SP2

To complete the scenarios, participants were asked to imagine that the local council is faced with having to make cuts to services and/or increase council taxes. Group members were then given a pack of different scenarios and were asked to put each scenario in order with the intervention that they would least like to occur at the top.

The Shrewsbury group struggled with this exercise, mainly because they thought these were choices that shouldn't have to be made. The Liverpool groups engaged with it well.

3.2.3 Summary

The qualitative part of the focus groups confirmed that the Phase 1 review had identified all the significant social impacts and that there was nothing else of significance that needed to be considered for this project.

The trial of the SP exercises was largely successful. One or two issues regarding presentation were noted, which were taken on board during the finalisation of the SP design for the pilot.

3.3 Stated preference pilot

3.3.1 Aims

The aim of the SP exercise is primarily to value the social benefits of bus service provision. These are the benefits individuals experience from being able to partake in activities. In other words, we are seeking to obtain the value that bus users place on the activities they undertake at their trip destination, rather than on the act of travelling itself.

SP choice experiments obtain valuations of the features that characterise each option between which a choice is made. Typically, a travel SP choice exercise might offer choices between two options characterised by, say, cost, time, headway[99] and walk time. Given that the two options would both be based around a specific journey, such as to visit friends, the utility to be derived from the visit itself is common to both options and hence cancels out and cannot be estimated. The exercise instead provides

[99] i.e. the time interval between successive buses.

estimates of the relative importance attached to each attribute. Expressing the importance of any attribute relative to the money attribute provides monetary values.

To be able to value the benefit of the activity, we must offer choices between options which differ in terms of the activity we want to value. The most obvious and clear-cut scenario is to offer a choice between some current activity, with its associated travel times and costs (Option A), and not undertaking that activity, with its associated zero travel time and cost and no activity benefits[100].

The choice model will specify the times and costs involved with option A and also a constant term to reflect the activity utility. The utility of option B will be set to zero. Alternatively, but entirely equivalently, we can specify the constant relative to option B whereupon the only difference is that the sign will change.

The most common means of analysing choice data is the logit model. In the choice between two alternatives (A and B), the probability that an individual *i* chooses option A is expressed as:

$$P_{iA} = \frac{1}{1 + e^{(V_{iB} - V_{iA})}}$$

The utility of option A, which we here take as the "travel by bus" alternative, is specified as:

$$V_{iA} = \alpha F_{i1} + \beta T_{i1} + ...$$

where F and T are the fare and time faced by individual i for bus. Additional terms, such as walk time and service headway, can be entered.

The utility for option B, the "not go" alternative, is simply specified as a constant (μ):

$$V_{iB} = \mu$$

μ should be negative given that this option loses the activity that is undertaken in option A.

The aims of the pilot are to establish whether the SP exercise performs satisfactorily, whether questions are understood and answered, whether the questionnaire can be completed in the allotted 20 minutes, and to test the means of data collection.

3.3.2 Design

We cannot simply offer choices between a current bus journey and "not travel" if "not travel" is not a realistic alternative to the current bus journey.

The way we offer a choice between a current activity, accessed through a bus journey, and not pursuing that activity is to identify situations where an individual's best alternative to bus is not to make the journey. We then change the characteristics of the current bus journey, in the form of increasing its times and costs,

[100] Strictly speaking there will be some utility for the "not travel" option which is whatever is done instead of travelling (for example, a home visit from a nurse or watching the television at home). Thus we are estimating the difference in utility between the current activity and the alternative activity that does not have the bus input. This is the social benefit of the bus service and the interaction it enables.

to induce some choices for the not travel option. Modelling these choices by some suitable statistical tool, such as the discrete choice logit model, will provide estimates of the relative importance of time and cost and also of undertaking the activity itself (as the constant term).

The ratio of the constant term and the coefficient estimate indicating the relative importance of cost provides the monetary valuation of the activity. Analogously, the ratio of the constant term and the time coefficient expresses the valuation of the activity in equivalent time units.

If there is some alternative to bus, such as walking or a lift, then we could in principle offer choices between bus and the best alternative and make the best alternative as well as bus worse than currently in order to induce some choices for not travel. Choices between three options (current bus, best alternative mode such as walking, not travel) would then be modelled and the exercise would again yield estimates of the importance attached to the activity alongside a separate constant denoting the preferences between bus and walk all else equal. However, in this case bus is clearly not critical to consuming the activity since there is an acceptable alternative. Bus therefore provides no social benefit, although it does provide an economic benefit since it is the preferred means of travel.

Two separate SP designs were pursued for commuting and non-commuting. This was because it was felt that the cost and time increases needed to induce a change in behaviour for commuting trips would be much greater than for non-commuting trips.

The commuting survey identified the best alternative to the current bus journey to work. The time and cost details of the bus journey and the best alternative were obtained. Where the respondent stated that they would no longer make the journey by bus, we enquired as to whether they would stop working altogether, move house or change jobs, and in the latter case we asked for the expected difference in income.

The SP exercise offered 12 choices between bus and the best alternative. The bus was characterised in terms of fare[101], journey time, walk time and headway, although it later emerged that the walk time had not actually been varied in the survey. Where the best alternative was another mode, its cost, where appropriate, and time were also varied. Where there was no alternative, the bus option alone was offered. In all cases, “not make the journey by bus” was an available response

The levels of the variables in the SP exercise were:

- Bus Fare: +0%, +25%, +33%, +50%, +100%
- Bus Time: +0%, +20%, +33%, +50%
- Bus Walk Time: +0%, +25%, +50%, +100%
- Bus Headway: as now, peak every 20 minutes off-peak every 30, peak every 30 off-peak every 60, peak every 30 off-peak every 30, peak every 60 off-peak every 60
- Alternative Cost: +0%, +25%, +33%
- Alternative Time: +0%, +25%, +33%, +50%

We also asked a Transfer Price question. This asks at what increase in bus fare the individual would switch to the best alternative. It is therefore a direct measure of the consumer surplus of the bus journey. Equivalent questions expressed in terms of time (Transfer Time) and walk time (Transfer Walk Time) were

[101] Where respondents had, say, a weekly season ticket the fare was taken as the average cost per journey.

also asked. Note that the value of time is the ratio of Transfer Price and Transfer Time and the value of walk time is the ratio of Transfer Price and Transfer Walk Time.

For non-commuting trips, we commenced by identifying all such trips in the past week and their associated journey purposes. This was done for each direction of travel. The best alternative to the bus was identified and we asked whether that alternative was cheaper or dearer and by how much and whether it was slower or quicker and by how much.

Given that the best alternative varies across scenarios, the SP exercise simply focuses upon the bus option. Each respondent was offered 8 SP scenarios which varied bus fare, bus journey time, bus walk time and bus service frequency. And because the variations do not relate to a specific journey, they are offered as absolute changes rather than the proportionate changes of the commuting SP.

The levels of the variables in the SP exercise were:

- Bus Fare: +0, +20p, +40p, +60p, +80p, +100p, +150p
- Bus Time: +0, +5m, +10m, +15m
- Bus Walk Time: +0, +5m, +10m, +15m, +20m
- Bus Headway: As now, peak every 20 off-peak every 30, peak every 20 off-peak every 60, peak every 30 off-peak every 60

For the scenario offered, the individual indicated which out of all the bus trips made in the past week would no longer be made.

In addition to this primary SP exercise, respondents were offered a ranking exercise characterised by a whole series of deteriorations in current bus services and other council services. The question took the form:

We would now like you to think of bus services as a whole and not just for your commuting trips.

Imagine that the local council and bus company is faced with having to make cuts to services and/or increase council taxes. Please rank the following options in order of preference"

So which would you least like to see happen?

Now which would you least like to see happen (then remove and continue until ranking exhausted)

- Route rationalisation leading to access time increases of 10 minutes (i.e. it takes you 10 minutes longer to get from home to the bus stop)
- Route rationalisation leading to egress time increases of 10 minutes (i.e. it takes you 10 minutes longer to get from the bus stop to your final destination at the other end)
- Day time frequencies reduced to every 60 minutes
- Evening services withdrawn
- Sunday services withdrawn
- Increase in bus fares by 20p per single trip
- Increase in bus fares by 50p per single trip
- All cross-town buses terminate in town centre
- Replacement of free concessionary travel for the elderly with 25p flat fare

- Increase in council tax of £5/month
- Increase in council tax of £15/month
- Increase in council tax of £30/month
- Household waste collected half as frequently as now
- Street cleaning half of current levels
- Removal of neighbourhood police support teams
- Removal of free school meals
- Car parking charges increased by 50%

We then asked:

On a scale of 0-10 (with 0 being not at all detrimental and 10 being very detrimental), how detrimental would worse bus services be in terms of:

- Greater difficulty in you getting to and from work
- Not being able to make as many other trips yourself
- Difficulties in being able to just get out and about but for no particular purpose
- Other adults in your household being unable to make as many trips
- Children in your household being unable to make as many trips
- Having to provide lifts to others more frequently
- Other people being less able to visit you
- A feeling that your community is not 'connected' (people in the area find it harder to get out and harder for people to come to the area)
- Services are not there in case they are needed

3.3.3 Data Collection

It was originally planned to conduct the pilot in Speke, Liverpool. However, there was no suitable venue in Speke with adequate footfall to recruit for the hall test. Instead the pilot was carried out in Hunts Cross, a couple of miles from Speke.

The hall test was conducted on Wednesday 4th April, followed up with door-to-door recruitment. All participants were given a £10 incentive on completion of the survey.

The following quotas were set:

- 60 interviews in total with a minimum of 15 interviews of commuters
- A minimum of 15 interviews in each of the following age groups: 18-30, 31-60, 60+
- A minimum of 20 interviews each of males and females
- All respondents to use the bus at least once a week

In the event, 15 bus commuters were interviewed along with 22 bus users for other journey purposes. The difficulty in recruiting was a result of the timing (the Easter holiday) and location. The venue was close to a mainline railway station, and some of the larger local employers provided transport for their staff; hence bus use in the area was relatively low.

3.3.4 Results: Commuting

In terms of best alternatives, 3 stated that they would walk, 3 would take a taxi, 5 would use another bus route and 4 would take a train. Nobody stated that their best alternative was not to travel to their current workplace.

The 15 respondents yielded 180 choice observations given each person was offered 12 SP scenarios. Of these 180 observations, the vast majority (113) would stay with bus despite some significant increases in bus fares and times. A further 61 would switch to another mode and 6 would not make the journey.

Of the 6 choices for not make the journey, these were from 2 people and both said they would work elsewhere but neither knew where that would be.

The results of the logit model estimated to the SP commuting data are reported in Table 3.1. The first column denotes the parameter and the second column provides its estimate along with the associated *t* ratio in brackets.

A *t* ratio of 2 indicates that the coefficient is significantly different from zero at a 95% level of confidence. The larger a *t* ratio the better.

We have two constants. One relates to the preference of bus relative to whatever the best alternative is, all else equal. It is not significant. The other is for the "not go" option and is highly significant, with a *t* ratio of 8.5; its negative sign indicates that the "not go" option is inferior to the option of making the journey, as expected. Dividing by the cost coefficient yields a value of £16.27 per day of travelling by bus and working at the current location relative to working elsewhere.

Table 3.1: Commuting SP Results

Parameter	Coefficient (*t* statistic)
Constant (Best Alt)	-0.136 (0.4)
Constant (Not Go)	-5.850 (8.5)
Time (mins)	-0.0208 (3.5)
Daily cost (£)	-0.3596 (6.7)
Value of Not Go	£16.27
Value of Time	2.9 p/min
Rho Squared (C)	0.33

This could well be a reasonable figure, representing the differential between the income at the current workplace and that elsewhere. Nonetheless, since no-one has stated that they would not work, we do not have a value of the social benefits of being in employment that is provided by the existence of a bus service.

The value of time is 2.9 pence per minute or £1.74 per hour (given that the time is in one-way units and cost is round trip). This is low, compared to official values of around 9 pence per minute. However, the latter is based on car drivers and is an equity value of time representing mean income levels, whereas the value of time here is for relatively low income individuals. Nonetheless, we suspect that the responses to fare increases could be subject to strategic bias by way of protest and this would reduce the implied values of time by inflating cost sensitivity.

Dummy variables denoting each of the different levels of headway relative to the current situation were not significant. This is not particularly surprising given the amount of data here available.

Note that the goodness of fit measure (Rho Squared with respect to constants) is very high for this type of data, indeed much larger than a figure of 0.1 that in our experience is typical of SP choice models. This suggests that the data is of good, or at least consistent, quality.

3.3.5 Results: Non-Commuting

For the non-commuting data we have 768 observations from 22 individuals. Nonetheless, many of these (560) relate to the cases where the best alternative is some other mode. As we have stated, these are not the choices that we are interested in since they do not provide evidence of the value of the activity being undertaken. The latter is provided by those SP choices amongst bus and the best alternative of not travel. This specific segment covers 208 SP observations, where 25% stated that they would continue to make the journey by bus and 75% stated that they would not travel.

Table 3.2 reports the Non-Commuting model. Again the Rho Squared goodness of fit measure is atypically large indicating we have data of good or at least consistent quality.

None of the frequency variables, specified as dummies relative to the current situation, had significant coefficients. As with the commuting model, this is not particularly surprising given the size of the sample. These have not been reported.

The constant denotes the utility of the activity. It is correct sign, denoting that not undertaking the activity reduces utility, and is equal to 66 pence per one-way trip. For the round trip, and hence the activity, this is equivalent to 132 pence (which is what we would get directly if the cost variable had been expressed in round trip units and hence the cost coefficient would be half that here reported).

This seems a reasonable figure, although we do not have other evidence against which to compare it.

The time and walk time coefficients are both significant although we would expect walk time to have a higher disutility. The value of time is again low at 3.4 pence per minute.

Table 3.2: Non-Commuting SP Results

Parameter	Coefficient (*t* statistic)
Constant (Not Go)	-2.8320 (3.1)
Time (mins)	-0.1434 (2.7)
Walk (mins)	-0.1326 (3.0)
Single Trip Cost (p)	-0.0423 (6.0)
Value of Not Go (one way)	67 pence
Value of Time	3.4 p/min
Rho Squared (C)	0.40

3.3.6 Other Results

The ranking exercises generally contained a spread of preferences. Thus respondents did not tend to rank on the basis of, say, the three council tax levels or the three fare levels.

For commuting, out of 15 respondents, 3 provided irrational orderings of council tax and 2 provided irrational orderings of bus fare increases. For the non-commuting sample, 6 of the 66 gave an irrational ordering of council tax increases and 3 gave irrational orderings of bus fare increases.

Feedback from the field work team suggests that some respondents only wanted to rank the first few options and didn't want to consider the rest. In the pilot they were forced to rank all the options listed and this may have led to the apparently irrational responses. In the main survey we will allow respondents to rank as many or as few options as they wish. The survey software will also be programmed to check for irrational responses such as preferring a £30 increase in council tax to a £10 increase.

The transfer price, transfer time and transfer walk time responses for commuting trips implied a value of time of 3.01 pence per minute and value of walk time of 4.61 pence per minute.

The values are again low but do not seem to be entirely due to the relatively low incomes of our sample since the transfer price responses imply price elasticities in excess of 3. We must be alert to the fact that, when offering situations where bus is being made worse, there is an incentive for respondents to send strategically biased responses by way of protest.

The questionnaire is too long for the allotted time of 20 minutes, taking 27 minutes on average, with a range between 13 and 38 minutes. It will need to be streamlined for the main survey.

There was a suspicion that respondents may have under-reported the number of trips they were making to reduce the time taken to complete the survey.

All the non-commuting trips were round trips and hence the survey can be made more efficient by dealing with round trips rather than each leg separately.

3.3.7 Conclusions

The pilot survey was successful, albeit with a smaller than expected sample size and despite the questionnaire proving to be too long. It yielded very respectable results given the size of the sample.

Having said that, we must be aware that respondents do have an incentive to strategically bias answers by way of protest as a result of the presented deteriorations to bus services. For this reason, for the main survey, the implied fare elasticities were compared with empirical evidence of actual behavioural responses to fare increases (see section 4.4.4).

Some care is needed regarding the interpretation of the constant in the commuting model. It does not represent the social benefits of working since no-one stated that they would not make the journey. Indeed, neither of the two people who stated that they would work elsewhere knew where that would be and hence there would also be some uncertainty as to what differences in income a change in workplace would entail. The value we have estimated is likely to include an element of the anticipated differences in salary and travelling cost, both of which are economic impacts rather than social.

For the purposes of this study we would need to isolate the social impacts of commuting travel from the economic. Following the pilot we concluded that it would not be possible to do this in a willingness to pay survey of this type.

It was therefore decided not to pursue a separate sample of commuters in the main survey. Better value would be achieved by collecting 600 interviews of travellers who use the bus for non-commuting purposes. This would enable the results to be analysed at a greater level of detail, for example obtaining values for the social impact by trip purpose and income.

The location for the pilot was not ideal, with bus use being relatively low. This is partly a result of being too close to a mainline railway station. Locations were therefore reviewed before proceeding to the main survey (see the following chapter).

4. Phase 3

4.1 Introduction

This part of the report presents the work undertaken in Phase 3 of the project. This comprises carrying out and analysing the main stated preference (SP) survey.

Section 4.2 describes the conduct of the survey.

Section 4.3 presents some initial data analysis.

Section 4.4 describes the detailed analysis of the SP data.

Section 4.5 describes the development of a model that predicts, for a given individual and trip, whether "not go" will be the best alternative to using the bus.

Section 4.6 discusses how the results could be used in scheme appraisal.

4.2 The survey

4.2.1 Context

The main aim of the survey was to provide stated preference (SP) data to enable the social value per bus trip to be estimated.

A key part of the survey is establishing what bus users would do if the bus was not available, e.g. whether they would use another mode or choose not to make the journey at all (we refer to this option as the “best alternative”). One of our key assumptions is that bus services only provide a social benefit where they enable a trip to be made that would otherwise not have been made (i.e. “not go” is the best alternative). If, in the absence of bus services, travellers would use an alternative mode, the benefits of bus mainly arise from savings in out of pocket costs (fares and petrol costs) and/or travel time, compared to the alternative mode. The quantification of such impacts is already well covered by WebTAG appraisal guidance.

For trips where “not go” is the best alternative, we deem the social value to be the monetary value that bus users place on being able to participate in whatever activity (such as shopping or attending a healthcare appointment) they are undertaking at their destination. This value is inferred from their SP responses using a willingness to pay approach, as described later.

Thus, we are mainly interested in those trips for which respondents say the best alternative to bus is “not go”. However, other trips still provide useful information and are included in the SP analysis, as described later in Section 4.4.

It is recognised that the adopted approach only represents the value to the traveller themselves. There may well be benefits to wider society that are not captured in this approach. Such benefits might include reduced costs associated with missed healthcare appointments. Nevertheless the work described here is a major advance in the valuation of social impacts and will enable the monetisation of a large proportion of the social benefits of bus service provision.

4.2.2 Stated preference design

In the pilot survey, we carried out separate SP exercises for commuting and non-commuting trips. We decided that, because of the very few cases of a commuting journey not being made as a result of bus being made worse, it was not a sensible use of resources to focus upon commuting to the extent originally intended. Furthermore, the benefit of bus services to commuters will be largely economic (through the economic benefits of being in work and having access to a wider range of jobs) rather than social.

The main survey SP exercise therefore related to all trips made over a seven day period, regardless of the journey purpose, and as part of this commuting trips were covered. Whilst the extent of having "not go" as the best alternative for bus commuting trips is still very minor, we did not waste survey resources on specifically collecting such data.

We allowed for up to ten different bus trips per respondent, with regularly made commuting trips reported only once, across seven days. This turned out to be a sufficient number to cover weekly trip making by bus. For each journey, the respondent reported the day of week, the purpose of the journey, whether it was a single or return journey, the fare type, the cost, time, access time and frequency for bus, whether a change of bus was required and whether the journey could have been made by car.

They were then asked to specify the best alternative for each bus journey. The precise question was:

> *Thinking now about all the bus journeys you made last week we would like to know what you would have done if you had not been able to travel by bus – say because the bus service became so expensive you couldn't really afford it.*

Possible responses were:

- Get a lift
- Drive self
- Walk
- Cycle
- Train
- Taxi
- Travel to a different destination by bus
- Travel to a different destination but not by bus
- Combine with another journey
- Make the journey less frequently
- Change job
- Move house
- Not make the journey at all

According to their responses, interviewees were asked, as appropriate, about the costs, time, access time, frequency and interchange of the alternative. Those responding "change job" were asked for travel details if they knew where the new job would be, and also to indicate any change in salary. Those responding "move house" were asked for relevant travel details, if known[102]. Similarly, those who would make the journey less frequently were asked how less frequent they would make the journey.

[102] As described later, it turned out that the number of "change job" or "move house" responses was too small to be of any use.

Each respondent was offered eight scenarios selected randomly from an orthogonal plan of 64 scenarios. These scenarios varied the bus fare, bus journey time, the walk time to and from stops and the bus frequencies. The alternative mode was not varied, on the grounds that the alternative will be different across the different journeys offered and hence we would have needed lots of different SP types rather than a single set of variations on the current bus journey.

The SP scenarios are provided in Appendix E. The emphasis in the design was on ensuring a range of values which would encourage sufficient switching from bus to the alternatives, and particularly to the option of not making the journey where this was the best alternative. Hence in some instances large increases in bus fares and times were presented.

The SP design offers variations on current levels for a one-way journey. Although we are primarily interested in the monetary value of what is the constant term relating to not travel, we also included other variables in the SP. This is because it is sensible to have estimates of transferable parameters, such as the value of time, so that some assessment of the quality of the data obtained and model estimated can be made by reference to other empirical evidence. In addition, also increasing bus journey times, bus access times and bus headways will lead to more of the switching behaviour that is essential if we are to estimate a robust model.

These variations are specified as absolute changes to times and costs. We cannot offer proportionate changes since respondents cannot handle these as a presentation format. Even if we had determined the times and costs for each actual journey and then calculated the new absolute levels based on proportionate changes, this would have meant presenting a lot more journey specific times and costs which would have placed a significantly greater burden on respondents.

We distinguished between those who paid a cash fare (including a zero fare) or had a day ticket and those who have some kind of pre-paid ticket that covers more than one day. For those who paid a cash fare or did not pay as a result of the concessionary travel scheme, the bus fare was simply presented as a variation on the current level. For those who bought a day ticket, the fare variation was doubled and offered as a variation in the price of the day ticket.

For those who buy weekly, monthly or annual tickets, it is not straightforward to find the cost of a particular trip from amongst all those made. A whole new SP exercise would have been required, allowing for switching out of pre-paid period tickets and using daily tickets or paying cash for those bus journeys that would still be made. A simpler approach was adopted. We required these bus users to assume that they would have to pay cash for each journey. The base fare offered was the current average fare across all trips made in the period covered by the ticket type. The SP variation was then applied to this average fare.

Our analysis subsequently examined whether, all else equal, there were variations in response to fare or variations in the constant terms relating to not make the journey according to ticket type normally used.

In addition to the journey data and the SP responses, the survey also collected socio-demographic data from each respondent, including age, household income, car ownership, employment status, household size, ethnicity and disability. The full questionnaire can be found in Appendix D.

4.2.3 Locations

At the end of Phase 1, it was decided to carry out the interviews at just two locations: suburban Liverpool and Shrewsbury town centre (with the latter surveys segmented by those who live in Shrewsbury itself and those who live in the outlying rural area).

At the end of Phase 2 it was decided to modify and extend the range of locations as follows:

- Metropolitan city centre (Liverpool)
- Market town, split between those living in the town and those living outside it (Shrewsbury)
- Local centre in a large conurbation (Perry Barr, Birmingham)

Also at the end of Phase 2, it was agreed that we would investigate carrying out surveys at a hospital. This was driven by a desire to obtain a separate value for the social impact of bus use for healthcare trips, and a recognition that the main SP was unlikely to pick up a large number of such trips. After contacting a number of different hospitals it was concluded that it was not practical to do this, the main limitations being the lack of suitable spaces within the hospital to set up the computer-based interviews, and access to a sufficiently large number of patients.

The dates and locations of the surveys were as follows:

Table 4.1: Survey locations and dates

Town/City	Venue	Dates
Perry Barr, Birmingham	One Stop Shopping Centre, 2 Walsall Road, Perry Barr, Birmingham	Thursday 7 June 2012 Saturday 9 June 2012 Saturday 16 June 2012 Tuesday 26 June 2012 Wednesday 27 June 2012
Shrewsbury	Lion Hotel, Wyle Cop, Shrewsbury, SY1 1UY	Tuesday 12 June 2012 Thursday 21 June 2012 Saturday 23 June 2012 Monday 25 June 2012 Thursday 28 June 2012
Liverpool	The Black Horse, 641 Prescott Road, Old Swan, Liverpool L13 5XD	Tuesday 26 June 2012 Wednesday 27 June 2012
	Richmond St Hall - 1st Floor, 20a Richmond Street, Liverpool, L1 1EE	Monday 25 June 2012 Thursday 28 June 2012

The surveys were carried out by Accent Marketing and Research using the hall test method. Eligible participants were recruited from the street and taken to the interview location. Interviews were conducted one to one by a trained interviewer, using a laptop computer.

4.2.4 Quotas

Potential participants were only considered eligible to take part if they met both of the following conditions:

- Travel by bus at least once a week
- Neither they, nor their close family, work in marketing, advertising, public relations, journalism, market research or the bus industry

The following quotas were specified for each of the survey locations, in relation to what were expected to be the key segmentation variables. Quotas were defined in terms of the minimum proportion of the sample at each survey location. For comparison, the proportion of bus trips made by each category of traveller is also shown (where available). This is based on analysis of 2010 NTS data supplied to the project team by DfT near the start of this project.

Table 4.2: Gender quotas

	Male	Female
Bus trip split from NTS	40%	60%
Minimum quota for SP	30%	30%

Table 4.3: Age quotas

	16 18 in education or training	19 24	25 39	40 59	60+
Bus trip split from NTS	Unknown	17%	15%	18%	27%
Minimum quota for SP	15%	15%	15%	15%	15%

Table 4.4: Household income quotas

	<£20k pa	£20k 40k pa	>£40k pa
Minimum quota for SP	25%	25%	25%

Table 4.5: Residential location quotas (Shrewsbury interviews only)

	Shrewsbury urban area (i.e. within the A5/A49 bypass)	Rural
Minimum quota for SP	25%	25%

The aim of the quotas is **not** to ensure that the SP sample has an identical profile to the general population of bus users. Instead it is to ensure that each category (e.g. male) within each variable (e.g. gender) has a large enough sample size to determine whether that category/variable has a significant effect on the model coefficients (e.g. males may value the "shopping" activity significantly differently from females).

This is consistent with standard practice in SP modelling. Overly strict quotas can increase the time and cost of data collection, without adding significantly to the quality of the final results.

In addition to the above quotas a minimum number of 200 interviews at each location was specified.

4.3 Initial data analysis

4.3.1 Quota fulfilment

The tables below show the proportion of interviews achieved compared with the quota, for each of the quota variables. They show that the target of 200 interviews at each location was achieved, along with the majority of the quota targets. The only quota that was not achieved was high income bus users (household income more £40k a year) in Liverpool – 6.5% of the sample is in this segment against a target of 25%. This leads to a shortfall in the quota for the overall sample for this category (19.9% instead of 25%). This

relaxation was agreed with the fieldwork agency on the basis that it was likely to be reflective of the economic make-up of bus users in Liverpool.

Overall 602 complete interviews were carried out.

Table 4.6: Interviews achieved by gender and location

			Q26. Gender		
			Male	Female	Total
Location	Perry Barr	Count	99	102	201
		% within Location	49%	51%	100%
	Shrewsbury	Count	99	101	200
		% within Location	50%	51%	100%
	Liverpool	Count	98	103	201
		% within Location	49%	51%	100%
Total		Count	296	306	602
		% within Location	49%	51%	100%
Quota			30%	30%	

Table 4.7: Interviews achieved by age and location

			Age.					Total
			16-18 in education or training	19-24	25-39	40-59	60 or older	
Location	Perry Barr	Count	40	39	42	43	37	201
		% within Location	20%	19%	21%	21%	18%	100%
	Shrewsbury	Count	42	38	38	40	42	200
		% within Location	21%	19%	19%	20%	21%	100%
	Liverpool	Count	33	45	38	43	42	201
		% within Location	16%	22%	19%	21%	21%	100%
Total		Count	115	122	118	126	121	602
		% within Location	19%	20%	20%	21%	20%	100%
Quota			15%	15%	15%	15%	15%	

Table 4.8: Interviews achieved by income and location

			Q22. Approximately what is your annual household income (before deduction of tax but including any benefits)?					Total
			£20k or less	£20-40k	£40k or more	Don't know	Do not wish to disclose	
Location	Perry Barr	Count	74	69	54	1	3	201
		% within Location	37%	34%	27%	1%	2%	100%
	Shrewsbury	Count	81	55	53	5	6	200
		% within Location	41%	28%	27%	3%	3%	100%
	Liverpool	Count	105	67	13	14	2	201
		% within Location	52%	33%	7%	7%	1%	100%
Total		Count	260	191	120	20	11	602
		% within Location	43%	32%	20%	3%	2%	100%
Quota			25%	25%	25%			

4.3.2 Other data on the profile of respondents

Section 2.2 identified a number of groups which particularly benefit from access to public transport. A number of these were used in the quotas discussed above (age, gender, income). In addition the questionnaire asked about two of the other groups identified in that section: ethnicity and disability. The profile of the sample with regards to these variables is set out in the tables below.

Table 4.9: Sample profile by ethnicity

Please state your ethnic group	Count	Percentage
White	463	76.9%
Asian / Asian British	52	8.6%
Black / African / Caribbean / Black British	59	9.8%
Mixed or multiple ethnic groups	13	2.2%
Any other ethnic group	14	2.3%
Prefer not to say	1	0.2%
Total	**602**	**100.0%**

Table 4.10: Sample profile by disability

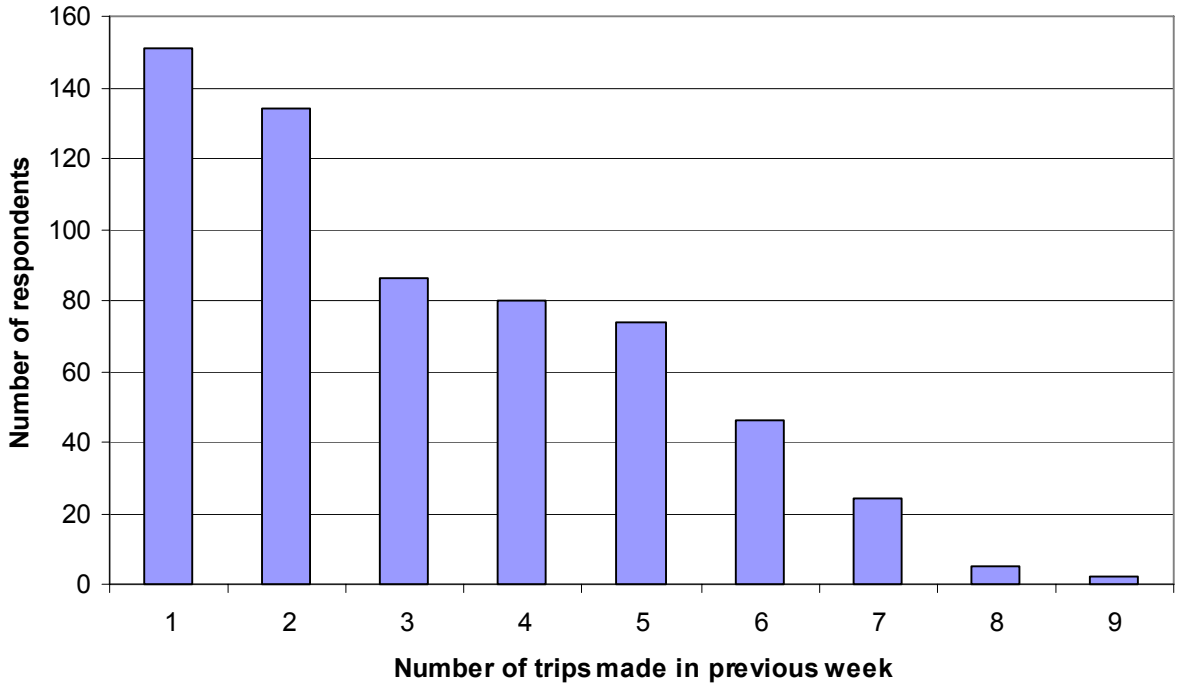
Do you consider yourself to have a disability? By disability we mean 'a physical, sensory of mental impairment or health problem which has a substantial and long term (over 12 months) adverse effect on your ability to carry out normal day to day activities'?	Count	Percent
Yes - Physical / mobility impairment	46	7.6%
Yes - Sensory impairment	6	1.0%
Yes - Mental impairment	10	1.7%
Yes - More than one of the above	2	0.3%
No	533	88.5%
Prefer not to say	5	0.8%
Total	**602**	**100.0%**

4.3.3 Brief analysis of trip data

4.3.3.1 Number of trips made

The following chart shows the frequency distribution of the number of trips made in the previous week by each participant. (Note that a return trip, e.g. home to shops to home, represents one trip.)

Figure 4.1: Frequency distribution of the number of trips made



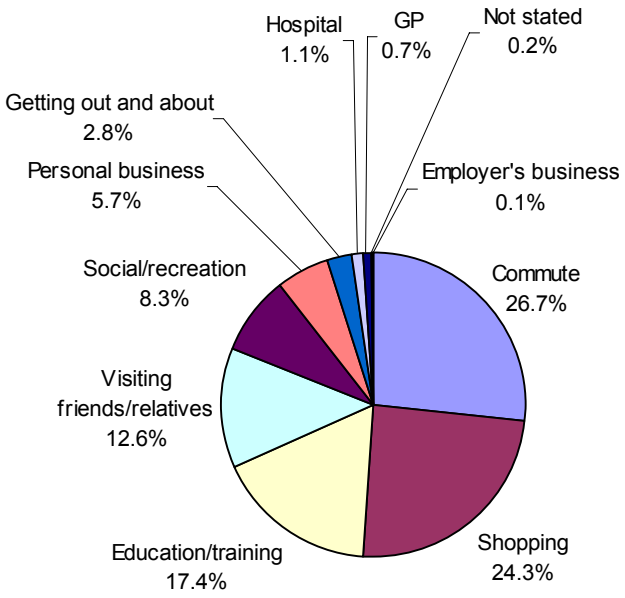
In total 1869 trips were made by the 602 respondents, an average of 3.1 each.

Each respondent was given 8 SP choices for each of their trips, giving a maximum of 14,952 SP observations for analysis.

4.3.3.2 Purpose splits

The chart below shows the purpose split of the 1869 trips made.

Figure 4.2: Purpose split of bus trips made



Total trips: 1869

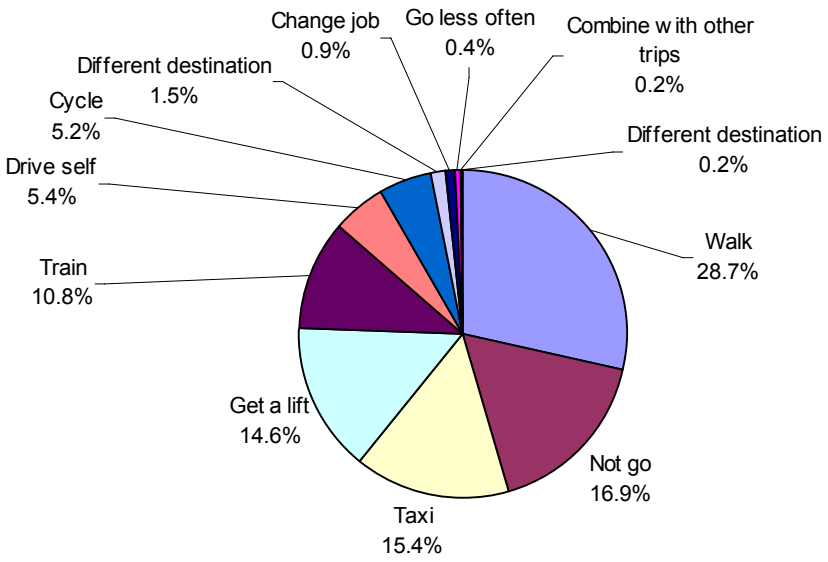
There are some differences here compared to NTS, particularly for the two biggest purposes (NTS has 32% shopping, 17% commuting, 18% education/training, 13% visiting friends and relatives, 7% social/recreation, 10% personal business (including healthcare), 1% employers business[103]). This suggests that bus use in the survey locations is not entirely representative of the national average. As noted earlier, for SP it is not necessary to ensure that the sample is perfectly representative of all bus users. The key question for this study is whether there are enough trips to be able to estimate the social value of trips separately for each purpose; this is discussed later in this section.

4.3.3.3 Best alternatives

The chart below shows the best alternatives specified for each of the 1869 trips, i.e. if bus was not available for that particular trip what would people do instead.

[103] 2010 figures for local bus trips in England (excluding London). Source: bespoke NTS analysis provided by DfT.

Figure 4.3: Best alternative to bus trips



Total trips: 1869

As noted previously, it is the "not go" option that we are most interested in. For these trips the SP modelling will be able to estimate a value for the activity being undertaken at the destination, which will be the social value for the trip. Nearly 17% of trips have "not go" as the best alternative, which equates to 315 trips or 2520 SP observations.

For the vast majority of trips (80%) the best alternative would be to change mode, with walk being the most popular. For these trips it can be argued that the benefit of bus service provision is not so much social as economic, with the benefit coming from reduced travel time, fuel costs and/or fares compared with the non-bus alternative.

One exception to this might be those whose best alternative is to get a lift (nearly 15% of trips). For these trips there may be a social benefit to bus availability through being less reliant on others, having a greater sense of independence and being flexible in when to travel.

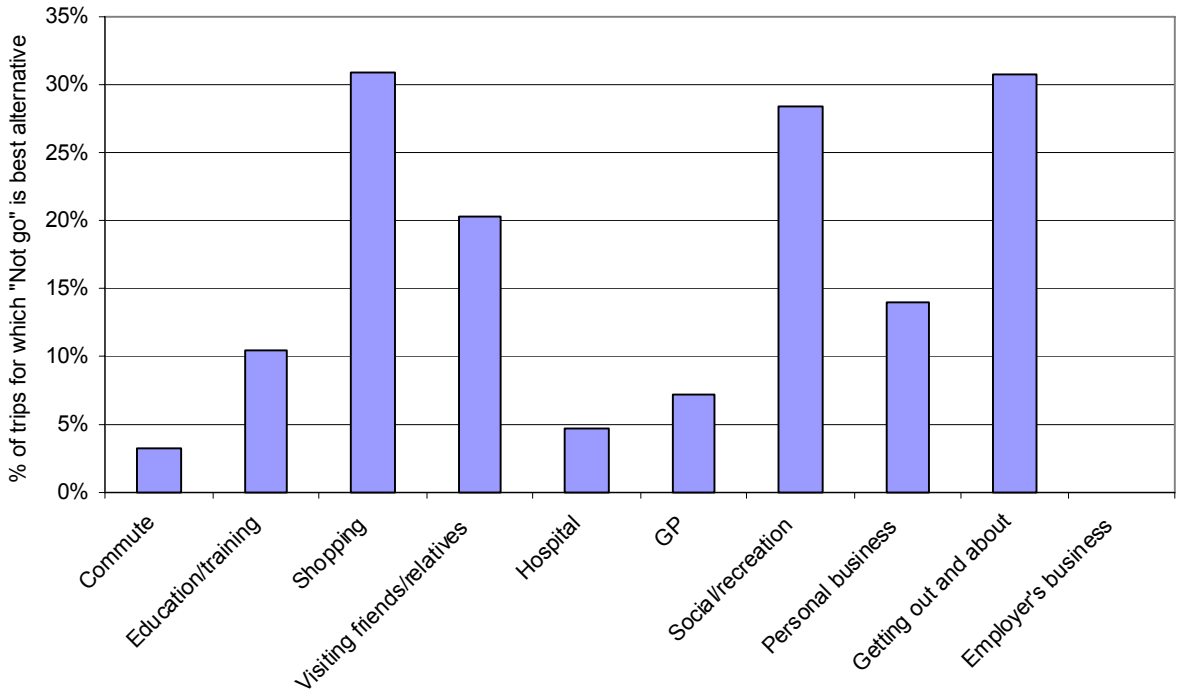
There may also be an implicit and hitherto non-quantified economic disbenefit associated with requesting a lift as it may require a friend or relative to make one or two non-productive trips. However, we cannot be certain that these costs would play a part in the mode choice decision of the lift receiver, and therefore whether they can be estimated as part of the willingness to pay analysis. (In any case, the focus of this project is social impacts, not economic ones).

4.3.3.4 Factors influencing the proportion of “not go” trips

When applying the results of this project it will be important to understand what determines how many trips have “not go” as the best alternative. Full cross tabs of best alternative against selected variables are presented in Appendix F. Here we focus on the “not go” alternative.

Figure 4.4 shows the proportion of trips within each purpose that have “not go” as the best alternative (for example, for just over 10% of education trips the best alternative is “not go”). Unsurprisingly this shows that the discretionary trip purposes such as shopping and social and recreation are more likely to have “not go” as the best alternative compared to health, education and work related trips.

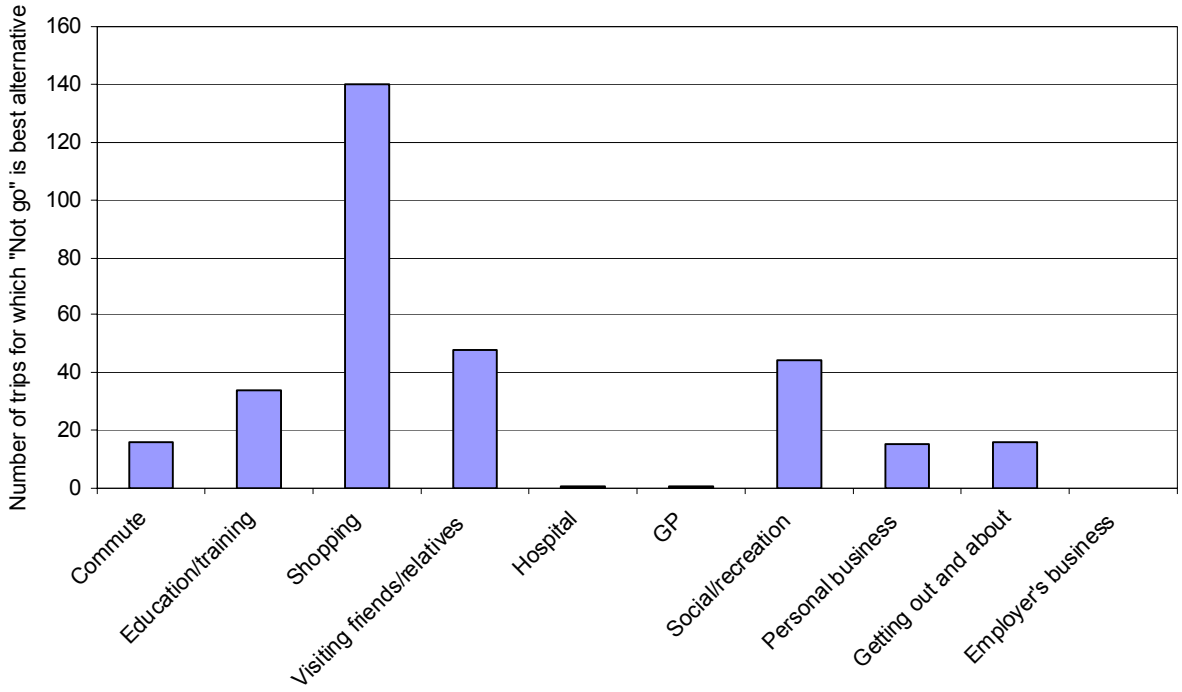
Figure 4.4: Proportion of trips within each purpose for which “not go “is best alternative



Total trips: 1869

Figure 4.5 shows the absolute number of trips in the sample which have “not go” as the best alternative, also by purpose. This is important as the greater the number of trips the more likely it is that we will be able to estimate a value for the social impact of that trip for that specific purpose. Shopping is by far the best represented purpose here and we can be reasonably confident about being able to estimate the social value of shopping trips. At the other end of the scale we are very unlikely to be able to estimate values for health trips and it will be impossible for employers business. The latter is not a concern as the impact of these trips will be economic rather than social. It is disappointing, but not unexpected, that there are too few health trips; there are relatively few of these in the sample and, for the vast majority, people would use an alternative mode if bus wasn’t available.

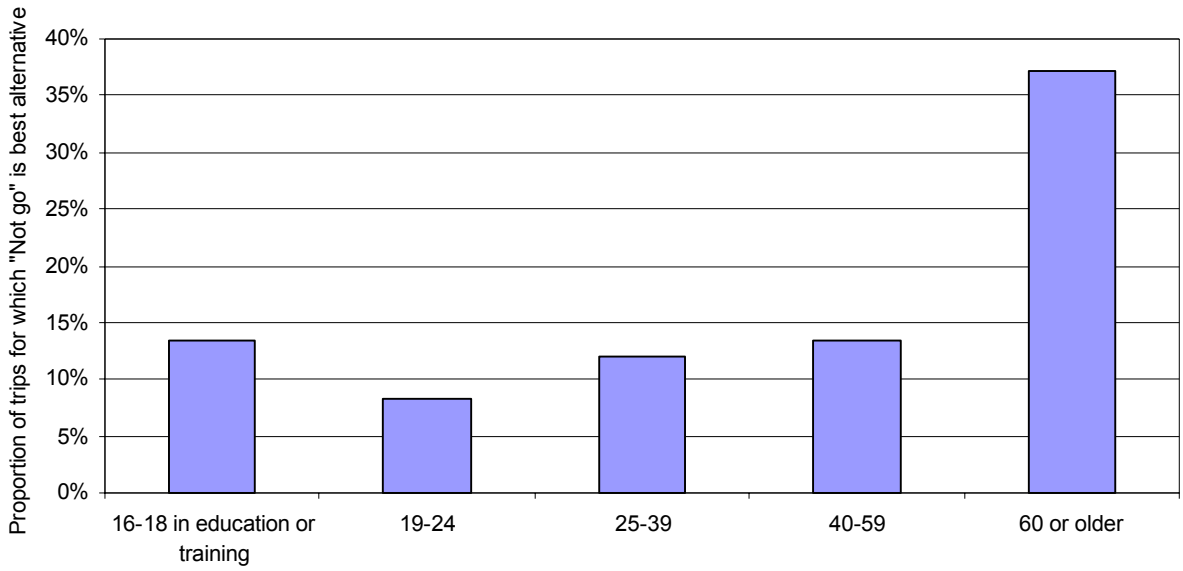
Figure 4.5: Number of trips of each purpose within the sample for which “not go “is best alternative



Total trips: 1869

Figure 4.6 shows the proportion of trips for which “not go” is the best alternative, by age group. There is a strong age effect here, with older travellers (over 60) much more likely to “not go”. This effect is not quite as strong as the graph suggests as there is a correlation between age and trip purposes, with older travellers more likely to be making discretionary trips. However, there is still an age effect after purpose has been taken into account, as shown by Figure 4.7, which shows just shopping trips (just as an example to show there is residual age effect after accounting for purpose). The formal SP analysis will disentangle age-related effects from employment status and concessionary travel pass holding, all of which are highly correlated[104][105].

Figure 4.6: Proportion of trips made by each age group for which “not go “is best alternative

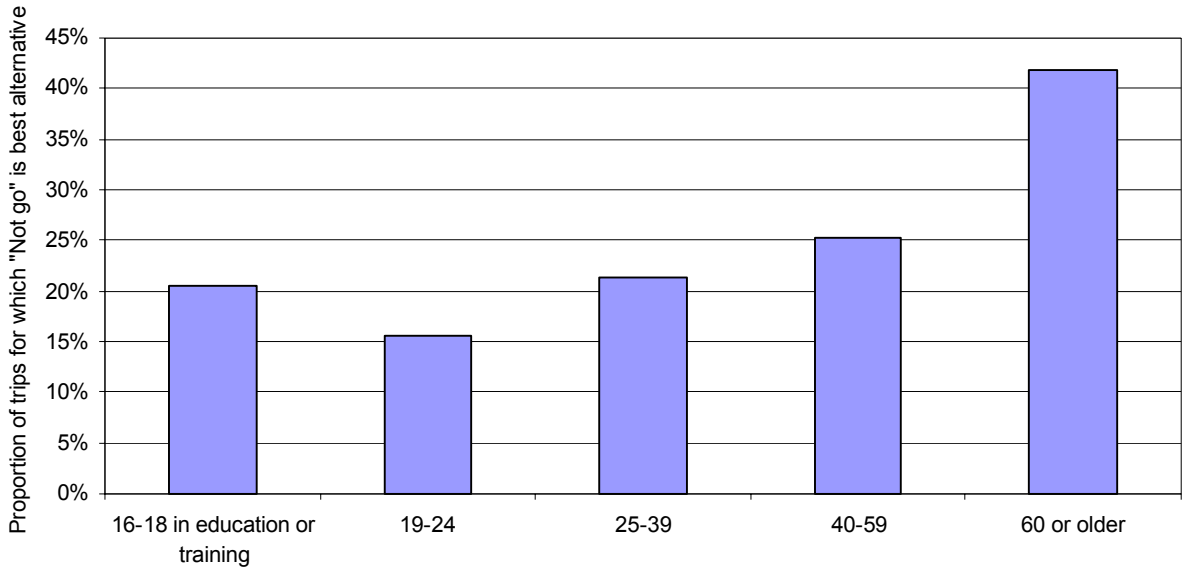


Total trips: 1869

[104] A very high proportion of over 60s will have a concessionary pass and most retired people will be over 60.

[105] Arrangements vary by local authority, but in the areas surveyed the concessionary fares pass offers free bus travel at weekends and bank holidays, and after 0930 on weekdays. It is generally available to those over 60 or with certain disabilities. However, the qualifying age is gradually being raised to 65, meaning that, in effect, only those aged 61 or over at the time of the survey would have been eligible on age grounds.

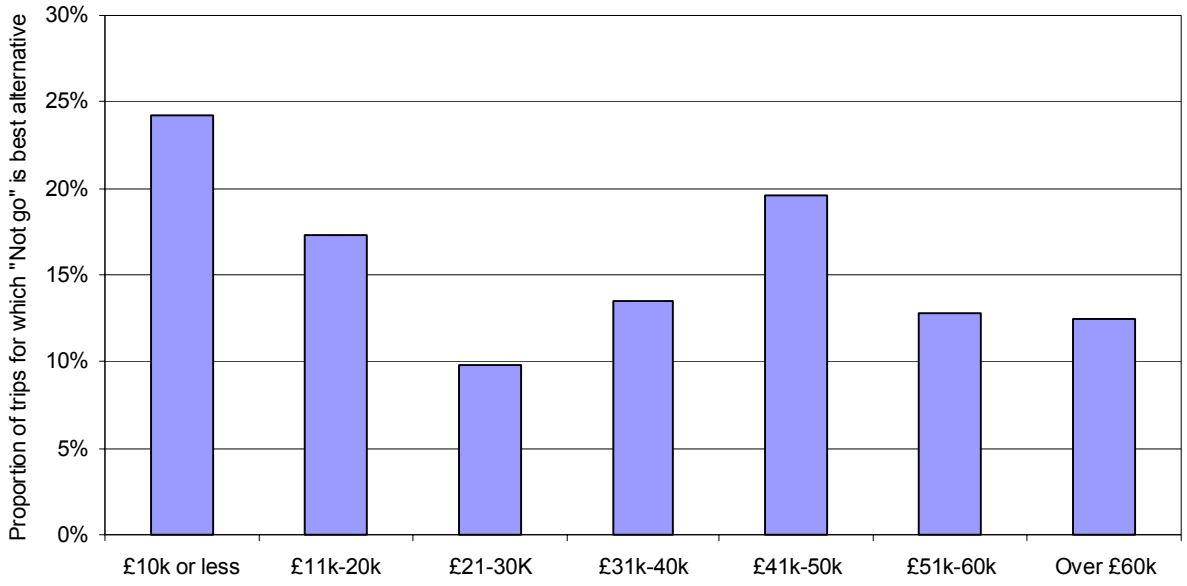
Figure 4.7: Proportion of shopping trips made by each age group for which “not go “is best alternative



Total shopping trips: 454

Figure 4.8 shows the proportion of trips by income group for which “not go” is the best alternative. There is some suggestion that there is an income effect for the lowest group, but this turns out not to be statistically significant (see Section 4.5 for details).

Figure 4.8: Proportion of trips made by each income group for which “not go “is best alternative



Total trips: 1869

It should be noted that many of the variables in the data are highly correlated, such as income, car ownership, age and trip purpose. So what seems like an income effect may disappear once car ownership has been taken into account. In practice it is very difficult to isolate which segmentation variables are significant just from looking at one or two variables in isolation in this way. One of the purposes of the statistical modelling of the data (described in Sections 4.4 and 4.5) is to look at all possible segmentation variables as a whole and to identify which are significant.

4.4 Stated preference analysis

4.4.1 Data cleaning

The first stage in the SP analysis was to review the data and seek to remove any responses which imply that the respondent has either misunderstood the question and answered illogically, or has sought to manipulate the results by giving unrealistic answers.

SP observations were removed from the sample in the following cases:

- No bus fare data provided and hence the fare offered in the SP scenario could not be calculated[106]

[106] In the SP, fares were presented as an absolute increase over the current situation. But if respondents did not specify the current

- No cost data reported for the alternative mode
- Bus fare in the SP scenario exceeds £10
- "Move home" or "change job" given as the best alternative (there are too few observations to be useful and their inclusion would greatly complicate the analysis and interpretation of results)
- Time on alternative mode is negative[107] or not given
- Walk time for the alternative mode not given when required (i.e. for walk mode, or access/egress to train station)

After cleaning, 14,141 out of 14,952 observations remained for use in the analysis, i.e. 95% of observations were retained.

4.4.2 Non-segmented model

The simplest model form estimated from the data is one that excludes any segmentation variables for the respondent or the trips. This means that variables such as age, gender, or trip purpose are not included in the model. The approach taken was to start with this very simple model, and then add in segmentation later.

4.4.2.1 Model form

The models fitted are a series of logit binary choice models between travel by bus and the best alternative for the trip. These have the general form:

$$p_{bus} = \frac{\exp(\theta_i \times U_{bus})}{\exp(\theta_i \times U_{bus}) + \exp(\theta_i \times U_i)}$$

where

p_{bus} is the probability of travelling by bus
U_i is the utility of the specified best alternative *i*
θ_i is the scaling parameter for the choice model between bus and alternative *i* (with the value for the bus/not go choice model set to 1)

The utility function for all alternatives (including bus) takes the general form:

$$U_i = ASC_i + \beta_1 Cost + \beta_2 IVT + \beta_3 WalkTime + \beta_4 Headway + \beta_5 BusInterchange + \beta_6 CycleTime$$

where

ASC_i is the alternative specific constant for alternative *i* (fixed at zero for bus) and is estimated as part of the modelling

$\beta_1 \ldots \beta_6$ are coefficients to be estimated

value we cannot calculate the total fare in the SP scenario.

[107] The recorded response was change relative to current bus time so bus time might be stated as 10 minutes and the alternative as 15 minutes quicker than bus, which is not feasible

Cost	is the monetary cost (bus, rail or taxi fare, or car cost, as appropriate)
IVT	is the in-vehicle time, i.e. the time spent actually inside the car, bus, train or taxi
WalkTime	is the amount of time spent walking, either as a mode of transport in its own right, or as access/egress to/from public transport (e.g. walking from home to the bus stop, from the bus stop to the shops)
Headway	is the headway of public transport (bus or train), i.e. the time interval between services (for example, every 10 minutes)
BusInterchange	is the number of interchanges between different buses required to complete the journey
CycleTime	is the amount of time spent cycling

Not all cost terms appear for each alternative. For example, cycle time is only non-zero for the cycle alternative.

All the data are pooled for model estimation. This means that although there are eight different binary choice models (for eight different alternatives to bus[108]), the models are estimated simultaneously and the coefficients are the same for each model.

[108] As noted earlier, some of the alternatives specified in the survey were removed at the cleaning stage as there were too few observations to be useful, and to simplify the analysis.

4.4.2.2 Results for non-segmented model

The following table shows the SP results for the simple model. Cost coefficients (β) and alternative specific constants that are not explicitly different from zero have been set to zero and scale parameters not significantly different from 1 have been set to 1. Values for these parameters are shown in red italics in the following table; because they are fixed there is no *t* value reported.

The table shows the value that was estimated and its associated *t* value[109]. The latter determines the statistical significance of the value (a *t* value greater than 1.96 indicates the value is statistically significant at the 95% level).

Table 4.11: Non-segmented model results.

Variable	Coefficient	t test
ASCs		
ASC Train	-0.417	-8.78
ASC Taxi	-0.824	-4.37
ASC Bus to Diff Dest	*0*	
ASC Not Go	-1.2	-16.44
ASC Lift	-1.65	-4.35
ASC Drive	*0*	
ASC Walk	-0.311	-3.38
ASC Cycle	*0*	
Travel costs		
β_1 Cost (pence one-way)	-0.003	-15.67
β_2 IVT(minutes one-way)	-0.0124	-9.15
β_3 Walk (minutes one-way)	*0*	
β_4 Headway (minutes)	-0.0035	-4.16
β_5 Bus Interchange	*0*	
B_6 Cycle time (minutes one-way)	-0.015	-10.45
Scale parameters		
Scale Lift	0.283	-7.43
Scale Drive	*1.00*	
Scale Walk	*1.00*	
Scale Cycle	*1.00*	
Scale Train	2.32	5.55
Scale Taxi	0.447	-9.75
Scale Bus to Different Destination	*0.00*	
Scale Not Go	*1.00*	

[109] The *t* value is the estimated value, divided by its standard error. The standard error is a measure of the level of uncertainty in the estimated value.

The value of time is the coefficient for IVT divided by the coefficient for cost, which is 4.1p/minute or £2.48/hour. This is a reasonable value, albeit low compared to the values in WebTAG Unit 3.5.6 (£6.46 and £5.71/hour for commuting and other purposes respectively, 2010 values and prices[110]). However, the WebTAG values are equity values of time and are the same for all modes; they do not reflect the lower than average incomes of bus users, nor the relatively short trip lengths (there is evidence that values of time increase with distance).

On the other hand, our estimated value of time is very similar to the result of a recent meta-analysis carried out by Abrantes and Wardman (2011), of 3.9p/minute for short-distance bus trips (Q4 2008 prices and incomes).

For the "Not Go" alternative there are no travel costs in the utility function, so the value of the ASC represents the total utility of not going, relative to the utility of making the bus trip (where the latter includes travel costs and, implicitly, the utility of the activity undertaken at the destination). As expected it is negative, and represents the loss of utility through not making the bus trip. This is the basis for calculating the social value of the bus trip.

The "Not Go" ASC has a monetary value of £4.00 (i.e. the estimated value of the constant divided by the cost coefficient). However, the cost coefficients are based on one-way trip costs. In order to value the activity at the destination it is more appropriate to use two-way trip costs. This would halve the cost coefficients β,, which in turn would double the monetary value of the ASC to £8.00.

Coefficients on headway and cycle time are reasonable in comparison with in-vehicle time. However, walk time (including to and from the bus stop) was not significant, which is surprising.

The following section describes the effects of introducing segmentation into the model and how this alters the valuation for the social impact.

4.4.3 Segmented models

The model reported above involved pooling data across the various behavioural responses, although allowing the scale to differ across them where warranted. We here extend that model to examine the impact of a range of socio-economic and trip characteristics.

The variables that we have tested are:

- Household income, specified as the original categories in the questionnaire and, with various assumptions, absolute income. We can then specify either income per household or per person.
- Journey purposes, covering commuting, education, shopping, visiting friends and relatives, health appointment either at hospital or GP, social/recreation, personal business, employer's business, and simply getting out and about.
- Journey distance.
- Location of Perry Barr, Shrewsbury Urban, Shrewsbury rural and Liverpool.
- Car availability for the specific journey being made.
- Ticket type, covering cash, prepaid ticket and concessionary travel pass.
- Weekly spending on bus fares and frequency of bus use.

[110] From the June 2012 in-draft version of WebTAG Unit 3.5.6 http://www.dft.gov.uk/webtag/documents/expert/unit3.5.6d.php

- Whether the journey reported was single or return.
- Employment status: full time employed, part time employed, student, retired, seeking work and not seeking work.
- Gender.
- Age group.
- Disability.
- Ethnicity.

4.4.3.1 Extension of the utility function to include segmentation

The way we model the effects of socio-economic and trip characteristics is through the specification of incremental effects composed as the interaction of our variable of interest and either the levels of some categorical socio-economic variable or some continuous variable.

Equation 4.1 below represents the utility of option *i* as a function of main effect variable X (which might be cost, time, walk time, headway or an alternative specific constant) and additional interaction terms. The marginal effect of variable X is denoted by α, which might vary across the *i* alternatives. This is the coefficient that is reported in standard choice models and which was reported in section 4.4.2 above.

$$U_i = \alpha_i X_i + \beta_i Z X_i + \sum_{j=1}^{n-1} \gamma_{ji} d_{ji} X_i + ... \quad (4.1)$$

We can allow the sensitivity to variable *X* to vary with some continuous variable, such as distance or income, by specifying the second term in the equation which is an interaction of our main variable of interest (*X*) and variable *Z*, say distance. The marginal effect of variable *X* is then ($\alpha + \beta Z$) and therefore depends upon the level of variable Z. Thus, for example, the marginal utility of cost might increase with distance.

Many of our socio-economic and trip characteristic variables are categorical in nature, such as journey purpose or employment status. We can represent these using dummy variables. In equation 4.1, we specify *n-1* dummy variables (d_j) representing *n* categories of the interacting variable. So if we have four locations of Liverpool, Perry Barr, Shrewsbury urban and Shrewsbury rural, we can specify three dummy variables to test whether, say, the constant terms varies across location. The coefficients are interpreted relative to the arbitrarily omitted (base) category and it does not matter which category is chosen as the base. Thus if the base category is Perry Barr, the marginal effect of variable *X* for Perry Barr residents is simply α (ignoring any effect from the interaction with variable Z). If dummy variable 2 represents Liverpool, then the marginal effect for Liverpool residents of variable *X* is ($\alpha + \gamma_2$).

Theory guides how we progress, in terms of which interactions apply to which variables. Thus we might expect cost sensitivity to depend upon income, and time sensitivity to depend upon journey purpose. Statistical tests are then used in the interpretation of the findings.

A particular form of segmentation relates to income. Income data is collected in categorical form. Hence examining its effect can be accommodated by using equation 4.1 above. We would expect income to impact on bus users' sensitivity to cost changes (so *X* represents bus fare) and the dummy variables (d_j) represent different income categories, with one removed as the arbitrary base. If the dummy variables represent increasing income levels relative to the lowest income base, then we would expect their

coefficients to be increasingly positive to denote the reduced (negative) effect of cost as income rises. But we can also convert income into a continuous form, by making some assumptions about the mean incomes for each income category. We can then specify the utility function relating to the cost for alternative i (X_i) as:

$$U_i = \alpha_i \frac{X_i}{Y^{\lambda}} \qquad (4.2)$$

where Y is income (as a continuous variable), whereupon λ denotes the elasticity of monetary valuations (e.g. of travel time) with respect to income. We can specify income as per household or deflated by the number of household members.

In the models we report, it turns out that they do not contain the function specified in equation 4.2. We have used it to test income effects but the results were not satisfactory. The reported effects are almost entirely related to the categorical incremental specifications (the γ terms) of equation 4.1.

The emphasis of the analysis is on examining how the ASC relating to not making the trip (ASC_NOTGO) and the cost term vary across the characteristics of the sample and the trips. This is because it is these two terms that together make up the monetary social value of bus service provision. Nonetheless, we also explore whether there are variations in the money value of time, since this can provide insights into the quality of the SP data obtained.

4.4.3.2 Dealing with non-traders

The issue of non-trading is a contentious one. It is conceivable that someone so needs to make the journey by bus that they will make it no matter what the increase in fare or deterioration in service quality is presented in the SP. On the other hand, all scenarios present at least one of the four design variables, and often more than one, at a worse level than the current (see Appendix E). Some would imply significant reductions in utility. It is therefore again conceivable that some travellers would choose not to use bus, particularly those at the margin or with good alternatives, in all the scenarios offered.

We have taken a conservative view in the omission of 'non-traders'. We have defined a non–trader as someone who always chooses bus or always switches from bus in all eight SP scenarios for **all** their reported journeys. There is no standard procedure adopted by analysts regarding non-traders. The main reason for their omission is that the responses they provide are regarded as somehow irrational or biased, perhaps reflecting protest response, justification bias or status quo bias. Nonetheless, it is a procedure that has attached to it a degree of controversy, since the responses could actually provide an accurate account of underlying preferences that are, by definition, different to those of the retained 'traders'. What we can point to here is our criterion being more rigorous, since it is based on non-trading patterns across more than one journey. We regard it as odd that, across different kinds of journeys and a wide range of variations offered, a respondent always provides the same answer.

Using this definition, 426 (71%) of the sample of 602 respondents are observed to trade (which, for an SP survey, is a relatively high proportion). There are 109 (18%) who always choose bus come what may and 67 (11%) who always choose an alternative to bus. The former could be sending a signal that buses are extremely important and should be supported whilst the latter might also be responding strategically with protest response aimed at discouraging any fare increases or other deteriorations in practice. It is also possible that such individuals have simply not taken the exercise seriously. This is more likely to happen for those who reported many trips and for whom the SP exercises could then be regarded to be quite

challenging and our definition of a non-trader will pick these up in contrast with someone who makes a few trips and for, say, one of them happens to choose the same response throughout.

We have looked at the differences in the data between traders and the two distinct categories of non-trader identified above. There are no significant differences that might explain the non-trading behaviour (for example, non-trading might be more likely and more plausible if only one or two trips are being made, but it turns out all three groups (traders and two types of non-traders) make similar numbers of trips). On the other hand, there are no clear anomalies that require us to discard non-traders on the basis of data quality (e.g. there are no apparent biases by location or interviewer). One possible exception is that non-traders took less time to complete the interview: traders took, on average, 18 minutes 29 seconds; those who always chose bus took 16 minutes 1 second; those who always chose the alternative took 17 minutes 54 seconds. This might be interpreted as evidence of the non-traders not taking the exercise seriously, but it is not clear cut.

The results presented below show the models with and without non-traders. Further discussion about which model to take forward appears at the end of this section.

4.4.3.3 Results for segmented model

Full models

Two models are reported in Table 4.12 below. Model I contains all those incremental coefficients that were found to be correct sign and significant at least at the 90% level[111] for the data set containing all the SP responses. Model II is the corresponding model but without the non-traders.

As before the table shows the estimated value for each variable and the associated t value. It also shows the monetary value where this is important: value of time for the time coefficients, and the value of “not go” for the ASC for not go.

Note: Two values are given. The first is for those who do not hold a concessionary travel pass and the second is for those who do hold such a pass. The remaining scales were set to one as being insignificantly different from it. The t ratios for the scales are relative to one. The cost term is in single trip units. If it were for a round trip then it would be halved. Given that the natural unit of the valuation of an activity is in terms of a round trip, we specify the monetary valuations for the ASC terms in round trip units.

Although some of the coefficients are quite small, it should be remembered that their contribution to the utility in the logit model is the coefficient multiplied by the variable value, i.e. for coefficients of continuous variables the size of the coefficient does not, in itself, tell us anything about the overall effect of that variable on the model.

The goodness of fit adjusted rho-squared values may, at first glance, look quite low, but they cannot be compared directly with R^2 values from a traditional linear regression model. Rho-squared values of around

[111] This requires the absolute value of *t* statistic to be greater than 1.64. This is slacker than the 95% level (t>1.96) mentioned earlier. It is useful to be more relaxed about statistical significance in these early stages of exploratory modelling as it helps to identify variables that are on the borderline of significance and therefore might fall in or out of later versions of the model. It is sometimes justified to include variables that are expected to be significant (from other studies and experience elsewhere), even if they do not prove to be significant in the current model. The significance of the coefficients in the final version of the model is discussed later.

0.1 are typical for discrete choice models fitted to SP data. The key test of this type of model is whether the individual coefficients are statistically significant.

Table 4.12: Segmented model results (full version).

	MODEL I			MODEL II		
Variable	Coeff	t test	Monetary value	Coeff	t test	Monetary value
ASCs						
Train: ASC_TRAIN	-0.346	5.4		-0.325	4.5	
Taxi: ASC_TAXI	-0.455	3.4		-0.394	2.1	
Bus to Diff Dest : ASC_DIFFDEST	-0.898	5.4		-0.050	0.2	
Not Go: ASC_NOTGO	-1.540	10.7	Base £11.16 Base £5.40	-1.283	7.1	Base £11.14 Base £3.34
Get a lift: ASC_LIFT	-0.732	7.9		-0.602	5.5	
Walk: ASC_WALK	-0.544	5.3		-0.283	2.3	
Cycle: ASC_CYCLE	0.500	2.6		0.073	0.3	
Segmentation of ASC Not Go[112]						
Ethnicity: Asian / Asian British NOTGO_ASIAN	0.430	2.4	-£3.10 -£1.50	-0.169	0.8	£3.74 £0.44
Ethnicity: Black / African / Caribbean / Black British NOTGO_BLACK	-0.285	1.8	£2.06 £1.00	-0.312	1.9	£2.70 £0.82
Disability NOTGO_DISABLED	0.245	2.2	-£1.78 -£0.82	0.197	1.5	-£1.72 -£0.52
Gender: female NOTGO_FEMALE	0.472	5.1	-£3.42 -£1.66	0.370	3.3	-£4.10 -£0.96
Trip purpose: healthcare NOTGO_HEALTH	-0.209	1.9	£1.50 £0.74	-0.133	1.2	£1.16 £0.34
Trip purpose: shopping NOTGO_SHOP	-0.324	3.3	£2.34 £1.12	-0.203	1.7	£1.76 £0.52
Employment status: part time NOTGO_PARTTIME	0.703	4.7	-£5.08 -£2.46	0.023	0.1	-£0.20 -£0.06
Employment status: seeking work NOTGO_SEEKWORK	0.272	1.8	-£1.96 -£0.94	-0.003	0.0	£0.02 £0.00
Employment status: student NOTGO_STUDENT	0.394	3.0	-£2.84 -£1.38	0.037	0.2	-£0.32 -£0.10
Trip type: single NOTGO_SINGLE	-0.454	2.1	£3.28 £1.58	-0.088	0.3	£0.76 £0.22

[112] Incremental relative to base value of ASC_NOTGO above

	MODEL I			MODEL II		
Variable	Coeff	t test	Monetary value	Coeff	t test	Monetary value
Weekly spend on bus fares: >£110 NOTGO_SPEND	-0.035	6.0	£2.52 for £10 spend £1.22 for £10 spend	-0.013	1.4	£1.12 for £10 spend £0.34 for £10 spend
Location: Perry Barr NOTGO_PERRYBARR	0.526	5.2	-£3.80 -£1.86	0.013	0.1	-£0.10 -£0.04
Travel costs						
Car travel time (minutes) CARTIME	-0.0186	6.7	6.64 p/min 3.26 p/min	-0.0182	5.5	7.91 p/min 2.36 p/min
Cost (fare or petrol) (pence) COST	-0.0028	10.2		-0.0023	7.2	
Cost for concessionary pass holders (pence) COST_CONC[113]	-0.0029	6.7		-0.0054	6.1	
Cost for pre-paid ticket holders (pence) COST_PREPAY	0.00046	2.2		0.00044	1.6	
Cycle time (minutes) CYCLETIME	-0.0198	5.6	7.07 p/min 3.47 p/min	-0.0222	6.0	9.65 p/min 2.88 p/min
HEADWAY	-0.001	0.9		-0.003	2.0	
Bus in-vehicle time (minutes) TIME	-0.0113	8.0	4.09 p/min 1.98 p/min	-0.011	6.0	4.78 p/min 1.43 p/min
Walk time (minutes) WALKTIME	-0.0094	7.5	3.36 p/min 1.65 p/min	-0.013	8.5	4.09 p/min 1.69 p/min
Scale parameters						
Scale Train	1.780	3.5		1.550	2.4	
Scale Taxi	0.516	8.2		0.382	8.3	
Goodness of fit						
Adj Rho Squared	0.06			0.05		
Observations	14141			9876		

Alternative-specific constants

There are eight alternatives to travelling by bus and hence we specify eight ASCs to denote the inherent preference of that alternative, net of travel times and costs, relative to bus. Model I finds all but car driver, which was not significantly different from zero, and the cycle ASC, to denote a preference for bus. The preference for cycle over bus could be because the mode specific element is being discerned by the

[113] COST_CONC and COST_PREPAY are incremental relative to COST

somewhat larger disutility attached to cycle time than travel time by motorised modes. Not surprisingly, the ASC_NOTGO is the largest since it reflects the loss of the activity and not just some modal preference.

Whilst generally we might expect an ASC in favour of car over bus, there may be underlying factors for these people using bus, such as a dislike of driving, which would reduce the more normally expected preference for car over bus all else equal. Moreover, all else is not equal; whilst we ask for the costs and journey time of car relative to bus, we did not account for the walk time element nor for any premium attached to driving in congested conditions.

Matters are a little different in Model II, with the ASC_cycle becoming insignificant as well as ASC_DIFFDEST. As expected, ASC_NOTGO remains the largest effect, although for a number of socio-economic groups it will be modified by the incremental terms.

It seems that bus users prefer bus over all other alternatives, except cycle, all else equal. This is not surprising given that they are bus users! We note that they seem to particularly dislike asking for a lift. This may reflect the disutility of a loss of independence.

Travelling to a different destination by bus is inferior to continuing to travel to the current destination by other modes.

Coefficients for the generalised cost of travel

We found those with concessionary travel passes to have somewhat greater sensitivity to cost variations (COST_CONC). The latter is an incremental effect to be added to the cost term (COST). This is not surprising since they will generally have lower incomes (this is confirmed in our sample). We cannot discount the fact that, given they currently do not pay for bus travel, there may be an element of protest response. What we observe though is that the differential between COST and COST_CONC terms is somewhat larger when we remove the non-traders, thereby leading to a greater divergence of values of time in Model II.

The values of time are 4.09 and 1.98 pence per minute for non-concessionaries and concessionaries respectively in Model I. The corresponding values in Model II are 4.78 and 1.43 pence per minute. We can compare these with a wealth of British evidence as synthesised in the Abrantes and Wardman (2011) meta-analysis of values of time. Their meta-model would predict, in summer 2012 prices and incomes and for the mean journey distance of 3.8 miles, a value of time for bus users of 5.6 pence per minute for leisure travel with a 12% larger value for commuting. This value will for the largest part relate to travellers without a concessionary travel pass. Our value of time estimates are not greatly removed from this. However, this predicted value is based on RP data. If we use the meta-model to predict what an SP study would provide, it would indicate a bus value of time for leisure travel of 4.3 pence per minute, increasing to 4.8 pence per minute for commuting; these are even closer to the values we obtain here.

The values of time for bus users implied by the models reported here are in line with empirical evidence. This allows us to have confidence in the quality of the SP data obtained, despite the SP being non-standard in focussing on deteriorations and being challenging in terms of covering, for some respondents, a large number of trips.

In both models, there is a large multiplier attached to cycle time (i.e. the value of the cycling time coefficient relative to the bus coefficient). The ratio of 2 in Model II is in line with official Department for Transport recommendations in TAG Unit 3.5.6.

There is also a large multiplier of car travel time relative to bus time, and we find this less credible. In Model I, walk time is valued less highly than bus time, which is contrary to what we expect and the recommendation in TAG Unit 3.5.6 which values walk time twice as highly as in-vehicle time. In model II, walk time is valued only slightly more highly than bus time. It may be that some respondents have ignored the walk time variations on the grounds that it is not realistic to vary the time taken to get to and from bus stops.

We examined whether the value of time varied with purpose by allowing the time coefficient to vary. No significant variation was detected across the various purposes, even when we adopted a simple dichotomy of leisure and non-leisure trips. Nor did we find the sensitivity to time to vary with age, gender or the frequency of trips making.

Investigation of possible income effects

Monetary values of time and of the ASCs will vary to the extent that the cost coefficients vary. One of the most commonly obtained results in choice modelling is that the sensitivity to cost diminishes as income increases, and thereby monetary valuations increase.

To test for this effect in our data we distinguished household incomes by the categories of up to £10,000 per annum, between £10,000 and £20,000, between £20,000 and £30,000, over £30,000 and missing (i.e. the respondent did not wish to say). The categories are broadly similar in size, with the exception that missing income data relates to only 5% of the sample. The base category was the lowest household income group, with incremental effects for the rest specified in terms of the cost coefficient. We were unable to discern a credible pattern of results, and indeed if anything the sensitivity to cost seemed to increase with household income.

We therefore resorted to using equation 4.2, taking the midpoints for the various household income groups and assuming the average household income for the highest income group to be £75,000. Where income data was missing, we replaced it with the average of £24,000. We were able to obtain a significant coefficient for λ but it was negative, implying more sensitivity to cost as household income increases. Matters were no better when we replaced household income with household income per person. It may be that, as far as sensitivity to travel costs is concerned, it is individual rather than household income which is most relevant.

We tested whether the cost coefficient varied with employment status, which could proxy for individual income to some extent, but no effects were apparent. Nor did it vary according to whether the respondent could have made the journey by car. The only incremental effect on the cost coefficient other than for concessionary travel pass holders was when the fare was pre-paid (COST_PREPAY). We allowed this effect since we felt that those who spread the cost of bus travel across a number of trips or days, and who were presented with an absolute bus fare per trip, might not have related to the SP exercise as well as those paying cash. Ideally we would have varied the price of the pre-paid ticket and allowed the appropriate behavioural responses to this, including switching to cash for those journeys specifically retained, but this was considered to be too complicated. An effect was apparent but it is only small.

Variations in the constant for “not go”

Given the primary focus of this study is on the social value of buses, we examined how and to what extent the constant term ASC_NOTGO varied across the sample. A number of effects are apparent in Model I.

For **journey purpose** the only significant effects were from shopping and health trips, both of which have larger valuations than other purposes. However, the effects are not large. While we might have expected more variation by journey purpose, it may be that within any specific journey purpose the range of specific activities being pursued are quite heterogeneous. Also, within each journey purpose it is likely to be the lowest valued trips that have "not go" as the best alternative.

The most significant effects on the constant for "not go" are related to **employment status**. Compared to the base of full time employed, part time workers, those seeking work and students all had lower values for "not go". There may be individual income effects at work here; particularly that those in full time employment can more afford to pursue higher value activities. On the other hand those not in work and not seeking work had a value for "not go" not significantly different from full time workers.

There is some evidence of **ethnicity** effects. Compared with respondents in the White ethnic group, Asian / Asian British respondents appear to have lower values for "not go" and Black / African / Caribbean / Black British respondents have higher values.

There is a significant **gender** effect, with females having a lower value for "not go" than males.

There is a significant **disability** effect, with respondents with disabilities having a lower value for "not go" than other respondents.

There is a limited **area type** effect. Out of the 4 area types included in the survey, only one (Perry Barr) has a value for "not go" that is significantly different from the other areas. Specifically, Perry Barr has a lower value for "not go" than the three other areas (Shrewsbury urban, Shrewsbury rural and Liverpool).

We also allowed for different values according to whether a single, rather than return, bus trip was being made (NOTGO_SINGLE). This turns out to be significant. We do not believe this reflects a genuine difference in valuation, but is more likely to be down to the way they related to the SP scenarios.

Apart from the concessionary travel pass holder effect already noted, there was no further effect for **ticket type**, with respondents having the same value of "not go" whether they paid cash for each journey or had a season ticket for one day or longer.

The remaining significant effect relates to the **amount of bus travel**. We did test whether those who used bus more frequently had a different a value for "not go". However, a better fit was obtained from weekly spend on bus fares (NOTGO_SPEND), which is dependent upon frequency of bus use, as well as the distance travelled. It shows that those who spend more on bus fares have a higher value for "not go". This might again be reflecting an income effect (i.e. people with higher incomes make more and longer trips, spending more on fares) but it may also be that those who travel more regularly by bus do so because they have so many more, and more valuable, activities that they want to undertake. No effects were obtained, from the overall distance of the journey.

Many of the effects discussed above have no obvious causal link. The most plausible explanation is that they are mainly related to individual (as opposed to household) income effects, i.e. those on higher incomes have higher values for "not go".

Differences between Model I and Model II

This discussion of incremental effects has been couched in terms of the results of Model I. What is noticeable, however, is that many of these effects disappear when non-traders are removed. In Model II, only the incremental effects on the ASC for female and Black / African / Caribbean / Black British respondents remain. Given that we have been quite stringent in our definition of what constitutes a non-trader, we conclude that not too much emphasis should be placed on the incremental effects in Model I.

However, headway does become significant in Model II, with a weight relative to bus time of 27%. Whilst a welcome finding, it is somewhat lower than the multiplier of 0.55 implied for bus users by the Abrantes and Wardman (2011) meta-model.

Stripped-down models

Table 4.13 reports stripped down models, removing those terms that are not typically used in forecasting and appraisal in practice. The stripped down models are therefore potentially more useful for practical application. Model III contains all the SP data whilst model IV removes non-traders. We retain the prepayment incremental cost effect (COST_PREPAY) and the incremental effect on the ASC from a single trip (NOTGO_SINGLE) on the grounds that these could be isolating particular contextual effects.

Note: Again two values are given and the first is for non concessionary travel pass holders and the second is for concessionary travel pass holders. The ASC valuations are in round trip units.

Table 4.13: Segmented model results (stripped-down version).

	MODEL III			MODEL IV		
Variable	**Coeff**	**t test**	**Value**	**Coeff**	**t test**	**Value**
ASCs						
Train: ASC_TRAIN	-0.293	4.9		-0.359	4.9	
Taxi: ASC_TAXI	-0.323	2.7		-0.529	2.5	
Bus to Diff Dest : ASC_DIFFDEST	-0.702	4.3		-0.099	0.3	
Not Go: ASC_NOTGO	-1.290	13.5	£8.60 £4.04	-1.461	11.5	£12.70 £3.40
Get a lift: ASC_LIFT	-0.763	8.2		-0.703	6.2	
Walk: ASC_WALK	-0.606	6.0		-0.390	3.1	
Cycle: ASC_CYCLE	0.510	2.6		-0.079	0.4	
Segmentation of ASC Not Go[114]						
Trip type: single NOTGO_SINGLE	-0.432	2.2		-0.1690	0.6	

[114] Incremental relative to base value of ASC_NOTGO above

	MODEL III			MODEL IV		
Variable	Coeff	t test	Value	Coeff	t test	Value
Coefficients						
Car travel time (minutes) CARTIME	-0.0192	7.3	6.40 p/min 3.00 p/min	-0.0190	5.6	8.26 p/min 2.21 p/min
Cost (fare or petrol) (pence) COST	-0.0030	11.5		-0.0023	7.3	
Cost for concessionary pass holders (pence) COST_CONC[115]	-0.0034	7.7		-0.0063	7.2	
Cost for pre-paid ticket holders (pence) COST_PREPAY	0.00065	3.1		-0.0004	1.6	
Cycle time (minutes) CYCLETIME	-0.0205	5.8	6.83 p/min 3.20 p/min	-0.0215	5.8	9.35 p/min 2.50 p/min
HEADWAY	-0.0006	0.5		-0.0037	2.5	
Bus in-vehicle time (minutes) TIME	-0.0122	8.7	4.07 p/min 1.91 p/min	-0.0114	6.4	4.96 p/min 1.33 p/min
Walk time (minutes) WALKTIME	-0.0088	7.3	2.92 p/min 1.38 p/min	-0.0129	8.6	5.61 p/min 1.50 p/min
Scale parameters						
Scale Train	1.580	3.6		1.520	2.3	
Scale Taxi	0.475	13.8		0.335	10.4	
Goodness of fit						
Adj Rho Squared	0.057			0.050		
Observations	14141			9876		

When we remove the gender, ethnicity, disability, spend and employment status variables, we find that the journey purposes effects become insignificant. The only significant incremental effects are COST_PREPAY and NOTGO_SINGLE and even these become insignificant in Model IV when the non-traders are removed. The values of time are little different to the comparable models in Table 4.12 above and therefore remain very plausible.

Models III and IV therefore leave us with readily interpreted valuations of the social value of buses. For those who are not concessionary travel pass holders, the value is £8.60 for the whole sample increasing to £12.70 when non-traders are omitted. The corresponding figures for those with a concessionary travel pass are £4.04 and £3.40.

[115] COST_CONC and COST_PREPAY are incremental relative to COST

4.4.4 Further validation – demand elasticities

Whilst we have pointed out that the close correspondence between the bus users' value of time estimated here and the wealth of British evidence bodes well for the quality of the data, another way to assess the quality of the SP data is in terms of the implied bus demand elasticities.

Our SP exercise contained 64 scenarios and each respondent was randomly presented with 8 of these. If we group the SP responses across individuals within any scenario, we can examine the change in bus demand as a result of the changes that were presented. Thus we take scenario 1, to start with, and identify how many people were offered the scenario (which becomes our base volume of demand termed V_b) and then calculate how many would still use bus given the changes presented in the SP scenario (which becomes our 'after' demand termed V_a). This is then repeated for the remaining 63 scenarios.

Given that the scenarios never presented bus to be better than the current situation, we do not have to concern ourselves with those not in our sample who might use bus should it be made better.

We can specify a constant elasticity model, relating the proportionate change in demand to the proportionate change in each of price (P), time (T), walk time (W) and headway (H) between the base (b) and after (a) scenarios as:

$$\frac{V_a}{V_b} = \left(\frac{P_a}{P_b}\right)^p \left(\frac{T_a}{T_b}\right)^t \left(\frac{W_a}{W_b}\right)^w \left(\frac{H_a}{H_b}\right)^h \qquad (4.3)$$

The terms *p, t, w* and *h* denote the elasticities to price, time, walk time and headway respectively. For any scenario, we know what the average fares, journey times, walk times and headways are for the base situation. We can then work out what the proportionate change in demand is as a result of the price change, journey time change, walk time change and headway variation contained in the SP exercise.

Alternatively, we could specify the demand model in 'difference' form. This would then take the form of:

$$\frac{V_a}{V_b} = e^{p(P_a - P_b) + t(T_a - T_b) + w(W_a - W_b) + h(H_a - H_b)} \qquad (4.4)$$

The elasticities would then be proportional to the level of the variable. For example, the price elasticity would be the product of the price coefficient (p) and the price level (P). The differences in equation 4.4 are precisely those offered in the SP exercise.

Logarithmic transformations of equations 4.3 and 4.4 allow estimation by ordinary least squares. Of course, it is possible to specify some independent variables in ratio form and some in difference form to have a mix of constant and proportionate elasticities.

Table 4.14 below reports the results for all travellers, those without a concessionary travel pass and those with a concessionary travel pass. This is done for the entire sample of respondents and for the sample that excludes the non-traders. In all cases, the proportionate elasticity model of equation 4.4 provided a better fit to the data that the constant elasticity model of equation 4.3.

Table 4.14: Demand model coefficients (t values in brackets) and elasticities.

	All SP Responses			Removing SP Non Traders		
	All	Non Conc	Conc	All	Non Conc	Conc
Price	-0.0060 (15.8)	-0.0066 (15.3)	-0.0037 (5.8)	-0.0092 (13.8)	-0.0095 (12.5)	-0.0095 (7.4)
Time	-0.0121 (4.0)	-0.0105 (3.0)	-0.0147 (2.9)	-0.0071 (1.3)	-0.0051 (0.8)	-0.0247 (2.4)
Walk	-0.0090 (3.2)	-0.0089 (2.8)	-0.0072 (1.5)	-0.0119 (2.5)	-0.0110 (2.0)	-0.0084 (0.9)
Headway	-0.0044 (1.2)	-0.0067 (1.6)	0.0019 (0.3)	-0.0056 (0.8)	-0.0080 (1.0)	0.0012 (0.9)
Price Elasticity	-0.81	-1.16	-7.7%[1] -28.0%[2]	-1.24	-1.69	-17.3%[1] -57.1%[2]
Time Elasticity	-0.27	-0.25	-0.28	-0.16	-0.12	-0.47
Walk Elasticity	-0.05	-0.06	-0.04	-0.08	-0.07	-0.05
Headway Elasticity	-0.07	-0.10	-	-0.09	-0.13	-
Adjusted R2	0.74	0.73	0.20	0.77	0.74	0.37

Note: There is no demand change with no change in the independent variables and hence there is no justification for a constant. It turned out that the constant was not significant in any of the reported models. The R^2 goodness of fit is for the corresponding model with a constant term included.

[1] denotes the demand reduction for a 20 pence fare (fare elasticities cannot be calculated for concessionary travel pass holders as the base fare is zero).

[2] denotes the demand reduction for a fare that is half the full fare.

Some of the price elasticities in particular appear on the large side, which might mean that respondents have responded strategically to the price variations offered. They are more reasonable in the model that includes non-traders.

One current view of bus price elasticities is that they range from -0.4 in the short run rising to -1.0 in the long run (TRL et al., 2004). The Department for Transport (2011) expects models used for transport appraisal to conform to a long run bus fare elasticity for full fare paying passengers in the range -0.7 to -0.9. A recent meta-analysis of price elasticities by Wardman (2012), covering 377 bus fare elasticities, found the long run leisure bus fare elasticity to vary between -0.84 and -1.09 and the long run commuting bus fare elasticity to vary between -0.64 and -0.83.

The best we can do for official recommendations for the journey time elasticity for urban bus journeys is the TRL et al. (2004) review. It states, based on limited evidence and some deducing of the time elasticity from price elasticities, that ‘‘Our best estimate is that a representative in-vehicle time elasticity for local bus might be in the range -0.4 to -0.6 (whilst for rail it might be -0.6 to -0.8)”. On this basis our time elasticities would appear to be on the low side.

Given the nature of responses included in our model we do not consider there would be any difference between short run and long run elasticities. The values reported in Table 4.14 can therefore be considered to be both.

A logit model has an own price elasticity of $bX(1-P)$ where b is the cost coefficient, X is the price level and P is its market share. So for a given X and P, if the elasticity is 20% too high it is because coefficient is 20% too high and there is an argument that it should be reduced. In our model reducing the cost coefficient in the model would increase the monetary social value per trip.

It is worth emphasising that the purpose of the elasticity analysis described above is to provide reassurance that the sensitivities in our SP data are broadly plausible. The survey was not designed specifically for the estimation of elasticities for use in forecasting, and it would not be appropriate to use the values in Table 4.14 for forecasting, in preference to other published estimates.

4.4.5 Summary and discussion of the social value per bus trip

The above sections have presented a number of different models that result in estimates of the social value per bus trip. The models differ in the level of segmentation used and whether SP non-traders are included in the analysis. In all models the implied values of time are reasonable, and give us confidence that the data is robust.

In terms of segmentation, our preferred models are those presented in Table 4.13, i.e. including only that level of segmentation that is likely to be available in practice. These are clearly preferable to a model with no segmentation at all, and are better suited to practical application than the fully segmented model.

The main issue for discussion is then whether to use the model that includes or excludes non-traders. As noted above, there does not appear to be anything in the data that clearly explains non-trading behaviour, nor are there any major anomalies that suggest non-traders should be excluded on the basis of data quality.

On reflection, our preference is to use the model that includes non-traders, i.e. model III. This is mainly on the basis that including non-traders gives more acceptable bus fare elasticities; it also gives lower (more conservative) estimates of the social benefits.

Model III contains limited segmentation, with the only significant variable for the social value per trip being whether or not the traveller holds a concessionary travel pass. The values are set out in Table 4.15. The surveys were conducted in Q2 2012 so the values reported above are in Q2 2012 values and prices. These have been converted to 2010 values and prices for consistency with WebTAG. This was done as follows:

- Change of price base using the GDP deflator
- Change of value base using the non-work value of time real growth column of Table 3b in TAG Unit 3.5.6[116].

Table 4.15: Recommended values for social benefit per return bus trip

	Value per trip	
Concessionary travel pass status	Q2 2012 values and prices	2010 values and prices
Holds a concessionary travel pass	£4.04	£3.84
Does not hold a concessionary travel pass	£8.60	£8.17

These are values per 2-way return trip. Most model and data will be based on single trip numbers, which would need to be halved to estimate return trip numbers.

[116] The justification for doing this is that non-work value of time is, like, our social values, based on willingness to pay. TAG Unit 3.5.6 assumes that willingness to pay increases relative to GDP per capita using an elasticity of 0.8.

Note that these are values per trip only for that subset of trips which would not take place at all if buses were not available. The following section discusses methods for identifying this subset.

Earlier in the project it was expected that the resulting values would need to be adjusted to reflect average incomes to provide "equity" values for use in appraisal (analogous to what was done to the non-work values of time in WebTAG Unit 3.5.6). However, as noted earlier, no plausible income effect has been found for these values and we recommend that no further adjustments are made.

Similarly, there was an expectation that area type might be an important variable, but in the end there was not strong evidence for this. Nor was there a significant distance effect, which provides confidence that the values can be applied to almost any scenario.

It is worth considering whether these values are realistic. They represent the value of the activity undertaken at the destination for existing bus trips, where travellers have said they would not go if bus were not available. This value must be at least equal to the generalised cost of travel (two-way travel time and fare) for the existing bus trip, otherwise the trip would not be made. This perhaps explains why the value is lower for concessionary travel pass holders - they have a lower generalised cost of travel for a given trip (because no fare is paid) and will therefore make some lower value trips which would not be worthwhile if a fare had to be paid.

At the upper end we can compare the value with the generalised cost of a taxi (travel time and fare). A taxi is an available alternative for virtually every trip currently made by bus, albeit it may not be actively considered because of the cost; relatively few respondents identified it as their best alternative to bus. If, in the absence of bus, a traveller chooses to "not go" rather than pay for a taxi then we can deduce that the value of the activity they would have undertaken must be less than the generalised cost of taxi.

A typical bus journey in the sample is about 3 miles, for which the typical taxi fare would be at least £5 each way. We therefore arrive at a figure of £10 just in taxi fares, before taking into account the travel time cost.

We therefore conclude that the proposed social values per bus trip are reasonable, in that they are significantly less than the average cost of using a taxi instead.

4.5 Predicting when "not go" is the best alternative to bus

4.5.1 Context

We estimate the social value of bus services as the constant term relating to the not make the journey ('not go') alternative. This reflects the utility of undertaking the activity net of the travel time and cost involved in making the journey.

It is important that we have some way of predicting the proportion of people who have "not go" as the best alternative, given this will have a direct bearing on the magnitude of the social value that bus services provide. In addition, by examining how the proportion of not go varies across different characteristics of the sample, we can identify whether a bus-related policy or scheme would impact disproportionately on certain segments of society.

The following sections describe the estimation of a model that allows us to predict this proportion.

4.5.2 Model estimation

We explain whether the traveller chooses not to travel or to travel by another mode when bus becomes unacceptable as a standard binary logit model. Alternative one is the choice of "not go". All variables relate to this alternative except that the alternative specific constant (ASC2) is specified relative to the choice of making the journey but by some other means. Thus if a coefficient is positive (negative) it increases the probability that the journey is not made (made by some other means).

The model is based on 1625 trips, after removing those trips where we were unable to calculate the journey distance or the distance to the nearest station, both of which we would expect to be important in determining the proportion choosing not to travel[117]. Ideally, such a model would include the characteristics of making the journey by all the alternative means but this data was not collected (to do so would have made the survey too time consuming and cumbersome).

4.5.3 General model

The most general model is reported in Table 4.16. The goodness of fit (as measured by the adjusted rho squared) is atypically high and we have been able to detect a number of right sign and significant effects.

Table 4.16: Coefficents for model predicting probability of "not go" being best alternative

Variable	Coefficient	t stat
ASC2	1.830	8.4
Household car ownership: 1 car	-0.440	2.5
Household car ownership: 2 or more cars	-1.080	3.5
Trip purpose: Commuting	-2.130	7.5
Trip purpose: Education	-0.931	3.6
Trip purpose: Employer's business	-8.480	7.9
Trip purpose: Visit friends/relatives	-0.350	1.7
Trip purpose: Personal business	-1.080	3.3
Trip purpose: Health	-1.692	2.2
Ethnicity: Asian / Asian British	1.160	4.5
Ethnicity: Black / African / Caribbean / Black British	0.960	4.1
Disability: Physical/mobility impairment	0.644	2.9
Journey distance (km)	0.030	2.6
Distance from home to nearest rail station (km)	0.183	4.4
Number of bus trips per week: 3 or fewer	-0.302	1.7
Employment status: Retired	1.220	5.7
Employment status: Seeking work	0.640	2.6
Employment status: Not seeking work	0.544	2.0

Adjusted Rho squared: 0.446
No. of observations: 1625

[117] Distance to the nearest rail station was estimated from the home postcode of respondents. Trip distances were estimated from the reported trip origins and locations.

Car ownership effects

As expected, those with one car in the household are less likely to choose the not travel option, since driving and lifts are likely to be feasible alternatives to bus travel. The effect is even stronger for two cars per household, reflecting reduced competition for available cars from other household members. The effect of three or more cars per household was a little less strong, and was in fact not quite significant; this might be because there are few people in this category (28 out of 602 respondents). We therefore combined the two car households and three or more car households into a two or more category given their separate coefficients were so similar. Surprisingly, there was no significant effect from whether the respondent had a driving licence, conditional upon there being at least one car in the household.

Journey purpose effects

A number of journey purpose effects are apparent. The base was taken to be shopping trips. The coefficients for "getting out and about" social trips were not significantly different from this base. Not surprisingly, those making commuting or education trips, and the few on employer's business trips, would be less likely to not make the journey.

The health trips (to the GP and to the hospital) both had very similar coefficients and hence were merged to produce a more precise single coefficient estimate. This shows, again unsurprisingly, that for such trips bus users are less likely to not make the journey at all. Those on personal business were also less likely to not travel, although to a lesser extent than the previous journey purposes, whilst the weakest negative effect relative to the base is visiting friends and relatives.

The results for journey purpose tend to confirm expectations; journeys that are essential or very important are more likely to be retained, and made by another mode, than trips of a more discretionary nature.

Traveller-related effects

With regard to **ethnicity**, Black / African / Caribbean / Black British respondents, and, to a slightly greater extent, Asian / Asian British respondents, are more likely to have "not go" as the best alternative. This might be related to attitudes to walking and cycling, which tends to be less favoured amongst some ethnic groups (see, for example, LRC, 1997; Parkin et al., 2008).

Those with a **physical impairment** are more likely not to make the journey but the effect is less strong than for ethnicity. Again the range of alternatives to bus will be less than for those without a disability. There are too few respondents with sensory and mental impairments to be able to detect any effect for this segment.

As far as **employment status** is concerned, and relative to a base of full time employment, students and part-time employed have coefficients that were insignificantly different. In contrast, retired people are more likely to have "not go" as the best option, presumably because they have fewer alternatives. Those not in work (whether seeking it or not) are also more likely to "not go".

These employment status effects may be income-related, with those on lower incomes less likely to be able to afford alternative means of travel such as car, rail, or taxi.

There is a strong correlation between someone being retired and holding a **concessionary travel pass**. One consequence of this is that including both these variables in a model meant it was not possible to get significant effects for both at the same time.

Including concessionary travel pass holding *instead* of retired/non-retired did show a significant effect. The concessionary travel pass holder coefficient was also positive but not as large as for the retired and led to a marginally worse fit with the log-likelihood falling from -606 to -617; in other words the model using concessionary travel pass holding is not quite as good as the one using retired/non-retired. We return to this issue below.

Note that age group did not have a significant effect over and above retired or concessionary travel pass holder (e.g. older concessionary travel pass holders were no more or less likely to "not go" than younger concessionary travel pass holders).

Trip frequency and distance

Those making 3 or fewer bus trips a week are less likely to forego trips, presumably because they partake in fewer activities and hence those that they do undertake are relatively important to them.

The remaining effects in the reported model were **distance** of the overall journey (in kilometres) and distance to the nearest rail station. Bus users are, as might be expected, more willing to forego journeys altogether when they are longer, but the effect is not strong. Whilst there are fewer alternatives to bus for longer distances, this might be counteracted by longer distance journeys being for more important activities, which is why people are prepared to invest the travel time to undertake them, whilst there may be a greater willingness to ask for a lift for journeys that are not short.

The distance to the nearest railway station has a somewhat stronger effect and is highly significant. As the distance increases, so the respondent is more likely to choose not to travel. This is because as the railway station becomes less accessible, rail is a less effective alternative to bus; we can expect rail to be a reasonably close substitute for bus when the rail station is close.

The other variables we tested that did not have significant effects were income, bus ticket type, gender and age group. We tested whether the distance effects, for the overall journey and access to the nearest station, were non-linear by the inclusion of directly estimated power terms on the relevant distance variables. However, these power terms were not significantly different from one.

4.5.4 Stripped-down models

The model above is our most general model, but it contains segmentation variables that are not typically used in planning, forecasting and appraisal. Table 4.17 below presents a 'stripped down' version that removes ethnicity, disability, frequency of trip making and employment type. However, we do retain the retired category as reasonably identifiable whilst also reporting a model that replaces retired with concessionary travel pass holder, for more straightforward application. The coefficients in the stripped down version are not greatly different to the model in Table 4.16 that contains all significant effects. Replacing the retired term with whether the respondent was a concessionary travel pass holder does not have a large impact on many coefficients, but noticeably the concessionary travel pass holder coefficient is somewhat smaller than the retired coefficient. This is because although almost all retired bus users have concessionary travel passes not all concessionary travel pass holders are retired and it is the latter who might be expected to be more likely to choose not to travel.

Although the model using concessionary travel passes has a slightly worse fit, we believe it is preferable for application as forecasting models which predict changes in the number of bus trips are more likely to have concessionary travel pass holding as a segmentation variable than retired/non-retired.

Table 4.17: Coefficents for stripped-down model predicting probability of "not go" being best alternative

	Using "retired"		Using "concessionary pass holder"	
Variable	Coeff	t stat	Coeff	t stat
ASC2	1.301	8.3	1.170	7.6
Household car ownership: 1 car	-0.519	3.1	-0.523	3.2
Household car ownership: 2 or more cars	-1.230	4.1	-1.290	4.4
Trip purpose: Commuting	-2.180	8.2	-2.340	9.0
Trip purpose: Education	-0.804	3.3	-0.983	4.2
Trip purpose: Employer's business	-7.500	7.4	-7.660	7.5
Trip purpose: Visit friends/relatives	-0.320	1.8	-0.421	2.1
Trip purpose: Personal business	-0.867	2.7	-0.927	2.9
Trip purpose: Health	-1.793	2.3	-1.790	2.4
Journey distance (km)	0.024	2.2	0.024	2.1
Distance from home to nearest rail station (km)	0.146	3.5	0.144	3.4
Employment status: Retired	0.970	5.7	-	-
Concessionary pass holder	-	-	0.317	4.2
Adj Rho Sq	0.429		0.421	

No. of observations: 1625

While both the distance terms in the above model are significant, they do pose a minor problem for application. Specifically, they will clearly vary from situation to situation, meaning that scheme appraisers would need to set up and apply the "not go" model for each intervention being considered. This adds to the burden on appraisers and introduces a risk of misapplication of the model.

If we remove the distance terms then only categorical variables are left. We can then apply the model for each combination of car ownership, purpose and concessionary travel pass status and provide a default proportion of "not go" trips for each such segment which can be included in guidance. This avoids the need for bespoke applications of the "not go" model. The following table sets out the model without the distance terms. It has a very slightly worse fit, but we believe this is outweighed by the practical advantages. This is therefore our preferred model for application. The default "not go" proportions for each segment will be calculated using this model and included in our separate note providing guidance on the application of our results.

Table 4.18: Coefficents for stripped-down model predicting probability of "not go" being best alternative, excluding distance terms

Variable	Coeff	t stat
ASC2	0.805	6.35
Household car ownership: 1 car	-0.438	-2.70
Household car ownership: 2 or more cars	-0.907	-3.54

Variable	Coeff	t stat
Trip purpose: Commuting	-2.280	-8.17
Trip purpose: Education	-1.03	-4.54
Trip purpose: Employer's business	-13.2	-13.03
Trip purpose: Visit friends/relatives	-0.428	-2.17
Trip purpose: Personal business	-0.883	-2.87
Trip purpose: Health	-1.80	-2.43
Concessionary travel pass holder	0.286	3.86
Adj Rho Sq	0.411	

No. of observations: 1625

4.5.5 Example forecasts

We can use these models to predict the proportion of people who would choose to forego undertaking the activity if their bus journey became unacceptable. Table 4.19 provides such forecasts for a range of distances for the actual journey and distances to the station, along with purpose categories that have been found to have a significant effect, whether the respondent was retired or not, and household car ownership. Each combination of purpose, retirement status and car ownership is labelled as a segment in the first column of the table, for ease of reference. Segments 22 and 23 use concessionary travel pass ownership instead of retirement status.

The table below demonstrates that there is very wide variation in the proportion who have "not go" as the best alternative according to the variables in the 'stripped down' model of Table 4.17. The journey purpose effects are very apparent. At one extreme, business travellers in segment 4 would hardly ever not make the journey, which is to be expected, whilst the commuters of segments 1 to 3 similarly are unlikely not to travel to work. At the other extreme, shopping and social trips, which are included within the other category and covered by segments 17-22, can have large probabilities of being foregone.

Moving from no to one car per household has a large effect except where the probability of not making the journey is already very low. Comparing segments 2 and 3, 7 and 8 and particularly 20 and 21 demonstrates that moving from one to two or more cars per household can have a large effect.

The journey distance effect is modest but credible; as might be expected the effect from proximity to the local station is stronger. Being retired has a strong impact and, as can be seen from segments 22 and 23, the effect from concessionary travel pass holders is somewhat less.

Table 4.19: Forecasts for the percentage of bus users with "not go" as the best alternative.

Segment	Journey distance (km) / Distance to nearest rail station (km) / Purpose/Car ownership/Retired (or not)	3 / 3	8 / 3	15 / 3	3 / 8	8 / 8	15 / 8	3 / 15	8 / 15	15 / 15
1	Commute No Car Non Retired	4.9	5.5	6.4	9.6	10.7	12.4	22.8	25.0	28.3
2	Commute 1 Car Non Retired	3.0	3.3	3.9	6.0	6.7	7.8	15.0	16.5	19.0
3	Commute 2 Car Non Retired	1.5	1.7	2.0	3.0	3.4	4.0	8.0	8.9	10.3
4	EB 1 Car Non Retired	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1
5	Health No Car Non Retired	7.0	7.8	9.1	13.5	15.0	17.3	30.3	32.9	36.7
6	Health No Car Retired	16.6	18.3	21.0	29.2	31.8	35.5	53.4	56.4	60.5
7	Health 1 Car Non Retired	4.3	4.8	5.7	8.5	9.5	11.1	20.6	22.6	25.7
8	Health 2 Car Non Retired	2.2	2.4	2.9	4.4	4.9	5.8	11.3	12.5	14.5
9	Pers Bus No Car Non Retired	16.0	17.7	20.3	28.3	30.8	34.5	52.3	55.3	59.4
10	Pers Bus No Car Retired	33.4	36.2	40.1	51.0	54.0	58.2	74.3	76.6	79.4
11	Pers Bus 1 Car Non Retired	10.2	11.3	13.1	19.0	21.0	23.9	39.5	42.4	46.6
12	Pers Bus 1 Car Retired	23.0	25.2	28.5	38.3	41.2	45.3	63.3	66.0	69.7
13	VFR No Car Non Retired	24.8	27.1	30.5	40.6	43.5	47.7	65.5	68.2	71.7
14	VFR No Car Retired	46.5	49.5	53.7	64.3	67.0	70.6	83.4	85.0	87.0
15	VFR 1 Car Non Retired	16.4	18.1	20.7	28.9	31.4	35.2	53.0	56.0	60.1
16	VFR 1 Car Retired	34.1	36.8	40.8	51.7	54.7	58.9	74.9	77.1	79.9
17	Other No Car Non Retired	31.2	33.8	37.7	48.5	51.5	55.7	72.3	74.7	77.7
18	Other No Car Retired	54.5	57.4	61.5	71.3	73.7	76.8	87.3	88.6	90.2
19	Other 1 Car Non Retired	21.2	23.3	26.5	35.9	38.7	42.8	60.9	63.7	67.5
20	Other 1 Car Retired	41.6	44.5	48.7	59.6	62.5	66.3	80.4	82.2	84.6
21	Other 2 Car Not Retired	11.7	13.0	15.0	21.6	23.7	26.8	43.3	46.3	50.5
22	Other No Car Concession	41.4	44.4	48.6	59.2	62.1	66.0	79.9	81.8	84.2
23	Health No Car Concession	10.6	11.8	13.6	19.5	21.5	24.5	39.9	42.8	47.0

The above table is just an illustration of the application of this model. A separate note provides step by step instructions to enable readers to apply the model to their own particular situation.

The probability of having "not go" as the best alternative can be compared to the diversion rates in TRL (2004) (Table 9.9). These show where new bus trips (in response to an intervention) come from. For urban areas 21% of new bus trips are "generated", which we can interpret as the proportion of trips that would not take place without bus. These diversion factors are embedded in the National Bus Model.

This figure of 21% of trips not taking place if bus was not available is broadly comparable to the average of 16.9% in our sample (see Figure 4.3)[118]. In principle the 21% figure could be used instead of applying the

[118] Note that the 16.9% figure comes from the unweighted sample, i.e. it has not been weighted to ensure the sample is completely representative of the general bus-using population. We would not therefore expect the numbers to be exactly the same. Nonetheless it is reassuring that they are roughly the same order of magnitude.

model presented above. Practitioners may find this easier to do, but application of the model allows a more disaggregate analysis of the social benefits and allows identification of which groups may be particularly affected by an intervention.

4.6 Use of the estimated values in scheme appraisal

4.6.1 Background

Having estimated the social benefit per trip (Table 4.15), it needs to be made clear how these values can be used in scheme appraisal.

WebTAG currently recommends that user benefits based on a willingness-to-pay approach are estimated using the so-called rule of a half. This is discussed in detail in TAG Unit 3.5.3: Transport User Benefit Calculation. Briefly, this calculates the user benefits for mode *m* as:

$$\sum_{ij} \frac{1}{2}\left(T^0_{ijm} + T^1_{ijm}\right)\left(C^0_{ijm} - C^1_{ijm}\right) \quad (4.1)$$

which gives an all-mode total of:

$$\sum_{ijm} \frac{1}{2}\left(T^0_{ijm} + T^1_{ijm}\right)\left(C^0_{ijm} - C^1_{ijm}\right) \quad (4.2)$$

where

T^0_{ijm} and T^1_{ijm} are the number of trips by mode *m* from zone *i* to zone *j* in the "before" (do-minimum) and "after" (do-something) situations respectively

C^0_{ijm} and C^1_{ijm} are the generalised cost of travel by mode *m* from zone *i* to zone *j* in the "before" (do-minimum) and "after" (do-something) situations respectively

The social values for the benefit per bus trip have been estimated by looking explicitly at the choice to "not go", and calibrating a constant representing the cost of choosing "not go" (i.e. the loss of utility associated with no longer participating in the activity at the destination of the trip). In other words the "generalised cost" of the "not go" alternative is the same in the do-minimum and do-something and (6.1) will give a zero benefit for the "not go" alternative.

In summary, using the WebTAG version of the rule of a half, it is not possible to calculate any **additional** user benefits from the values for the social benefit per trip that we have estimated.

Section 4.6.3 discusses alternative methods of benefit calculation. Meanwhile, Section 4.6.2 below discusses how to make use of these values in the context of WebTAG.

4.6.2 Use of the social values within the WebTAG framework

One of the features of the application of the rule of a half in WebTAG is known as the "attribution of benefits" by source. Suppose bus fares increase by £1, which leads to a number of previous bus users to

no longer use bus. Some will use alternative modes; others might no longer make the journey. Under the attribution of benefits by source, the impact on all those who use the bus in the do-minimum is recorded as a bus fare disbenefit, regardless of what they choose to do in the do-something.

In some cases this convention can be unhelpful and make it hard to identify the real impacts of an intervention. The work described in this report has very much been focused on those who would choose not to travel at all in the do-something. For this subgroup the impact of the fare increase would be two-fold:

- They would lose the utility of participating in the activity at their destination (i.e. a social disbenefit)
- They would save the travel time and bus fare that was previously spent on the bus trip (i.e. an economic benefit[119])

Under the current WebTAG system, only the net disbenefit would be reported, and that would appear as a bus fare disbenefit.

One potential use of the social values per trip we have estimated would be to allow this net disbenefit to be split between the social impact (the first bullet) and the economic cost impact (the second bullet).

Briefly, the social impacts can be estimated from the following steps:

1. Estimate the change in the number of bus trips caused by the intervention being appraised.

2. Estimate what proportion of these would not take place if bus was not available.

3. Apply the recommended values per trip to this proportion.

This gives the social impact. Implicitly, the economic impact can be obtained by subtracting this value from the net impact given from the application of the WebTAG version of the rule of a half.

A separate note has been produced, providing detailed guidance on the application of these three steps. It includes a worked example.

4.6.3 Use of alternative benefit estimation methods

As noted above, the WebTAG implementation of the rule of a half does not allow us to claim any additional benefits using the values for the social benefit per trip that we have estimated. This begs the question whether there are alternative methods of benefit estimation that would allow additional benefits to be claimed.

This is part of a broader question of how to incorporate alternative-specific constants in benefit estimation (since it is the alternative-specific constant for the “not go” alternative that gives us our value for the social benefit).

[119] The terminology can get confusing here. As part of the changes to WebTAG that became definitive in August 2012, impacts relating to the generalised cost of travel for non-business travellers now appear in the “Social” (instead of “Economy”) section of the Appraisal Summary Table (http://www.dft.gov.uk/webtag/documents/project-manager/unit2.7.2.php). However, to avoid confusion with the social values we have estimated in our work we refer to all generalised cost-related impacts as “economic”.

There are alternatives to the WebTAG version of the rule of a half that can be used to calculate user benefits. This includes methods where alternative-specific constants don't simply cancel out because they take the same value in the do-minimum and do-something scenarios.

This is discussed further in a separate note about benefit appraisal with discrete choice models. These methods would require further investigation before their use could become part of formal guidance.

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Appendices

Appendix A. List of reviewed literature

A.1. Papers

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Appendix B. Glossary

ADL	Activities of Daily Living
BAME	Black, Asian and minority ethnic
BMRB	British Market Research Bureau
CBA	Cost Benefit Analysis
CBT	Campaign for Better Transport
CRSP	Centre for Research in Social Policy
CfTS	Centre for Transport Studies
CTS	Centre for Transport Studies
CV	Contingent Variation
DPTAC	Disabled Persons Transport Advisory Committee
ELSA	English Longitudinal Study of Ageing
GP	General Practitioners
IMD	Index of Multiple Deprivation
IS	Income Support
ITS	Institute of Transport Studies
JSA	Jobseeker's Allowance
LSOA	Lower Super Output Area
MCA	Multi Criteria Analysis
NET	Nottingham Express Transit tram service
NHS	National Health Service
NTS	National Travel Survey
ONS	Office for National Statistics
OPCS	Office of Population Censuses and Surveys
PCT	Primary Care Trust
PTEG	Passenger Transport Executive Groups
RNIB	Royal National Institute for Blind People
SDI	Social and Distributional Impact
SEU	Social Exclusion Unit
SP	Stated Preference
SPARC	Strategic Promotion of Ageing Research Capacity
TEV	Total Economic Value
WTA	Willingness to Accept
WTP	Willingness to Pay

Appendix C. Summary of individual focus groups

C.1. Liverpool (Speke) – unemployed

All participants were unemployed however it would seem that most participants were not actively seeking employment. Participants regularly used the bus for shopping and socialising purposes with females tending to make more trips. Those group members that were previously employed did rely upon the bus for commuting trips.

Participants were asked to consider the benefits of travelling by bus and there was a general consensus that bus travel provided participants with a realistic travel option, in addition links to train stations and the frequent radial routes into the city centre were also felt to be positive aspects.

When asked to consider the negative aspects of bus travel group members reported that orbital services tended to be unreliable and infrequent. In addition, travelling to the hospital was felt to be particularly difficult.

'Getting to Liverpool town centre is not a problem but getting to say the hospital isn't.'

The lack of space on the bus was cited as a negative aspect of travel, particularly if passengers were travelling with a baby. Group members reported that they often had to wait for another bus service if the pram area was already full.

'I've got a young baby 5 months old so if there's too many prams already on you've got to wait there for another bus and you could be waiting, 10, 20 minutes just for another bus to come.'

Travelling on Sundays or Bank Holidays was considered to be particularly difficult as services did not operate or were less frequent. Other negative aspects of bus travel included services not arriving at the time specified in the timetable and the antisocial behaviour of other passengers. Furthermore, group members reported that they disliked travelling on bus services with school children with some participants avoiding travelling during 3pm and 5pm.

'You end up waiting for half an hour something like that for a bus if you want to go anywhere.'

'You wait for 20 minutes and then four buses turn up at the same time.'

The behaviour of bus drivers was also cited as a negative aspect of bus travel, participants reported that they often drove off before elderly passengers had managed to sit down.

A small number of participants reported that the late arrival of a bus service had affected them when travelling to work or when trying to interchange onto a bus or rail service, however they had still been able to make their journey albeit later than as planned. In addition to this, group members recalled when heavy snow affected bus travel and participants relied upon making shorter journeys on foot.

Participants reported that they would be significantly affected if their bus service did not exist suggesting that they would travel on foot, by bike, train or taxi, or would arrange a lift instead. A small number felt that it would increase their overall transport costs as they would have to pay for taxis or contribute towards the cost of petrol when receiving a lift.

'You'd have to think about how much money you'd have to spend on taxis or if you're going to pay someone petrol money just to take you somewhere. So it would just slow down, you'd end up being a hermit basically.'

Participants also reported that it would difficult to apply for jobs and this could cause problems with the job centre.

'You couldn't apply for another job further away if there's no transport.'

It would seem that for the majority of participants overall travel horizons would reduce as they could only travel to destinations that could be reached on foot with group members reporting that they would save taxi travel for important trips, such as travelling to the hospital. A small number felt that if the bus did not exist they would have to move closer to a train station.

Participants were talked through a series of scenarios and were then asked what they would do in these situations.

Walking to the Bus Stop

All participants lived with a five minute walk for their local bus stop and were satisfied with the distance.

'In Speke there's a bus stop on every corner.'

A walk which was fifteen minutes longer was generally considered to be unacceptable, particularly in bad weather. Twenty minutes was considered too far to walk to the bus stop with group members reporting *'that you might as well walk the whole way'.*

A number of group members reported that they would look to use a different mode of transport if the walk to the bus stop was greater than twenty minutes such as cycling or walking to the train station.

Time from Bus Stop to destination

Participants found it difficult to answer this question as they did not make a regular journey such as commuting therefore the time taken from the bus stop varied depending upon the journey purpose.

Participants could travel for between ten to thirty minutes depending upon the journey purpose however group members did feel that thirty minutes was the maximum walk time before an alternative bus route or mode would be considered.

Bus frequency

Most participants used a frequent bus service when travelling into Liverpool city centre with services arriving every ten minutes. Group members noted that less direct services were every half an hour. Generally participants were satisfied with the level of service, however it was noted that services were unreliable with a number of buses arriving at the bus stop at the same time. In addition, a small number noted that the frequency had increased over the last couple of years.

When asked how they would behave if their bus only arrived every hour it would seem that a number of participants would consider using different modes to travel, depending upon the journey being made. Those participants that would still travel by bus reported that they would arrive earlier at the bus stop and factor in an even greater delay time into their overall journey to cater for the bus not arriving at the specified time. Furthermore participants were concerned that they would be unable to board the bus as an hourly service would result in overcrowding.

Journey Time

Participants' reported that their journeys could often take fifty minutes or longer depending upon the service used. Group members did report that express services were available however these services did not stop close to their home and were more expensive.

Generally participants were accepting of travelling for longer as they would have no other option but to make the journey.

'I'd rather be sat on a bus for 10 minutes longer than standing outside.'

Cost of Travel

Participants usually purchase day saver type tickets when travelling by bus which can cost between £3.90 and £4.60. In addition to this, cost increases tended to be a regular occurrence and were reluctantly accepted.

An increase of a £1 (depending upon ticket type) may result in a change of travel behaviour however it was noted that for some trips, they would still require to travel by bus.

SP1 - commuting

Participants were asked to consider what their alternative would be to the bus when commuting. Once identified, each participant was given a SP game which was relevant to their alternative form of transport and was then asked to consider the information. All participants could understand that the SP was describing two modes of transport for the same journey. Participants then completed the form and the results are set out below.

'Basically giving you the times, giving you the option whether to get a lift, time of buses and prices and stuff.'

Issues raised for this game centred on participants' lack of regular trips such as commuting or job hunting which made it difficult to make a comparison between travel modes as the journey purpose was unspecified. Participants were asked to consider their regular journeys however these tended to vary each week. It was suggested that it would be easier to complete if participants were given more details of the specific trip they needed to consider.

'It would be better if they would give you where you were going as well.'

SP1 – non-commuting

Participants found it difficult at first to calculate the number of trips they had made in the previous week for non work purposes. In addition, group members were not always making round trips as they may use a different form of transport to return such as travel by bus to the supermarket and then return by taxi. Participants may also be making complex journeys using several bus services to make the journey in one direction and perhaps using less to return home on.

'What if on the same journey you've got two buses there and two buses back do you just count them as one bus?'

Participants were asked to complete the form with no explanation and the majority were able to do so with little assistance.

SP2

To complete the scenarios, participants were asked to imagine that the local council is faced with having to make cuts to services and/or increase council taxes. Group members were then given a pack of different scenarios and were asked to put each scenario in order with the intervention that they would least like to occur at the top. Participants understood the task.

To finish the exercise, participants were asked to consider what measures they would like to see introduced to improve bus travel. Increasing the amount of space, improving the driver's customer service, providing school buses so that school children did not need to travel on public buses and increasing the levels of cleanliness were all suggested. Introducing measures to make the journey more reliable, increasing the frequency particularly in the evening and at weekends and reducing fares were also put forward. In addition, participants suggested that bus conductors would reduce overall journey times as the driver would not have to deal with taking bus fares.

C.2. Liverpool (Speke) – employed

All participants were employed and were heavily reliant upon the bus for commuting, travelling on work purposes, socialising, visiting the gym and shopping. The majority of group members did not have access to a car or could not drive.

'I use buses constantly most days, and I don't drive'

Participants were asked to consider the benefits of travelling by bus and there was a general consensus that bus travel was cheap, especially when using season tickets or day savers. Other benefits included that it was less stressful than driving and provided a better alternative to walking, especially in bad weather. Participants that lived close to high frequency bus corridors also reported that their service was reliable and frequent.

'One of the benefits as well is if you buy a Day Rider because that could be cheaper again can't it, or your weekly bus pass, or monthly. It does save you quite a bit of money doesn't it?'

When asked to consider the negative aspects of bus travel, the antisocial behaviour of other bus passengers was frequently cited by participants. Group members reported that they disliked travelling on bus services with school children and it was suggested that there should be a separate school bus. Participants reported that school children often use bad language and listened to music very loudly through their headphones. A small number also reported that school children smoked cigarettes and marijuana on the bus. Interestingly, it would seem that group members would avoid confrontation as they were concerned of the repercussions of challenging a fellow passenger for bad language or listening to music too loud.

'You do feel pretty vulnerable saying do you mind not because you'd just get laughed at wouldn't you?'

The behaviour of bus drivers was also cited as a negative aspect of bus travel, participants reported that they often drove too fast and occasionally took short cuts if they were not running on time. A number of group members reported that there were occasions when they could not travel because the driver was unable to provide change for £10 and £20 notes, a small number reported that when this happened they would get on the bus anyway.

'I just walk on. It's not my fault they haven't got change.'

'I just end up sitting down like, I've got to make that journey; it's your job isn't it.'

Travelling on Sundays or in the evening was considered to be particularly difficult as services were unreliable and less frequent. Other negative aspects of bus travel included not being able to use season tickets on all bus services, indirect bus routes which increase the overall journey time, services not arriving at the time specified in the timetable, waiting at the bus stop and the lack of bus shelters. In addition, there was a general consensus that bus travel was often unreliable and participants factored in potential delays into their overall journey time.

'When you're planning your journey you need to add half an hour extra.'

Participants could recall a number of incidents where they had missed their bus, however they had still been able to make their journey albeit slightly later than planned. Bus services were often delayed due to congestion or could be diverted; however it would seem that participants were still able to travel.

'When you've been working nights and you're coming out and you want to get home, and you're missing your buses. They just don't want to turn up; they just come when they want.'

Participants reported that they would be significantly affected if their bus service did not exist. In order to commute to work participants would look for an alternative form of transport with group members suggesting that they would travel by bike, train or taxi, or would arrange a lift with a colleague. A small number felt that they may have to consider looking for employment closer to home, move house or buy a car in order to travel to work.

'I'd probably get a job closer to Speke in a factory.'

'It would be murder wouldn't it if there were no buses!'

Group members that reported that they would travel by taxi were concerned that they would spend more on transport costs.

'It probably wouldn't be worth going to work after you'd spent out on taxis and all that.'

It would seem that for the majority of participants overall travel horizons would reduce as they could only travel to destinations that could be reached on foot. Furthermore, it was also noted that greater planning would be required to determine how they would travel to reach a destination. A small number reported that they would cycle more or rely upon family or friends for lifts.

Participants were talked through a series of scenarios and were then asked what they would do in these situations.

Walking to the Bus Stop

All participants lived with a five minute walk for their local bus stop. Generally group members were satisfied with the distance however a small number reported that they would prefer it if their bus stop was closer.

A walk which was ten minutes or fifteen minutes longer was generally considered to be acceptable however twenty minutes was considered too far to walk to the bus stop. Group members reported that they would have to leave their home earlier to make their journey to work and a small number suggested that they may run to the bus stop.

Waiting at the Bus Stop

The wait time at the bus stop varied across the group, depending upon the service used, time of travel and also if travelling on a Sunday. Generally participants would arrive at the bus stop earlier than the timetabled time and would also wait for longer on a Sunday as services were less frequent and were also perceived to be less reliable.

A longer wait at the bus stop was considered to be unacceptable particularly in bad weather. If the bus service was unreliable, there were concerns that even more time would have to be factored into their overall journey to cater for any potential delays.

A twenty minute wait time was considered to be unacceptable although group members reported that this could often be a regular occurrence.

Time from Bus Stop

Participants usually did not have far to travel once leaving the bus and it would seem that the maximum walk time was ten minutes. Group members were less concerned with a greater walk time once leaving the bus as this aspect of the journey was the most reliable.

Bus frequency

Most participants travelled on a frequent bus service using services which arrived between every six to twenty minutes. Participants did report that services could be unreliable with three buses arriving at once and it would seem that the majority of group members tended to factor in the likelihood of the bus not arriving at the allocated time into their overall journey time.

When asked how they would behave if their bus only arrived every hour it would seem that the majority would arrive earlier at the bus stop and factor in an even greater delay time into their overall journey to cater for the bus not arriving at the specified time. A frequency of less than an hour was deemed to be completely unacceptable with the majority of participants reporting that they would travel using a different mode of transport.

Journey Time

Participants' journey time on the bus varied depending upon the destination, time of travel or the day of the week the journey is made. Generally participants were accepting of travelling for longer as they would have no other option but to make the journey.

Cost of Travel

This question was difficult to ask as participants tended to purchase a variety of different season tickets or day savers, furthermore fares varied between the different bus operators. It would seem that any increase was considered negatively however an increase of a £1 (depending upon ticket type) may result in a change of travel behaviour.

SP1- commute

Participants were asked to consider what their alternative would be to the bus when commuting. Once identified, each participant was given a SP game which was relevant to their alternative form of transport and was then asked to consider the information. All participants could understand that the SP was describing two modes of transport for the same journey.

An issue raised for this game was when a participant was unaware of the daily cost of travel as they usually purchased a season ticket.

SP1 – non-commute

Participants found it difficult at first to calculate the number of trips they had made in the previous week for non work purposes. In addition, group members were not always making round trips as they may use a different form of transport to return such as travel by bus to the supermarket and then return by taxi. Participants may also be making complex journeys using several bus services to make the journey in one direction and perhaps using less to return home on.

Participants were asked to complete the form with no explanation and the majority were able to do so. A number of participants did not make any non work bus trips so did not complete the form. A small number ticked the different options rather than state an actual number, whilst one participant did not understand what was asked of them until a fellow group member explained it to them.

SP2

To complete the scenarios, participants were asked to imagine that the local council is faced with having to make cuts to services and/or increase council taxes. Group members were then given a pack of different scenarios and were asked to put each scenario in order with the intervention that they would least like to occur at the top. Participants understood the task.

To finish the exercise, participants were asked to consider if they were in charge of improving bus services what single measure would they like to introduce. The majority of suggestions tended to be associated with addressing antisocial behaviour by either not allowing children onto the bus or stopping people from listening to music loudly on earphones. In addition, it was suggested that bus conductors would reduce overall journey times as the driver would not have to deal with taking bus fares. Introducing measures to make the journey more reliable, increasing the frequency particularly in the evening and at weekends and reducing fares was also suggested.

C.3. Shrewsbury – over 60s

All participants were over 60s and retired. They were all heavily reliant on the bus service for shopping, leisure trips and visiting friends and families. The majority of participants did not have access to a car.

'I use the buses almost every day I'm totally dependent on them'

'I come in about three times a week mainly for shopping and my husband actually comes in every day and then walks back home, just for leisure'

Participants were asked to consider the benefits of travelling by bus and there was a general consensus that the service was reliable in most instances. This was especially true for participants that lived close to high frequency corridors.

'I come in from Montford Bridge and the service is the best service I've ever been anywhere. It runs every half an hour it is totally reliable and the quality of drivers is excellent in every way'

Participants also mentioned that long distance services were just as good, if not better than local services for frequency and reliability.

'There are also other services which are excellent here. National Express can get people to ferry ports or airports with an excellent service.'

Other benefits of buses were quality of drivers and good disabled access (especially on the Arriva buses).

When asked to consider the negative aspects of the bus service, the main dissatisfaction was that the services stopped too early in the evening (sometimes as early as 5.40pm) and that a Sunday service was non-existent for all participants. Group members mentioned that this restricted their access into Shrewsbury and was just as limiting for students who may want to go into towns on evenings and Sundays.

'They stop them altogether on Sundays so for anyone who hasn't got access to a car they simply can't get into Shrewsbury because you're 13 miles from a station and you're just absolutely stumped.'

'Years ago there was nothing open [on Sundays] and all the buses were running. Now everything is open and there's no buses'

Another concern was that the prohibitive and confusing cost of the bus service. Group members discussed the current status where there is a standard fare whether you travel for one stop or 3 stops and no return fares. Discussions also revolved around the fact that bus passes did not cover a wide enough geographical spread and that they could only be used after 9.30am. Comparisons were made to London and other European countries where group members perceived cost and access to be better.

'I go to Bulgaria sometimes and there, bus service is excellent and I can tell you it costs you roughly about £5 to do 300 miles. So your figure of £4 for about 200 yards is a dreadful indictment of the English system.'

'It seems to me extremely unfair that in London you can travel free if you're over 60 on all transport for a huge area'

Other negative aspects of the bus service were the timetables which were perceived to be too small to read, not easy to understand and out of date. Group members also reflected on the connectivity, or lack of connectivity in this case of local buses with longer distance service such as National Express.

'It would be a knife edge whether you would get the National Express to London with my bus so I think the local buses should tie in with these services.'

Participants could recall a number of instances where they had missed their bus and in most cases, they had walked to their destination. Bus services were often delayed or cancelled at short notice.

If bus services were removed, most people would walk but a lot was dependent on the weather, the distance from Shrewsbury and whether they were fit enough to walk into Shrewsbury and walk back with shopping bags.

'If push comes to shove, I probably could walk but sometimes I do get arthritis in the knees so it would be quite difficult'

Some group members had cars but were conscious of congestion in Shrewsbury and apprehensive about the cost of petrol and how expensive this would be for them. Some mentioned that they would be willing to take the trains as the latter had discounted tickets but this was not always an available option.

'I could use the car. I do have the option. It is saving me a fortune in petrol by being able to get that service.'

For all group members however, the most significant change would be that they would either make fewer trips or not make certain trips at all. Group members reported that they would make more local trips. But, this had limitations as some local shops were still too far to walk, were significantly more expensive and did not have a variety of goods.

'We've got a very good Co-Op and it is very good but it hasn't got the variety of Marks & Spencer. You could certainly get all the basics but you couldn't get anything exciting.'

Ultimately, for many, this would lead to isolation as it would only limit trips to essential ones. Group members reported that they would miss out on the social aspects linked to having a regular and reliable bus service; that is, meeting friends on the bus, having quality time with their family or attending social meetings and evening classes. Not having a bus service would end up dividing places and communities up.

'I would hardly come to Shrewsbury, especially if I'm coming for the sake of leisure. I have got a car but then there's the expense. I met a friend today on the bus so it's a very social thing really the bus. I've often found it's a social connection.'

'I've got relations in Bilgrest and she's been ill lately so unless the bus service was there I couldn't go.'

'I would probably pop up to New Town or Welshpool which are closer or not bother really. I'd love to come to Shrewsbury for a walk along the river.'

'My grandson lives at Ponsbury and he's separated but he has his little girl every weekend and of course instead of now being able to keep her until Sunday he has to fetch her back on the Saturday night ready for school on a Monday morning as there's no Sunday service.'

Further, group members were convinced that removing bus services would quite rapidly see the town centre dying away as the only people sustaining the businesses during the day were older people and students.

'If you go into this town in the middle of the day it's older people and students. That's it. Once you take the older people out you can say well middle of the day you've got the students and the rest of the day it will empty.'

Participants were talked through a series of scenarios and were then asked what they would do in these situations.

Walking to the bus stop

Most participants lived within five minutes walk, if not closer, to their local bus stop. Generally, group members were happy with the distance.

A walk which was ten or fifteen minutes longer was generally considered to be acceptable. However, although some group members were happy with 20 minutes, this was generally considered too long, especially if they had to carry shopping bags. An acceptable distance was also heavily reliant on the conditions of the person. Group members said that whilst most of them could walk 20 minutes at the moment, they were not sure they would be able to as they became less able physically. 20 minutes was also considered too long a distance in wintry conditions. A few participants said in this situation, they wouldn't make the trip.

'20 minutes walk to the bus getting to town would be fine I think, but going back with shopping would be a problem.'

'If it's minus five degrees outside you're not going to walk 20 minutes.'

Time from stop

Participants in Shrewsbury did not have to travel far to catch a bus back home from town; the distance was generally less than 5 minutes walk. Once again, while the general consensus was that an additional 10 or fifteen minutes would be acceptable, this was heavily reliant on the amount of shopping they were carrying back with them.

Bus frequency

Most participants travelled on a frequent bus service of 15 minutes or 30 minutes. Only two participants had a current frequency of every two hours. All group members reported having no late evening service and no Sunday service.

If the frequency was reduced to every hour, all group members suggested that they would still carry on with most of their trips but would have to plan more and check bus timetables to make sure they did not miss the bus.

A few group participants mentioned that they would rather the number of buses a day were spread out more to cover early morning and late evening.

'I'd prefer to have, of the five buses, one less during the middle of the day and one about 9.00pm so if I'm coming back from London I could get on the bus.'

A frequency of less than every hour was deemed unacceptable for most people.

Journey time

Journey times varied amongst group members. Some had a journey time of 15 minutes while others could last an hour. All were however generally happy with the journey time and did not want it to change.

Cost of travel

Group members considered the bus fare to be too expensive at present and reported that they would not pay anymore, even if that was just an additional 20 pence. Most participants said they would only make the essential trips such as hospital and doctor trips.

Interestingly however, one participant commented that if bus fares were increased, people would deem it unacceptable at first and would reduce the number of trips they made but over time, most people forget about the cost and would have to make certain trips and carry on their business as usual.

SP1 – non-commuting

Participants were given a SP game which outlined a bus service option and asked them to consider which alternative modes they would use in this situation.

None of the participants understood what was being asked of them. Most of them used crosses and ticks next to each bus service option (e.g. time to stop, cost, etc) and could not comprehend the rest. The group commented that too much information was being presented at the same time and in too complicated a manner. The group wanted more time to consider the options by taking the game home and assessing what was being asked.

SP2

To complete the scenarios, participants were asked to imagine that the Council is faced with having to make cuts to services and/or increase council taxes. Group members were then given different scenarios and asked to put each scenario in order with in terms of which intervention they would least like to see occur.

Participants struggled to rank the scenarios as they felt it did not reflect their perceptions of what should be done with the bus service. However, after much probing, they managed to complete the exercise.

Appendix D. Questionnaire

QDAY. **INTERVIEWER: ENTER DAY OF WEEK**

- ○ 1. Sunday
- ○ 2. Monday
- ○ 3. Tuesday
- ○ 4. Wednesday
- ○ 5. Thursday
- ○ 6. Friday
- ○ 7. Saturday

LOCATION. **INTERVIEWER: CODE FROM RQ**

- ○ 1. Perry Barr
- ○ 2. Shrewsbury urban
- ○ 3. Shrewsbury rural
- ○ 4. Liverpool

QAGE. **INTERVIEWER: CODE FROM RQ**

- ○ 1. 16-18 in education or training
- ○ 2. 19-24
- ○ 3. 25-39
- ○ 4. 40-59
- ○ 5. 60 or older

We are carrying out research for the Department for Transport into how public transport is valued. We would like to ask you some questions about the bus journeys you make. Any answer you give will be treated in confidence in accordance with the Code of Conduct of the Market Research Society. The questionnaire will take about 20 minutes and on completion you will receive a £10 voucher to thank you for your time.

Q3. Do you have access to a car which you can use as a driver or passenger?

- ○ 1. Yes, as driver
- ○ 2. Yes, as passenger
- ○ 3. No

Q4. Whereabouts do you live?

Please tick all that apply

- ☐ 1. Post Code
- ☐ 2. Street Name/Area

Q8. What kind of bus ticket do you usually get?

- ○ 1. Cash fare for each journey
- ○ 2. Day Ticket
- ○ 3. Weekly Ticket
- ○ 4. Monthly Ticket
- ○ 5. Annual Ticket
- ○ 6. Concessionary Travel Pass
- ○ 7. Other (Please specify)

Q5. About how much do you spend on bus fares per week?

£

Q6. How regularly do you travel by bus?

- ○ 1. 6 or 7 days a week
- ○ 2. 4 or 5 days a week

- 3. 2 or 3 days a week
- 4. One day a week

Q7. Do you use the bus to travel to or from a place of work or education/training?

- 1. Yes to work, 3 or more days a week
- 2. Yes to work, 1-2 days a week
- 3. Yes to education/training, 3 or more days a week
- 4. Yes to education/training, 1-2 days a week
- 5. No

We would now like you to tell us about the bus journeys you made in the last week, that is between #DAY#. For each journey, please tell us:

- The day of the week
- Where you were travelling to
- Whether a single or return journey
- The main journey purpose
- Fare type and fare (if cash)
- The one-way journey time on the bus and the time involved walking to and from bus stops
- The frequency of the bus service
- Whether you changed buses and if you could have used a car for the journey.

Thinking now about all the bus journeys you made last week, we would like to know what you would have done if you had not been able to travel by bus - say because the bus service became so expensive you couldn't really afford it. Please look again at all your journeys and state what you would do instead.

T1Q11A. Starting with your first stated journey, which was a #Q10D1# trip made on a #Q10A1# to #Q10B1#.

What would you have done if you had not been able to travel by bus? **READ OUT**

- 01. Get a lift
- 02. Drive self
- 03. Walk
- 04. Cycle
- 05. Train
- 06. Taxi
- 07. Travel to a different destination by bus

- ○ 08. Travel to a different destination but not by bus
- ○ 09. Combine with another journey
- ○ 10. Make the journey less frequently
- ○ 11. Change job
- ○ 12. Move house
- ○ 13. Not make the journey at all

T1Q11B. You said you would make this journey less frequently than you do currently. How many times do you currently make this journey per month?

[ ]

T1Q11C. And how many times would you make the journey per month if you were not able to travel by bus?

[ ]

T1Q11D. About how much would this cost per day/round trip?

£ [ ]

T1Q11E. Would the overall journey take longer or be shorter than your current bus journey?

IF LONGER OR SHORTER PROBE HOW MANY MINUTES

- ○ 1. About the same
- ○ 2. Longer than current (specify minutes)
  [ ]
- ○ 3. Shorter than current (specify minutes)
  [ ]

T1Q11F. What would the frequency be?

- ○ 1. Every 5 minutes
- ○ 2. Every 7 or 8 minutes
- ○ 3. Every 10 minutes
- ○ 4. Every 15 minutes
- ○ 5. Every 20 minutes
- ○ 6. Every 30 minutes
- ○ 7. Every hour
- ○ 8. Less than hourly
- ○ 9. Other (please specify)
  [ ]

T1Q11G. How much time would be spent getting to and from the train?

[ ] hrs [ ] mins

T1Q11G2. Would you need to change trains?

- 1. Yes
- 2. No

T1Q11H. What would the frequency be?

- 1. Every 5 minutes
- 2. Every 7 or 8 minutes
- 3. Every 10 minutes
- 4. Every 15 minutes
- 5. Every 20 minutes
- 6. Every 30 minutes
- 7. Every hour
- 8. Less than hourly
- 9. Other (please specify)

T1Q11I. How much time would be spent getting to and from the bus?

hrs mins

T1Q11I2. Would you need to change buses?

- 1. Yes
- 2. No

T1Q11I3. Which mode would you use?

- 1. Lift
- 2. Drive self
- 3. Walk
- 4. Cycle
- 5. Train
- 6. Taxi

T1Q11I4. About how much would this cost?

£ [ ] . [ ]

T1Q11I5. Would the overall journey take longer or be shorter than your current bus journey?

IF LONGER OR SHORTER PROBE HOW MANY MINUTES

- ○ 1. About the same
- ○ 2. Longer than current (specify minutes)
  [ ]
- ○ 3. Shorter than current (specify minutes)
  [ ]

T1Q11I6. What would the frequency be?

- ○ 1. Every 5 minutes
- ○ 2. Every 7 or 8 minutes
- ○ 3. Every 10 minutes
- ○ 4. Every 15 minutes
- ○ 5. Every 20 minutes
- ○ 6. Every 30 minutes
- ○ 7. Every hour
- ○ 8. Less than hourly
- ○ 9. Other (please specify)
  [ ]

T1Q11I7. How much time would be spent getting to and from the train?

[ ] hrs [ ] mins

T1Q11I8. Would you need to change trains?

- ○ 1. Yes
- ○ 2. No

T1Q11J. Would you have some idea where the job would be?

- 1. Yes
- 2. No

Please indicate how the journey would relate to your current bus journey.

T1Q11L. Would you make the journey by bus?

- 1. Yes
- 2. no

T1Q11M. Which mode would you use?

- 1. Car
- 2. Walk
- 3. Cycle
- 4. Train
- 5. Taxi

T1Q11N. Would the overall journey take longer or be shorter than your current journey? **IF LONGER OR SHORTER PROBE HOW MANY MINUTES**

- 1. About the same
- 2. Longer than current (specify minutes)
- 3. Shorter than current (specify minutes)

T1Q11O. About how much would this cost per day/round trip?

£ .

T1Q11P. Would the time getting to and from the #MODEB# be longer or be shorter than your current bus journey?

- 1. About the same
- 2. Longer than current (specify minutes)
- 3. Shorter than current (specify minutes)

T1Q11Q. What would the frequency be?

- 1. Every 5 minutes
- 2. Every 7 or 8 minutes
- 3. Every 10 minutes
- 4. Every 15 minutes
- 5. Every 20 minutes
- 6. Every 30 minutes
- 7. Every hour
- 8. Less than hourly
- 9. Other (please specify)

T1Q11Q2. Would you need to change #MODEB#?

- 1. Yes
- 2. No

T1Q11R. Would the pay in the different job be? **READ OUT**

- 1. About the same
- 2. More than current (specify £)
- 3. Less than current (specify £)

T1Q11S. Would you have some idea where you would move house to?

- 1. Yes
- 2. No

Please indicate how the journey would relate to your current bus journey.

T1Q11U. Would you make the journey by bus?

- 1. Yes
- 2. No

T1Q11V. Which mode would you use?

- 1. Car
- 2. Walk
- 3. Cycle
- 4. Train
- 5. Taxi

T1Q11W. Would the overall journey take longer or be shorter than your current journey? **IF LONGER OR SHORTER PROBE HOW MANY MINUTES**

- 1. About the same
- 2. Longer than current (specify minutes)
- 3. Shorter than current (specify minutes)

T1Q11X. About how much would this cost per day/round trip?

£

T1Q11Y. Would the time getting to and from the #MODET1C# be longer or be shorter than your current bus journey?

- 1. About the same
- 2. Longer than current (specify minutes)
- 3. Shorter than current (specify minutes)

T1Q11Z. What would the frequency be?

- 1. Every 5 minutes
- 2. Every 7 or 8 minutes

- 3. Every 10 minutes
- 4. Every 15 minutes
- 5. Every 20 minutes
- 6. Every 30 minutes
- 7. Every hour
- 8. Less than hourly
- 9. Other (please specify)

T1Q11Z2. Would you need to change #MODET1C#?

- 1. Yes
- 2. No

Q14A. Thinking about the #Q10D10# trip made on #DAY10# to #Q10B10#, suppose bus fares were to **increase**. For this journey, what **increase** in the cost of the bus ticket you used would be just sufficient to make you stop making that journey by bus?

Q15. Still thinking about that trip, suppose bus journey times, that is the time on the bus, got worse. What **increase** in bus journey times per journey would be just sufficient to make you stop making that journey by bus?

hrs mins

Q16. Still thinking about that trip, suppose the bus network changed so that it took longer to get to your bus. What **increase** in the amount of time getting to and from your buses would be just sufficient to make you stop making that journey by bus?

hrs mins

R1. We would now like you to think of bus services as a whole.

Imagine that the local council and bus company is faced with having to make cuts to services and/or increase council taxes. Please rank the following options in order of preference.

So which would you least like to see happen?

- 01. Route rationalisation leading to access time increases of 10 minutes (i.e. it takes you 10 minutes longer to get from home to the bus stop)
- 02. Route rationalisation leading to egress time increases of 10 minutes (i.e. it takes you 10 minutes longer to get from the bus stop to your final destination at the other end)
- 03. Day time frequencies reduced to every 60 minutes

- 04. Evening services withdrawn
- 05. Sunday services withdrawn
- 06. Increase in bus fares by 20p per single trip
- 07. Increase in bus fares by 50p per single trip
- 08. All cross-town buses terminate in town centre
- 09. Replacement of free concessionary travel for the elderly with 25p flat fare
- 10. Increase in council tax of £5/month
- 11. Increase in council tax of £15/month
- 12. Increase in council tax of £30/month
- 13. Household waste collected half as frequently as now
- 14. Street cleaning half of current levels
- 15. Removal of neighbourhood police support teams
- 16. Removal of free school meals
- 17. Car parking charges increased by 50%

Q18. Finally, we would like to ask some questions about yourself and your household. These are just to ensure we speak with a wide range of members of the public. Any information that might personally identify you will remain confidential to Accent.

How many cars are there in your household?

- 1. 0
- 2. 1
- 3. 2
- 4. 3 or more

Q19. Do you have a full driving licence?

- 1. yes
- 2. no

Q20. Is a car available for the journeys you have told us about?

- 1. Often/always
- 2. Sometimes
- 3. Rarely
- 4. Never

Q21. Please tell us your employment status.

- 1. Full time employment
- 2. Part time employment
- 3. Student
- 4. Retired
- 5. Seeking work
- 6. Homemaker/not seeking work

Q22. Approximately what is your annual household income (before deduction of tax but including any benefits)?

- 1. £10k or less
- 2. £11k-20k
- 3. £21-30K
- 4. £31k-40k
- 5. £41k-50k
- 6. £51k-60k
- 7. over £60k
- 8. Don't know
- 9. Do not wish to disclose

Q23. How many **other** adults (18 and over) are in your household?

- 1. 0
- 2. 1
- 3. 2
- 4. 3 or more

Q24. And how many children aged 5 or under?

- 1. 0
- 2. 1
- 3. 2
- 4. 3 or more

Q25. And how many children aged between 6 and 17?

- 1. 0
- 2. 1
- 3. 2
- 4. 3 or more

Q26. INTERVIWEWER: CODE GENDER

- 1. Male
- 2. Female

Q27. **INTERVIWEWER: CODE AGE GROUP OR ASK:**

And which of the following age groups are you in? **READ OUT**

- 01. 16-18
- 02. 19-25
- 03. 26-34
- 04. 35-44
- 05. 45-54
- 06. 55-59
- 07. 60-64
- 08. 65-69
- 09. 70-79
- 10. 80 or over

Q28. Do you consider yourself to have a disability? By disability we mean 'a physical, sensory of mental impairment or health problem which has a substantial and long term (over 12 months) adverse effect on your ability to carry out normal day-to-day activities'? **READ OUT**

Please tick all that apply

- ☐ 1. Yes - Physical / mobility impairment
- ☐ 2. Yes - Sensory impairment
- ☐ 3. Yes - Mental impairment
- ☐ 4. Yes - More than one of the above
- ☐ 5. No
- ☐ 6. Prefer not to say

Q29. Please state your ethnic group

- 1. White
- 2. Asian / Asian British
- 3. Black / African / Caribbean / Black British
- 4. Mixed or multiple ethnic groups
- 5. Any other ethnic group (please specify)
- 6. Prefer not to say

Appendix E. Stated preference scenarios

The following table sets out the 64 stated preference scenarios defined in the survey. Each respondent was offered a random selection of 8 from the 64.

In each scenario fare, in-vehicle time and access time are defined as increases over the current situation, and one of four headway levels (service frequency) is specified. The different headway levels are:

1 = daytime as now; evening as now, as reported in the questionnaire

2 = daytime every 20 mins; evening/sunday every 30 mins

3 = daytime every 20 mins; evening/sunday every 60 mins

4 = daytime every 30 mins; evening/sunday every 60 mins

Scenario	Fare increase (p)	In vehicle time increase (min)	Access time increase (min)	Headway level
1	0	10	10	3
2	100	0	10	3
3	20	15	10	1
4	100	5	15	4
5	150	15	20	4
6	80	15	15	2
7	40	10	0	1
8	100	0	5	4
9	20	10	15	3
10	20	5	0	2
11	100	5	0	2
12	40	5	20	1
13	40	15	10	3
14	100	15	5	2
15	150	10	10	3
16	60	10	5	4
17	80	0	20	3
18	40	15	5	2
19	100	15	10	4
20	60	0	15	2
21	0	0	0	1
22	60	10	5	1
23	20	15	5	4
24	100	10	20	2
25	40	10	0	4
26	150	10	10	2
27	0	10	10	2
28	100	10	0	4

Scenario	Fare increase (p)	In vehicle time increase (min)	Access time increase (min)	Headway level
29	100	10	15	3
30	80	15	0	2
31	150	0	0	4
32	80	5	10	1
33	0	15	0	4
34	60	15	0	3
35	150	5	5	3
36	20	10	20	2
37	20	15	10	4
38	150	5	5	2
39	100	5	20	1
40	100	15	10	1
41	150	15	0	1
42	40	0	10	2
43	60	15	20	3
44	100	10	0	1
45	20	0	5	1
46	40	5	15	4
47	80	10	5	1
48	100	15	5	3
49	80	15	0	3
50	100	5	0	3
51	60	5	10	4
52	0	15	20	4
53	20	5	0	3
54	100	15	5	1
55	100	15	10	2
56	60	15	0	2
57	0	5	5	2
58	150	15	15	1
59	60	5	10	1
60	0	15	15	1
61	80	10	5	4
62	40	15	5	3
63	80	5	10	4
64	0	5	5	3

Note: Variations are for a one-way bus journey

Appendix F. Selected cross-tabulations of trip data

Table F.1: Cross-tabulation of trip purpose against best alternative (% shown is % of column total)

			Not stated	Commute	Education or training	Shopping	Visiting friends/ relatives	Hospital	GP	Social /recreation	Personal business	Getting out and about	Employers business	TOTAL
Best Alternative	Get a lift	Count	0	90	83	29	30	4	4	16	15	2	0	273
		%	.0%	18.0%	25.5%	6.4%	12.7%	19.0%	28.6%	10.3%	14.0%	3.8%	.0%	14.6%
	Drive self	Count	1	36	10	33	11	2	1	4	1	1	0	100
		%	25.0%	7.2%	3.1%	7.3%	4.7%	9.5%	7.1%	2.6%	.9%	1.9%	.0%	5.4%
	Walk	Count	2	128	84	138	68	4	5	51	41	15	1	537
		%	50.0%	25.7%	25.8%	30.4%	28.8%	19.0%	35.7%	32.9%	38.3%	28.8%	100.0%	28.7%
	Cycle	Count	0	36	17	10	19	0	0	6	6	3	0	97
		%	.0%	7.2%	5.2%	2.2%	8.1%	.0%	.0%	3.9%	5.6%	5.8%	.0%	5.2%
	Train	Count	0	55	42	43	26	1	0	21	6	8	0	202
		%	.0%	11.0%	12.9%	9.5%	11.0%	4.8%	.0%	13.5%	5.6%	15.4%	.0%	10.8%
	Taxi	Count	0	113	47	49	30	9	2	10	21	6	0	287
		%	.0%	22.6%	14.4%	10.8%	12.7%	42.9%	14.3%	6.5%	19.6%	11.5%	.0%	15.4%
	Diff. destination (bus)	Count	1	6	6	7	2	0	1	3	2	0	0	28
		%	25.0%	1.2%	1.8%	1.5%	.8%	.0%	7.1%	1.9%	1.9%	.0%	.0%	1.5%
	Diff. destination (not bus)	Count	0	1	0	2	0	0	0	0	0	0	0	3
		%	.0%	.2%	.0%	.4%	.0%	.0%	.0%	.0%	.0%	.0%	.0%	.2%
	Combine with another journey	Count	0	0	3	0	0	0	0	0	0	0	0	3
		%	.0%	.0%	.9%	.0%	.0%	.0%	.0%	.0%	.0%	.0%	.0%	.2%
	Go less frequently	Count	0	1	0	3	2	0	0	0	0	1	0	7
		%	.0%	.2%	.0%	.7%	.8%	.0%	.0%	.0%	.0%	1.9%	.0%	.4%
	Change job	Count	0	17	0	0	0	0	0	0	0	0	0	17
		%	.0%	3.4%	.0%	.0%	.0%	.0%	.0%	.0%	.0%	.0%	.0%	.9%
	Not make the journey at all	Count	0	16	34	140	48	1	1	44	15	16	0	315
		%	.0%	3.2%	10.4%	30.8%	20.3%	4.8%	7.1%	28.4%	14.0%	30.8%	.0%	16.9%
Total		Count	4	499	326	454	236	21	14	155	107	52	1	1869
		%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Table F.2: Cross-tabulation of household income against best alternative (% shown is % of column total)

			£10k or less	£11k-20k	£21-30K	£31k-40k	£41k-50k	£51k-60k	Over £60k	Don't know	Do not wish to disclose	TOTAL
Best Alternative	Get a lift	Count	44	60	91	25	27	11	7	7	1	273
		%	10.7%	13.6%	20.3%	19.8%	10.2%	23.4%	17.5%	11.1%	3.7%	14.6%
	Drive self	Count	9	21	27	8	20	1	9	0	5	100
		%	2.2%	4.8%	6.0%	6.3%	7.5%	2.1%	22.5%	.0%	18.5%	5.4%
	Walk	Count	137	147	101	31	69	16	4	23	9	537
		%	33.2%	33.4%	22.5%	24.6%	26.0%	34.0%	10.0%	36.5%	33.3%	28.7%
	Cycle	Count	15	7	41	2	19	0	2	11	0	97
		%	3.6%	1.6%	9.2%	1.6%	7.2%	.0%	5.0%	17.5%	.0%	5.2%
	Train	Count	35	38	72	17	22	7	2	8	1	202
		%	8.5%	8.6%	16.1%	13.5%	8.3%	14.9%	5.0%	12.7%	3.7%	10.8%
	Taxi	Count	58	84	58	14	47	5	11	4	6	287
		%	14.0%	19.1%	12.9%	11.1%	17.7%	10.6%	27.5%	6.3%	22.2%	15.4%
	Diff. destination (bus)	Count	9	1	6	4	7	1	0	0	0	28
		%	2.2%	.2%	1.3%	3.2%	2.6%	2.1%	.0%	.0%	.0%	1.5%
	Diff. destination (not bus)	Count	0	1	1	1	0	0	0	0	0	3
		%	.0%	.2%	.2%	.8%	.0%	.0%	.0%	.0%	.0%	.2%
	Combine with another journey	Count	3	0	0	0	0	0	0	0	0	3
		%	.7%	.0%	.0%	.0%	.0%	.0%	.0%	.0%	.0%	.2%
	Go less frequently	Count	3	0	2	0	2	0	0	0	0	7
		%	.7%	.0%	.4%	.0%	.8%	.0%	.0%	.0%	.0%	.4%
	Change job	Count	0	5	5	7	0	0	0	0	0	17
		%	.0%	1.1%	1.1%	5.6%	.0%	.0%	.0%	.0%	.0%	.9%
	Not make the journey at all	Count	100	76	44	17	52	6	5	10	5	315
		%	24.2%	17.3%	9.8%	13.5%	19.6%	12.8%	12.5%	15.9%	18.5%	16.9%
Total		Count	413	440	448	126	265	47	40	63	27	1869
		%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Table F.3: Cross-tabulation of age against best alternative (% shown is % of column total)

			16-18 in education or training	19-24	25-39	40-59	60 or older	TOTAL
Best Alternative	Get a lift	Count	91	57	60	34	31	273
		%	25.8%	14.9%	17.1%	8.3%	8.3%	14.6%
	Drive self	Count	4	13	11	47	25	100
		%	1.1%	3.4%	3.1%	11.5%	6.7%	5.4%
	Walk	Count	94	91	119	138	95	537
		%	26.6%	23.8%	33.9%	33.7%	25.5%	28.7%
	Cycle	Count	23	37	7	22	8	97
		%	6.5%	9.7%	2.0%	5.4%	2.1%	5.2%
	Train	Count	40	67	46	26	23	202
		%	11.3%	17.5%	13.1%	6.4%	6.2%	10.8%
	Taxi	Count	48	75	61	64	39	287
		%	13.6%	19.6%	17.4%	15.6%	10.5%	15.4%
	Diff. destination (bus)	Count	6	7	0	6	9	28
		%	1.7%	1.8%	.0%	1.5%	2.4%	1.5%
	Diff. destination (not bus)	Count	0	0	1	0	2	3
		%	.0%	.0%	.3%	.0%	.5%	.2%
	Combine with another journey	Count	0	3	0	0	0	3
		%	.0%	.8%	.0%	.0%	.0%	.2%
	Go less frequently	Count	0	1	2	2	2	7
		%	.0%	.3%	.6%	.5%	.5%	.4%
	Change job	Count	0	0	2	15	0	17
		%	.0%	.0%	.6%	3.7%	.0%	.9%
	Not make the journey at all	Count	47	32	42	55	139	315
		%	13.3%	8.4%	12.0%	13.4%	37.3%	16.9%
Total		Count	353	383	351	409	373	1869
		%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%