A wider look at how travellers value the quality and quantity of travel time

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Abbreviations and acronyms

A/SA	agree/strongly agree
AKL/WLG	Auckland/Wellington
D/SD	disagree/strongly disagree
EC	estimated commute time (existing commute time)
IC	ideal commute time
MoT	Ministry of Transport (New Zealand)
NZTA	NZ Transport Agency
SGD	Singapore dollars
TTB	travel time budget
TTR	travel time reliability
TTS	travel time savings
VTTS	value of travel time savings
WTA	willingness-to-accept
WTP	willingness-to-pay

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Executive summary

Purpose

The purpose of this research project was to explore the 'utility' of travel time when commuting to work or tertiary study, for a variety of modes including driving a motor vehicle, walking, cycling and public transport. It involved a review of international literature and experience, and practical fieldwork (an online survey of about 500 commuters) to validate/verify the composition of any travel time utility and distribution of travel time saving valuations. The commute trip to work/study was chosen because it is a common, regular trip for many people and appears to be the most susceptible to encouragements to change mode use. The research was exploratory and the resources were limited: hence, some choice to limit the focus had to be made.

Literature review findings

Currently, economic appraisal in New Zealand and elsewhere assumes that travel time, irrespective of the mode used, has a disutility to the individual and a cost (in time and money) to be reduced or minimised. The value of travel time savings are generally acknowledged to vary by mode, trip purpose and time of day. Researchers have also found that value of travel time savings can vary by time budget/time spent; income; gender; household composition; age; reliability/variability of travel time, comfort or quality (eg comfort, convenience and security); and speed of transport mode.

We hypothesised that travel time and travel time savings could not be paramount for all travellers all of the time – otherwise, no one would shift from the quick option of driving a private vehicle to 'slow modes' such as walking, cycling or public transport. The literature review found evidence for an argument that travel time for different modes vary in their utility/disutility for travellers. Indeed, it may be that some people do not have positive utility for travel on any mode, but rather they have a lower disutility for one particular mode than for other modes.

The reviewed material suggested that there may be an 'ideal' or 'minimum' commute time for travel to work, which commuters may or may not consciously acknowledge. This commute time is generally greater than zero and varies from individual to individual, dependent on several possible factors including demographic characteristics, the perceived utility of the trip, activities conducted while travelling, attitudes, mode used and potentially habitual behaviour. Where an existing commute trip takes longer than the ideal commute time, it has some disutility (and hence travel time savings would have a positive value). Where the existing commute time matches or is less than the ideal commute time, the value of travel time savings could be said to be zero or negative. In these instances, a commuter may be a 'non-trader', unwilling to pay to change their commute time.

There were two distinctions in the value of travel time – the opportunity cost of time spent travelling (ie the trade-off between spending time travelling and the other activities that the traveller could do if they did not travel, or spent less time travelling) and the disutility or utility of the travel time itself (ie the activities conducted while travelling, which may or may not make the trip useful/worthwhile for the commuter). The review showed that doing an activity while travelling did not necessarily give the travel time a positive utility, as the traveller may simply have been making the best of a 'bad' situation; similarly, pure 'monochronic' travelling did not mean the travel time was wasted, nor that it had a disutility to the traveller.

To date, none of the studies reviewed here had been emulated in New Zealand. Our exploratory fieldwork was designed to investigate what aspects of these findings might be relevant in the New Zealand context and to expand on the findings of the overseas research.

The fieldwork

Data was collected via an online survey over a two-week period in early 2011. The targeted audience was Auckland and Wellington metropolitan area residents, aged 18 and over, who were either employed or studying on a full- or part-time basis. After data cleaning, we had 512 respondents as the core respondents for this study. Full-time workers formed 65% of the sample, with part-time workers and students (both full- and part-time) being 17% each. The respondents were evenly split between Auckland and Wellington, with 21% living in the inner city areas. The mode used most frequently for commuting to work in a typical week was driving (59%), while for commuting to study it was public transport (49%).

We were not overly concerned that the sample was potentially biased towards those most comfortable with the technology employed, given the exploratory nature of the study.

Highlights from the analysis and its implications for valuing travel time and travel time savings

The results of our research lead us to conclude that, from the perspective of *some* commuters, time spent travelling *by any mode* may not be all lost.

The median existing or estimated commute time (EC) for all commuters was 20 minutes. The median ideal commute time (IC) of 10 minutes identified by our sample meant that 68% of respondents spent more time commuting each day than they would have liked to. Their IC varied by mode (eg 79% of drivers and 76% of walkers chose an IC of <20 minutes, compared with 50% of public transport users) and by length of existing commute (eg 96% of those whose EC was <20 minutes preferred an IC of <20 minutes, compared with 73% of those whose EC was 20–29 minutes).

However, while they may have spent more time commuting than they wanted, very few (3%) specified a 'zero' ideal commute time. The best-fit linear regression equation suggested a minimum IC for the study population of 7–8 minutes, which was very close to the median IC of 10 minutes. (It should be noted that at the same time, most (79%) also said that if provided with the opportunity, they would teleport to work/study, thus altogether avoiding the time spent commuting).

Many respondents (40%) enjoyed the time spent commuting, which may partially explain why most did not want to eliminate their commute entirely. Walkers and cyclists were more likely to enjoy the time spent commuting than drivers or public transport users. Those who enjoyed their jobs were also much more likely to enjoy their commute, while people who did not enjoy their jobs also reported that they did not enjoy their commute. The reasons that people enjoyed their commute included it being a transition time, a time to think and/or relax (35%); being able to listen to radio/music; being out in the fresh air and/or enjoying the scenery; and for exercise. The primary reasons given for not enjoying the commute were the traffic (29%) and that it was a 'waste of time' (20%).

Enjoying their commute time did not mean that people used it to expand their work/study day. Rather, they spent the time on other activities: 93% of commuters who were 'polychronic' (undertaking one or more activities at the same time as travelling) were listening to music/radio, window gazing/people watching, and chatting with people around them. About one-fifth reported doing work or study activity, namely reading/writing/typing/thinking, while commuting.

When asked what they would do with the travel time savings from shortening their trip by half or doing away with their commuting trip (by teleporting), few respondents said they would use the time saved to do work or study, as has been supposed by some previous studies: less than 10% identified work or study as the sole activity they would undertake using the time saved, with about 15% including work or study in a list of two or more activities they would spend time on. The more common responses identified non-work/non-study activities such as sleeping, more time getting ready for work, eating breakfast, family time, household chores and reading.

There was a core of commuters for whom it would appear that travel time savings would have zero value: 12% selected to maintain their existing commute rather than halve it or teleport. They gave clear reasons for being non-traders, the most common being wanting to have transition or 'down time' between home and work, and having thinking or reading time.

The wide diversity of values for travel time savings across a range of services, as uncovered in the literature review and through our fieldwork, suggest it may be inappropriate to use a mean value for travel time savings in economic evaluation. Not only do our findings point to a non-zero value for the ideal commute time – which could also be described as a preference for a minimal commute time – indicating that reducing travel time for people whose commute is at or below this threshold may have no value to them, but we found evidence to suggest that the distribution around the 'mean' is skewed and/or non-linear. One-third (33%) of commuters were contented with their time spent commuting, enjoying it and finding it a useful transition between home and work. Fewer (19%) were classed as discontented: ie they did not enjoy their commute and thought the travel time was wasted. The amount of time they currently spent commuting and their ideal commute times offered some explanation as to their different status, in that the median EC of contented commuters was 20 minutes compared with a 15-minute IC (a mismatch of 5 minutes), while the median EC of discontented commuters was 30 minutes and their IC was 10 minutes – a mismatch of 20 minutes.

If travel time (and cost in the case of public transport) was held constant between driving and using public transport or driving and walking, 89% of the 263 regular drivers in our study were willing to change modes at least some of the time. Walking was definitely preferred to taking public transport. Hence, we did not find strong evidence, with respect to regular car commuters, to suggest that the 'endowment effect' was operating and, in fact, there were very few non-traders.

There was a very distinct propensity of respondents to report both their estimated commute time and their ideal commute time in 5-minute intervals. This could indicate that very small units of travel time savings (eg several seconds, or a minute or two) may be relatively meaningless to them, and hence should not be valued.

Current practice in executing stated preference surveys for national valuation of travel time and travel time savings does not consider that some/many people may want to travel, may value their travel time, and may choose to drive rather than walk or cycle, not because it is the quickest method of travel, but because they derive some utility from it (or, at the very least, experience less disutility on that mode over another). Furthermore, while respondents may choose in a stated preference experiment to reduce their commute travel time, our results indicate they may have a journey time threshold below which time savings have no value (and they will 'lose' their other perceived benefits). Stated preference surveys could explore this by including questions on time use and attitudes to it, as well as asking respondents to identify their ideal commute time, possibly by a given mode and trip purpose.

Hence, we conclude there is apparently much more variation (both random taste variation and variation systematically related to observed and attitudinal factors) across individuals than is currently

recognised and accommodated in official evaluations. There are also indications that there might be more thresholds and non-linearities in behaviour than are included in such analyses and appraisals. A core of commuters responding to our survey were very clear they had a minimum threshold time for their commute and were unwilling to go below this threshold or abandon their commute altogether. This raises the potential issue that travel time savings for commuters whose existing travel time is below a certain threshold are incorrectly being counted as positive benefits to a project, when their actual value might be zero or even negative.

Recommendations for further research

We consider further work to verify our exploratory research result is required to ascertain the existence and values of:

1 potential minimum travel time thresholds for commuting and other purposes

2 the effect of current travel time, particularly for the commute trip, on the value of proposed travel time savings

3 variations in travel time savings values due to random and systematic taste variations of individuals, particularly including how the value of travel time varies with the use of travel time.

We consider that it is likely such variations in value of travel time savings, and the inclusion of minimum thresholds of travel time for commuting, can be accommodated in conventional evaluation and appraisal frameworks.

Abstract

In the context of transport policy, travel time is widely treated in purely economic terms, with the key aim of 'saving' or reducing what is seen as unproductive travel time.

The current emphasis on travel time savings uses mean values for different modes, and assumes that people want to minimise (save) their travel time irrespective of what mode they use. Our work explored the possibility that some people value their travel time, particularly for commuting, and may not want to reduce it, irrespective of what mode they usually use. We examined a range of issues through data gathered from an online survey of approximately 500 Auckland- and Wellington-based commuters, including the following:

- Does the bulk of commuters' existing commute trip travel time lie above or below their 'ideal' commute travel time – what are the implications for the value used for travel time savings?
- How do people use the time they spend commuting and do they value this time? Even if they 'do nothing' on their commute trip, do commuters value it for its 'anti-activity' nature?
- Is how they value their commuting travel time related to the purpose for travel, their enjoyment of their current job or course of study, and/or to other attitudes about travel mode and the environment?

1 Overview

1.1 Background

In the context of transport policy (setting policy programmes, funding transport investment, evaluating the outcomes of such investment), travel time is widely treated in purely economic terms: the time devoted to travelling to a destination is considered as the 'price paid' for fulfilling the reason for getting to the destination; it is treated as 'unproductive time' and therefore to be minimised. Jain and Lyons (2008) observed that 'by interpreting travel time as a disutility or burden, transport policy has been driven by the goal of quicker journeys'.

Concerns about environmental sustainability, fuel shortages and public health (in the face of a growing obesity epidemic) have created a strong push towards implementing programmes to encourage slower modes (ie walking, cycling, and using public transport), among other things. However, investment decisions continue to focus on travel time savings (TTS). This situation clearly disadvantages any investment seeking to encourage modes other than the passenger car. Recognising that there may be different values for TTS provides the opportunity for policy makers, planners, and transport providers to promote particular travel situations/environments as the opportunity for activities (or anti-activities, such as the ability to rest while on the train, or have transition time on the bus).

The need for this research project became apparent when, in 2004, Land Transport New Zealand (now NZTA) and the Energy Efficiency and Conservation Authority commissioned the development of evaluation procedures and a guidance handbook for travel behaviour change programmes. This required an estimate of the benefits to a 'travel behaviour changer', who generally switches from using a car to walking, cycling or using public transport, all of which may require more travel time. A review of international and New Zealand material on the nature of the benefits to the behaviour changer revealed much conjecture and very little concrete evidence as to why people change their travel behaviour, or how to value it. If TTS were paramount for travellers, then logically no one would shift from driving a private vehicle to walking, cycling or using public transport. The Technical Working Group, along with the project team, surmised that people using modes other than private motor vehicle might value their time differently from car drivers.

For example, it may be that the shift to a different mode is due to:

- altruistic reasons (eg for the good of society and the environment)
- practical reasons (eg it is more cost effective, saves time, improves own health and well-being)
- the opportunity to use the time as 'equipped time' (Jain and Lyons 2008) or productive time (eg to use mobile technology to work, study, be in communication with others, or to read a book or newspaper)
- the individual's value of time is within the distribution of travel time values, which is represented by a mean value
- end-to-end travel times are comparable
- the opportunity to have 'time out' or 'transition time' (Jain and Lyons 2008) between one destination/activity and the next

- some combination of these.

In other words, travel time is productive time, and is not necessarily a cost that needs to be 'economised' or 'saved'.

The purpose of this research project was to explore the 'utility' of travel time, *when commuting to work or tertiary study*, for a variety of modes including vehicle driver, walking, cycling and public transport. It involved a review of international literature and experience, and practical fieldwork (an online survey of about 500 commuters) to validate/verify the composition of any travel time utility and distribution of their TTS valuations. The commute trip to work/study was chosen because it is a common, regular trip for many people and appears to be the most susceptible to encouragements to change mode use. The research was exploratory and the resources were limited: hence, some choice to limit the focus had to be made. The literature review occurred in 2010, while the fieldwork took place in early 2011, with the analysis completed during 2011.

Car passenger, as a mode, was not a significant focus in this study, as another NZTA research project focuses on valuing TTS for car passengers (Wallis and O'Fallon, in progress). In addition, Hensher (2008) examined the impact of car passengers on the valuation of car drivers' TTS.

The current emphasis on TTS incorporates mean values for different modes, and assumes that people want to minimise (save) their travel time irrespective of the mode they use. Our work explored the potential range of these values to ascertain the appropriateness of TTS. Some of the issues were as follows:

- Should TTS be included in evaluation for commuters whose existing travel time is below a certain threshold, such as ideal travel time or minimum travel time?
- Do the bulk of commuters' existing commute times lie above or below their ideal commute time – and what are the implications of this for the value used for TTS?
- Do walkers perceive more utility for their commute trips than car drivers (and hence a lower value of TTS?)
- Even if they 'do nothing' on their commute trip, do commuters value it for its 'anti-activity' nature?

This work built on exploratory work by the University of the West of England (eg Jain and Lyons 2008, Holley et al 2008, Holley et al (in press), Lyons and Holley 2007, Lyons and Urry 2005), which focused on the concept that 'travel time can be a gift rather than a burden' and that a potentially longer travel time, as often experienced when walking, cycling or using public transport, can have a positive utility, and on the work of Ory and Mokhtarian (2005), who argued that travel is not purely a means to an end, undertaken to participate in spatially separated activities. Rather, Ory and Mokhtarian suggested that:

> *... individuals have a positive utility both for travel itself (eg the sensation of motion and movement through space which travel provides) and for activities that can be conducted while travelling (eg listening to music, talking on the telephone).*

What they termed 'travel liking' was seen to have an important influence on the amount people actually travelled, their perceptions about the amount they travelled, and their desire to change that amount (eg to reduce car use). Other researchers (eg Laurier 2004, Watts 2007) also contributed to the discussion.

Given that New Zealand's transport investment funding currently focuses on economic growth and productivity through the easing of severe congestion, better use of existing capacity, providing more transport choices, reducing adverse environmental effects and contributing to positive health outcomes (NZ Government 2011), the possible weakness in valuing TTS as 'disutility' or 'burden' could be disadvantaging programmes and initiatives that encourage walking, cycling, car sharing and public transport use. Not fully understanding how car drivers value their travel time and any potential TTS also means that the efforts to support and/or change their behaviour may not be targeted to what would really make a difference to them.

1.2 Overview of methodology

The methodology utilised a combination of a literature review and an online survey of inner city and non-inner city residents in Auckland and Wellington to gather primary research data.

On completion of the survey data collection, we analysed the data in conjunction with the literature review findings. The results of our analysis are presented in this report, which has been externally reviewed and signed off by two peer reviewers and reviewed by our steering group.

1.3 Report structure

This report is structured as follows:

- Chapter 2 summarises the findings from our review of international and New Zealand-based research on utility of travel time.
- Chapter 3 considers the data collected from the online survey of Auckland and Wellington residents conducted for this project.
- Chapter 4 discusses the combined results of the various research strands and their implications for evaluation and appraisal, and outlines some ideas for further research.

2 Literature review: valuing travel time

2.1 Overview

The purpose of the literature review was to:

1 discuss the findings of studies where the usefulness (positive utility) of travel time or the disutility of TTS was specifically explored (section 2.3)

2 identify factors that may have an impact on the value of travel time and/or TTS, such as:

- habit, reference point theory and the endowment effect (section 2.4)
- comfort or quality associated with different modes (section 2.5)
- the arguments for and against the existence of a 'travel time budget' (section 2.6)
- satisfaction with existing commute time and current work/study (section 2.7)
- attitudes towards travel time, different modes, the environment and other factors (section 2.8).

To put the review in context, in section 2.2 we discuss how travel time is treated as a disutility in economic evaluation and modelling.

The literature review incorporated terms such as 'value of time'/'value of travel time'; 'travel time savings' (TTS); 'value of travel time savings' (VTTS); 'utility of travel time'; 'travel time budget' (TTB); 'productive travel time'/'productive time'; the 'gift of travel time'; 'equipped time', 'travel liking', and 'zero value of time'. The search incorporated English-language electronic databases (including TRIS Online, Google, Google Scholar, etc); transport-related websites; on-line bibliographies (such as Sage Journals Online, European Transport Conference (1999 onwards), Victoria Transport Policy Institute TDM Encyclopaedia); reference lists in documents/publications/reports; references held by our peer reviewers; and Pinnacle Research & Policy Ltd and Ian Wallis Associates' own archives of published and unpublished documents and reports. Within the search, we sought, among other things:

- transport-related material as the primary focus, but also recreational/tourism literature, social behavioural, and other disciplines as appropriate
- careful delineation of the definition and composition of any utility of travel time that was identified.

We intended to investigate in detail any practical experience/fieldwork that had been undertaken to explore the value of the utility of travel time to identify population segments/settings/trip purposes. However, we only found one example where such values had been derived (see the discussion in section 2.3).

We inspected more than 135 studies that related to the utility of travel time and TTS. Nearly half of them were excluded from detailed analysis for various reasons, which are described in appendix B under the heading 'Excluded studies'. Reference to some of these studies was subsequently included in the literature review to illustrate specific points.

The following literature review synthesises the findings of 80 studies. In addition, brief summaries of most studies are provided in appendix B under the headings of 'Reviews' and 'Empirical studies'.

2.2 Treatment of travel time as a disutility in economic evaluation and modelling

For the most part, analysis and modelling of travel demand treats travel as a 'derived demand' – ie mobility is caused by reasons outside the act of travelling itself, such as the desire to go from home to another activity at a different location. Users of the transport system are assumed to make conscious decisions based on a rational assessment of different available alternative modes of transport, and to want to minimise the financial costs of, and time spent, travelling to reach their destination/activity.

In economic appraisal, travel time is translated into a monetary value, which is usually varied by trip purpose (eg on employers' business, commuting to/from work), time of day (eg peak, shoulder, off-peak), location (eg metropolitan/city, town, rural), distance, mode and other attributes (eg Abrantes and Wardman 2011, NZTA 2010). Wardman et al (2007) and Börjesson (2010) found that the value of travel time and TTS for cyclists varied according to the type of facility offered (eg major/minor road with no cycle facilities; segregated cycle lanes; non-segregated on-road cycle lanes). The value of travel time for walking also varied depending on whether or not it was the main or primary mode for a trip, or if it was to access or egress a main mode (eg as part of a public transport trip or to walk from the car park to work/study) (Wardman et al 2007). In other instances, the value of travel time may vary by comfort factors, such as public transport user values which, in New Zealand's *Economic evaluation manual* (NZTA 2010), vary depending on whether an individual is seated or standing. Reliability of travel time (or travel time variability) has also been shown to impact on VTTS, and methods are being developed to embed values for reliability into VTTS (see, for example, Carrion-Madera and Levinson 2010, Li et al 2009). A current NZTA research programme is investigating the valuation of reliability by transport modes and trip purpose (eg freight, commuting and tourism).

National valuation studies to determine the value of travel time and TTS examine a variety of factors, but typically, time utility or the use of travel time is not one of them. For example, the most recent New Zealand valuation of travel time study in 2001 recognised that the commute trip to work was increasingly being used for work activities, and observed that this highlighted the difficulty of making a clear separation between work and non-work trip purposes. The issue was then set aside, as the use of stated preference methods for work commuting meant that 'information on work-related use of commuting time, or the diversion of commuter time savings to work/non-work purposes is not strictly relevant' (Beca et al 2002).

The European experience is similar. The latest Dutch national survey on the value of travel time and travel time reliability (like its predecessors, such as Hague Consulting Group 1990) did not include any questions or attributes to do with time utility, apart from recording the 'productive time during the trip' for employees travelling on business trips (de Jong et al 2004, Warffemius 2009). UK national value of travel time studies (the most recent was in 1997) included questions about the productive use of travel time by business rail travellers (Mackie et al 2003), while an earlier Swedish national valuation study measured productivity of business travel by private and company car, air and long-distance train (Algers et al 1996). Note that in these studies, business travel excluded commuting to or from work.

Most recently, national valuation studies in Switzerland (2006) and Norway (2008–2010) had the ability to segment by age, gender, income and day of the week, but collected no information on time use, even for business travellers (Axhausen et al 2008, Ramjerdi et al 2010).

With respect to investment in transport infrastructure and services, Eddington (2006) observed that economic appraisal has a particular view on VTTS, which perhaps begins to explain why time utility is not considered:

> *The benefit of a transport improvement with regard to time savings is the value of the time that becomes available to do things that could not be done whilst travelling, and for business this translates directly into a reduction in costs and/or an increase in output.*

Lyons et al (2007) observed that any travel time saved during the working day is viewed as a conversion of unproductive time to productive time, thereby realising an economic value. Travel time, irrespective of what mode is used, is considered as having a disutility to the individual:

> *Thus has travel time continued to been seen in mainstream transport studies as a 'cost' incurred by individuals and society as a means to enjoy the benefits of what is available at the destinations of journeys, whether that be employment, education, healthcare or leisure* (Lyons et al 2007).

Indeed, many have termed it 'wasted' time (eg Eddington 2006, Urry 2006, Lyons et al 2007, Schiefelbusch 2010). It was thought that such wasted time could be converted into 'productive' time through quicker journey times that permitted people to spend more time on other (preferred) activities. Amaoko-Tuffour and Martinez-Espineira (2008) pointed out that in this context, the value of travel time engenders the notion of opportunity cost: a traveller sacrifices not only monetary costs but also the opportunity of using the time in an alternative manner. That is, the time used travelling to and from a site could have been devoted to other endeavours, so the cost of time is the benefit of the next best alternative foregone. In the case of commuting, Mendes (2002) observed that economic evaluation assumes that the next best alternative use of time (ie the TTS) would be to spend it in increased productivity – meaning that workers would increase the amount of time they worked.

Mackie et al (2001b) argued that TTS potentially mattered to an individual because they would have (1) less travel, (2) more of other activities, (3) a change in their consumption pattern, and (4) a change in their activity schedule. If time spent in paid work was increased, then there was a potential change in the consumption level (due to increased income). If the sum of all these effects was positive, then there was a willingness-to-pay (WTP) to reduce or save travel time.

In another study, Jara-Diaz (2001) proved mathematically that VTTS was unlikely to be related to observed wage rate. He observed that the subjective VTTS, which is the value of doing something else instead of travel, was always equal to the value of travel time as a personal resource, minus the value of the marginal utility of travel. As a result of his findings, Jara-Diaz recommended further work to analyse what really lay behind the WTP to diminish activities like travel, particularly by exploring an individual's satisfaction with work/leisure and with their commute.

Both Mendes (2002) and Eddington (2006) contended that TTS would be *used* for travel to new leisure opportunities and lifestyle choices. That is, it:

- would not be saved
- would not be used for increasing working hours/productivity (thus its value was unlikely to be related to the average or marginal wage rate).

An empirical study by Fickling et al (2008) confirmed the propositions of Mendes and Eddington. Surveying 1660 UK business passengers travelling by rail, Fickling et al found that any TTS would mostly be used for personal activities rather than result in a business/employer 'productivity gain'.

Our fieldwork expanded on the Fickling et al study by including all commuting modes. Specifically, we explored what respondents would do with potential TTS if their commute time was reduced by half or if they chose to 'teleport' (travel instantly from home to work or study).

We also investigated the supposition of Jara-Diaz (2001) that the willingness (or not) to reduce travel time is related to commuters' satisfaction with their current job/study and/or with the time spent commuting to work (study/training), asking them to rate, on a 5-point Likert scale, their enjoyment of both.

2.3 The possible utility of travel time – or the disutility of travel time savings

Richardson (2003) set out to specifically investigate whether or not some travellers had what he called a 'zero value of time', ie whether or not they were willing to pay for reductions in the duration of their trip. A stated preference survey was completed by 2450 public transport and private mode users in Singapore. Each scenario contained a trade-off between two attributes across two transport options. From the results, the mean value of travel time was calculated as SGD $0.082/minute, while the range was from zero (14% of sample) to >SGD $0.20 (8% of the sample). The value of travel time varied by mode use: none of the private mode users had a zero value of time, while 23% of public transport users had zero value of travel time. It also varied by employment status: full-time or self-employed respondents were less likely to have zero value of travel time than those who were working part-time or were not in the employed workforce (eg housewives, students and the retired). In summary, a zero value of travel time was more likely for low-income earners, for females (who were also less likely to be employed and more likely to be on a low income), and for the young or old.

Using data collected for the 1999 German Mobidrive study of 5795 tours (ie journeys starting and ending at home) performed by 136 individuals in 66 Karlsruhe households, Cirillo and Axhausen (2004) developed several discrete choice models and found that not only did VTTS vary by tour types, trip purposes, time of day, and the time budgets/times spent, but about 10% of the population was interested in extending their travel time, especially during non-work (shopping or leisure) tours. Cirillo and Axhausen concluded that respondents had a zero or negative VTTS for those tours.

One possible explanation for a zero or low value of time may be that an individual has a low income and therefore prioritises their expenditure to consumable goods/services other than travel. This would explain some of Richardson's 2003 findings. However, some full-time or self-employed travellers in all four studies cited also had a zero value of travel time.

A second possible explanation is that travel time has a positive utility for at least some travellers. Ory and Mokhtarian (2005) suggested several reasons why travel (including, but not limited to automobile travel) might have a positive utility, including independence; physical exercise (and relatedly 'therapeutic value'); control; status; transition time (also referred to as buffer or escape time); exposure to the environment; scenery and amenities (may lead to longer trips); variety seeking; synergy (including the ability to be productive while travelling, eg working on the train); and adventure seeking. As they viewed it, these and other reasons may mean that travel is not 'strictly a cost to be minimised'

but that there may be some element of 'travel liking' for which empirically measured values could be derived.[1]

A Centre for Transport & Society and Centre for Mobilities Research (2007) project explored utility of travel time as part of a broader study exploring the concept of travel time budget (TTB is discussed in section 2.6). The researchers hypothesised that if travel time per individual per day was largely constant, then it was possible that the travel time *itself* had a utility to travellers. The positive utility of travel time was attributed to what an individual could do with the time, as well as to the 'experience and sensation of travel itself'. They used several different methodologies to explore this hypothesis. The primary focus was on *rail* travellers, including a large national rail passengers survey (with 26,221 responses) of how passengers used their time and how worthwhile they thought this was. They also used mobile ethnographies, a diary study, stakeholder interviews and focus groups. The researchers found that most rail passengers either made some use, or very worthwhile use, of their time travelling by train, suggesting that rail travel had positive utility for many travellers. Only 18% of passengers agreed with the statement that their travel time was wasted. The most common uses of travel time on the train were to read for leisure, window gazing/people watching, and working/studying. Business travellers were found to spend more time working/studying, while commuters read for leisure and non-working/non-commuting travellers window-gazed/people-watched. About half of the travellers were noted to 'equip' themselves with activities to do, particularly using electronic devices. In reporting on the rail survey, Lyons et al (2007) concluded:

> *While our evidence cannot substantiate a counter-argument, we have contested the argument that the focus of appraisal assumptions on the marginal savings in travel time are not challenged by some productive use of travel time.*

Lyons et al also highlighted the importance of researchers and other observers not interpreting utility from a simple description of the activity itself. For example, while they found that over 25% of rail passengers who spent most of their travel time reading for leisure considered their time use very worthwhile, more than 10% considered their time reading for leisure was wasted on the train. Clearly the opportunity for uninterrupted leisure-reading time was welcomed by some passengers, while for others it was a means to regain some sense of control over travel time or even just to kill time.

In addition to assessing whether there were personal and/or business/employer benefits arising from any TTS, Fickling et al (2008) estimated the degree of productive use of travel time by 1660 business rail passengers while travelling on the train, including assessing the productivity of work done on the train relative to work done at the workplace. They found that about 80% of business rail travellers spent some time in 'productive' (work-oriented) activities. In all, around 46% of the business travel time was allocated to work activities. Working travellers suggested that their productivity was 96–98% of what it would be had they done the same work in their office environment. Crowding was found to decrease the productivity level, but it still remained high even in the worst crowding conditions (eg all seats occupied and standing room only). Fickling et al's finding that productivity in the office and on the train was similar implied that there was no benefit in reducing train time, provided that TTS were used to increase working time in the office, and not converted to leisure time or other activities.

To put the findings of Lyons et al (2007) and Fickling et al (2008) in context, it should be noted that surface rail and London Underground trips comprised approximately 3% of all trips made in the UK in

1 The 'travel liking' concept is discussed further in section 2.8.

2009 (DfT 2009). In New Zealand, rail comprises less than 0.5% of all trips for any purpose (O'Fallon and Sullivan 2009). Hence, while perhaps important to rail, the results do not apply to the vast majority of the transport network users, either in the UK or New Zealand.

The careful repetition of national 'value of travel time' studies provides an opportunity to observe inter-temporal changes in the value of time, thus supplying further indication that some external factor(s) are affecting the value of travel time and VTTS. Tapley et al (2007) reported on a study that compared the values of travel time between two earlier Dutch national surveys conducted in 1988 and 1997. After allowing for income, socio-economic and other trip characteristics, the analysis revealed an overall trend decline in the value of travel time for commute, business and other trip purposes. Similarly, an investigation of national British value of time studies in 1985 and 1994 found an overall trend decline in the value of time. Tapley et al then analysed data collected as part of a 2006 value-of-time study, which took into account inflation, and found that the value of time derived was marginally lower than that of the 1994 dataset. Tapley et al concluded, with respect to the British and Dutch evidence, that the marginal disutility of travel time appeared to be falling, thus negating the declining marginal disutility of travel cost, with the net effect a 'constant or declining money value of time over time' (p5).

Börjesson (2010) analysed two key components of the value of travel time using data from 1994 and 2007 Swedish value-of-time surveys, where the 2007 questionnaire and survey methodology intentionally replicated the 1994 one. She found that the marginal disutility of travel time (itself composed of the direct disutility of time spent travelling and the opportunity cost of travel time) remained unchanged, while the marginal utility of cost reduction decreased as the income level increased. The net effect of this was that the real value of travel time remained stable at each real income level between the survey years (Börjesson et al 2009).

Various explanations have been proffered as to the causes of the trend decline (or constancy) in the monetary value of time, such as shorter working hours, the increased comfort of vehicles, improved motorway facilities, and/or the use of cell phones, laptops and other electronics while travelling (Tapley et al 2007). Abrantes and Wardman (2011) also suggested that travellers' resignation to congestion may be a factor.

Ettema and Verschuren (2007) explored the notion that 'multi-tasking' (ie undertaking another activity while travelling) by car users (both drivers and passengers) and train travellers affected their value of travel time. Their study also investigated how value of travel time was affected by travellers' attitudes toward multi-tasking. A total of 226 surveys, containing statements designed to measure respondents' multi-tasking factors and a stated preference exercise to establish their value of travel time, were completed by 164 car-based commuters and 62 train commuters in the Eindhoven region of the Netherlands. Their primary conclusions were as follows:

- Commuters' attitudes towards multi-tasking (measured based on responses to several attitude statements) influenced value of travel time, such that 'monochronic' commuters, who preferred simply to travel without undertaking any other activity simultaneously, had a higher value of travel time than 'polychronic' commuters, who preferred to multi-task.
- Commuters who listened to music had a lower value of travel time than those who did not listen.
- Commuters who read for work (not leisure) had a higher value of travel time than those who did not read, or who read for leisure.
- Differences in value of travel time also arose due to demographic characteristics of respondents,

most notably their age (ages <40 and 40–50 had higher value of travel time than other age groups); household composition (single with children had the highest value of travel time; married with children had a smaller value of travel time compared with households with no children) and income effect (those on the lowest income had a lower value of travel time).

Ettema and Verschuren (2007) provided illustrative values for value of travel time based on two types of commuters and their preference to multi-task or not, to read for work, and to listen to music, as shown in table 2.1.

Table 2.1 Value of time as influenced by presence/absence of multi-tasking (based on Ettema and Verschuren 2007)

	Value of travel time (in Euro/hour)			
Commuter type	**Base value**	**Monochronic**	**Multi-tasking – listen to music**	**Multi-tasking – read for work**
Age 50, low household income, married with children (age not specified), by car	6.68	8.21	3.35	(not given)
Age 30, moderately high household income, no children, by train	1.57	5.51	(not given)	8.03

The fieldwork for our project drew on the questions used in the Centre for Transport & Society and Centre for Mobilities Research (2007) and Fickling et al (2008) studies, while systematically expanding the respondent base beyond rail (included in the Centre for Transport & Society, Fickling et al, and Ettema and Verschuren studies) and private car (found only in the Ettema and Verschuren study) to include commuters on *all* modes.[2]

Specifically exploring mono- and polychronicity (as per Ettema and Verschuren 2007), although interesting, was considered beyond the scope of the current project, although we did collect data on socio-demographic characteristics such as age, gender, and household composition. Hence, respondents were asked about:

- what activities they did while commuting to work/study and how frequently they did them (never/rarely to always/almost always) in a typical week – the activity categories were drawn from the study of UK rail passengers' travel time use by Lyons et al (2007)
- which activities they did while commuting that they felt were a particularly valuable use of their time
- which one activity they did while commuting that they spent the most time on
- their age, household composition, gender, household vehicle-ownership rates, employer-paid vehicle costs, drivers' licence-holding rates, among other demographic characteristics.

The survey also asked whether or not commuters would prefer to:

- be instantly 'teleported' to work/study, or to spend some time travelling between home and work/study – those who said they preferred to have some travel time were asked what the desired minimal amount of time would be, while those who preferred to teleport were asked how they

2 There were insufficient 'car passengers' and cyclists to report on these two groups separately.

would use the time saved

- have their existing commute trip time cut in half – those who preferred to cut their commuting time were asked what additional activities they could do with the time saved
- have their existing commute time doubled – those who preferred this option were asked what activities (before or after their commute trip) they would have to reduce or give up if their travel time was doubled.

2.4 Travel time as a habit and reference point theory

Through in-depth interviews with 25 households in Sweden, Waldo (1999) concluded that chosen ways of travelling are as much a result of habit as any other consideration. More recently, Lyons and Chatterjee (2008) reviewed earlier commuting studies and found proof suggesting people accept or tolerate the commute, including their mode choice and the time it takes, without thinking about alternatives. For example, one study they reviewed asked motorists commuting for at least 10 minutes one way why they did not live closer to work: most respondents stated that they liked the area in which they lived (28%) or that they had never thought about it (27%). Other studies found that people would tolerate (or be contented with) a certain maximum number of minutes commuting each way (a Dutch study calculated this as 50 minutes, a US one as 46 minutes) – above this amount of time, the respondents were more likely to look for another job. These actions could be seen as consistent with rational, utility-maximising behaviour, although other factors (such as cost, type of time, frequency, etc) undoubtedly enter into it.

Gunn and Burge (2001) focused on travellers who were willing to pay to save travel time or to avoid travel time increases versus those who were not. They found there were a core of 'non-traders', who simply wanted to stay with their current travel time. In other words, they accepted or tolerated their commute as it was and did not wish to change it. Further examination of the non-traders did not identify any distinguishing characteristics between them and traders. Gunn and Burge posited that there was a possible questionnaire-prompted inertia effect.

The results of research by de Borger and Fosgerau (2006, 2008) offered an explanation for the tolerance or acceptance behaviour of commuters, using the theory of reference-dependent preferences, wherein individuals are assumed to interpret options in decision problems as gains or losses relative to a reference point, usually the status quo. Using the reference point of a recent trip, de Borger and Fosgerau interviewed more than 2000 car drivers, who were offered repeated choices between alternatives, defined in terms of time and cost changes relative to the reference trip (refer to table 2). In total, the dataset contained 16,559 observations from 2131 individuals. They concluded that reference point theory explained the choices made by car drivers very well: gains tended to be undervalued and losses overvalued relative to the reference point. In addition, de Borger and Fosgerau found the value of time tended to vary with the size of the time difference (ie smaller time differences had a smaller value of time compared with larger time differences).

Table 2.2 De Borger and Fosgerau's basis for stated preference scenarios (adapted from de Borger and Fosgerau 2006)

Reference trip = current driver trip	Alternative trip		
	Type of scenario	Cost	Travel time
Status quo (car driver, same travel time, same cost)	WTP	More	Faster
Status quo (car driver, same travel time, same cost)	Willingness to accept	Less expensive	Slower
Faster than status quo, same cost	Equivalent gain	Less expensive	Same as status quo
Slower than status quo, same cost	Equivalent loss	More expensive	Faster than status quo

Subsequently, using a subset of the same data, Fosgerau et al (2007) explored the effect of self-selection on value of travel time. They hypothesised (and then provided evidence) that respondents would carry their unobserved value of travel time with them to the alternative mode. In other words, car drivers and train users have higher value of travel time in a bus than bus users, and bus users have lower value of travel time in a car/train than car drivers/train users respectively.

Others, such as Morrison (1998) or Hoorens and Bloem (1997) would argue the 'endowment effect' is at play: so that if individuals were asked to express a preference for one good that requires a willingness to forego some of another (eg to use public transport instead of drive their car), they would be more likely to choose to stay with the familiar/what they know, rather than try an alternative. Hoorens and Bloem observed the existence of an endowment effect means that encouraging people to switch from the current situation to another may require a higher value/payoff/benefit than what they have now. List (2004) provided evidence that the endowment effect explained the choices of inexperienced consumers, while experienced consumers would make more economically rational choices.

2.5 Effect of comfort or quality on travel time savings and its value

Mackie et al (2003) and Kato (2006) found VTTS (and by extension, value of travel time) varied across modes for a given individual. Mackie et al posited this was due to a comfort or quality effect, and recommended 'that work is justified to define, quantify and value the modal characteristics involved'. In a later review, Litman (2008) made the same finding – ie travel time unit costs were quite sensitive to qualitative factors such as comfort, convenience and security, whereas Kato (2006) concluded that speed was the essential factor: in general, travellers who used higher-speed travel modes had a greater willingness to pay for TTS. Kato was analysing data for airplane, rail and car driver leisure travel from an inter-regional transport survey in Japan, where other quality factors were excluded. Litman's 2008 review concluded that value of travel time also varies by how much people *enjoy* a mode.

Li (2003) explored the effect of perceived travel time versus 'objective' travel time (as measured by a clock), drawing on cognitive models of time perception and behavioural decision theory. Li reported that time-judgement experiments showed that relatively short intervals were lengthened by judgement, and that relatively long intervals were shortened, meaning that objective commute duration was biased by the commuter's perception of duration. Hence, stages/interruptions in a commute (eg transfers, wait time, walking time) were thought to lead to a trip being perceived as having a longer duration;

comfortable circumstances could result in a perception of shorter duration. Li posited that users valued travel time by car more highly because of the certainty (of duration), minimisation of interruption/journey stages, and comfort it provided, as compared with public transport.

Steg (2004) and Steg and Tertoolen (1999) provided evidence suggesting there was a group of drivers for whom TTS were less important, and who would not switch modes under most/any circumstances. They found such people did not drive their car simply because it was necessary to do so, but also because they loved driving: their symbolic and affective attitudes/beliefs (particularly about the attractiveness of car use and the 'material meaning of possession' – status, freedom and power) significantly contributed to the positive utility of driving, more so than other more objective aspects of car use.

The fieldwork explored the perceived value of travel time of using different modes (for car drivers only) and the affective attitudes associated with different modes used through various questions, as follows:

- Are different modes substitutable for driving, holding other factors (time and cost) constant?
- Is the time spent on other modes a better/worse use of time than driving to work/study?

Regarding their commitment to particular modes, respondents were asked to rate their agreement/disagreement, on a 5-point Likert scale, with the following statements:

- No matter where I live, I intend to walk, cycle or use public transport to travel to study/training.
- If I could, I would drive to my study/training course every day.
- I'd rather live in a suburban neighbourhood, even if it meant I had to drive to shops, schools and services.
- Being environmentally responsible is important to me as a person.
- I'd rather live in a neighbourhood where I can walk to some shops, schools and services.
- It's important to me to use environmentally friendly travel methods (walking, cycling and public transport).

2.6 Travel time budget

Some researchers (eg Metz 2003, 2008a and 2008b, Centre for Transport & Society and Centre for Mobilities Research 2007, and Schafer 2000) have argued long-run evidence suggests the presence of a travel time budget (TTB), which would imply that TTS were being used for travel (rather than being saved or used for other activities). Metz hypothesised that individuals' average daily travel time tends to be relatively constant, offering as evidence analysis of aggregated household travel data illustrating that the average travel time per person, in several countries, has remained constant at about an hour a day for at least the past 30 years[3], while the average distance travelled has increased by over 50% during this same period. The behavioural hypothesis is that people have a certain (generally non-zero) amount of time they are willing (or may even want) to spend on travel, and they will make adjustments

3 Metz (2003) noted some variation as a function of age, gender, geographical area, household income and car ownership had occurred.

to minimise departures from that budget in either direction (Mokhtarian and Chen 2004). The Centre for Transport & Society and Centre for Mobilities Research (2007) contended that the existence of a constant TTB implied the long-run value of TTS (over all trips for any purpose) was zero, which contrasted markedly with the short-run TTS estimations made for transport projects in current stated preference and revealed preference methodologies. This does not mean TTS will not be valued for the activities (including travel to an alternative destination) that a traveller may undertake, but suggests too much emphasis may be placed on small savings for a particular trip, given a (hypothesised) desire to travel a certain amount per day.

Cavagnoli and Norman (2008) analysed a time use Melbourne dataset for 1991–2006, consisting of 'hundreds of millions of trips', and found travel time for work had remained fairly constant. Cavagnoli (2009) later argued workers were bearing the extra costs for faster modes so that they freed up time for other (leisure) activities, including the travel time to participate in them in some instances. Similarly, Schafer (2000) suggested the presence of a constant TTB, where distances had been increasing while the amount of time spent travelling was largely unchanged, implied that higher speeds and faster modes of travel were required – and could explain shifts in mode share. Private cars could be driven due to a desire to keep within the TTB, rather than because of a higher value of travel time per se.

In a review exploring the notion of a constant TTB, Mokhtarian and Chen (2004) observed several sources of bias by those estimating TTB, including the exclusion of very slow (walking and cycling) and very fast (airplane and rail) modes; different methods of recording travel time; a differing basis used by different analysts (eg per person, per traveller, per household); and the types of trips included/excluded. They refuted the existence of a constant TTB (as did Urry 2006), presenting evidence to suggest travel time expenditure is strongly related to individual and household characteristics (eg income level, gender, employment status and car ownership), attributes of activities at the destination, and the characteristics of residential areas (eg density, spatial structure, and mix of transport options available).

In what could be seen as a blending of TTB and rational utility-maximising behaviour theory, Susilo and Dijst (2010) and Dijst and Vidakovic (2000) explored the 'travel time ratio' (ie the ratio obtained by dividing the travel time to a particular activity place by the sum of the travel time and activity duration for the same activity location) for different types of non-work activities. Dijst and Vidakovic (2000) concluded that different activities had a different 'turn-over point' – ie a maximum desired amount of travel time, after which travel increasingly became a disutility and interfered with other activities individuals wanted to spend time on. Expanding on the earlier work, Susilo and Dijst (2010) posited that as this point was reached, individuals would (rationally) either switch to a closer location or reduce the amount of time spent on the activity in order to maintain their travel time ratio (TTR). However, Susilo and Dijst did not consider mode choice in their analysis – this could provide a third option for individuals, as changing modes could assist them to stay within their desired TTR range.

Indeed, it is possible that mode is selected to have travel and activity fit within the desired TTR range and/or their TTB – ie people have considered how much time they are prepared to spend commuting and have selected their mode to match this. Hence, travellers would be indifferent to actual mode used, provided the travel time and/or TTR remained within the desired parameters. If this were true, it implies that value of travel time (and TTS) may be more closely related to the destination/activity, desired travel time and/or TTR rather than the mode used, as is generally assumed in current economic evaluation. In order to explore this possibility, we asked respondents to identify their (current) estimated commute time, their ideal commute time and, for car drivers only, their willingness to

change modes (from driving a car to either public transport or walking) if the cost and travel time were held constant.[4]

In light of the discussion about TTB, we also asked respondents what they would do with the extra time if their commute trip time was shortened.

2.7 Satisfaction with commute time: actual v ideal commute

In 1998, Mokhtarian and her colleagues sent a 14-page self-administered mail-back survey to 8000 San Francisco Bay area households. The survey collected data on attitudes toward travel and related issues, affinity or liking for travel, objective (actual travel time) and perceived amounts of travel, satisfaction with an individual's amount of travel, personality traits, lifestyle orientation and demographic characteristics. Included in the survey were 32 attitude, 18 lifestyle and 13 'excess travel' statements, as well as 17 attributes of personality. Excess travel statements queried how often a respondent engaged in activities generating what could be considered unnecessary or excess travel – ie longer distances and/or travel time than what many/most people would spend on the same type of trip.

A total of 2000 completed questionnaires were returned and Redmond and Mokhtarian (2001) reported on a subset of 1300 part- or full-time workers who were analysed for their attitudes towards commuting.[5] The primary variables used in their particular analysis were 'ideal commute time' (IC) (based on the question 'Some people may value their commute time as a transition between work and home, while others may feel it is stressful or a waste of time. For you, what would be the ideal one-way commute time?') and the 'relative desired commute' (the difference between ideal commute and actual commute times[6]). Redmond and Mokhtarian found that IC was positively related to actual commute time and to a 'liking and utility' of the commute. IC was negatively related to how often people commuted.

Attitudes were found to play a role in determining the preferred IC: agreement and/or strong agreement with the statements 'I use my commute time productively' and 'My commute trip is a useful transition between home and work', and disagreement or strong disagreement with 'My commute is a real hassle', lengthened the preferred IC. They concluded that it was feasible to commute too little as well as too much, as 7% of the sample reported an IC that was greater than their current actual commute time.

Others have drawn similar conclusions, albeit through a quite different approach. Young and Morris (1981) and Calvert and Avineri (2009) found that satisfaction with commute travel time peaked in the

4 We recognised that those who chose to continue driving could have been demonstrating that their symbolic and/or affective values were important in their choice of how to commute to work, as per Steg (2004) and Steg and Tertoolen (1999). Hence, we included attitude statements concerning commitment to driving and to using alternative modes for travel to work/study, as well as asking about whether walking/public transport was a better/worse use of time than driving to work/study.

5 This is one of many papers/reports based on analysis of this extensive dataset.

6 We have adopted 'estimated commute' in place of 'actual commute' time, as this more correctly reflects the questioning, in both our survey and in Redmond and Mokhtarian's 1998 survey. Respondents were asked to 'estimate the amount of time it usually takes you to commute from home'.

range of 10–20 minutes.[7] Young and Morris observed that commuters disliked trips longer than this, but also disliked trips shorter than this: ie they preferred to be close to work, but not too close. Offering to reduce their travel time below a certain threshold had no value to them; for example, both Young and Morris and Calvert and Avineri found such respondents would say no to the prospect of teleporting (instant travel between home and work).

Based on their stated IC, which was compared with their actual or estimated commute time (EC), Paez and Whalen (2010) found that the typical respondent in their sample of 1251 university students in Hamilton, Canada would like to decrease their commute time by approximately 32%, irrespective of what mode they currently used. Students who were active commuters (walkers and cyclists) were less dissatisfied (more satisfied) with their commute – meaning they did not want to shorten it – followed by drivers and public transport users.

Paez and Whalen also asked respondents to rate 14 attitude statements, but found only five were significant in the regression model for walking/cycling, and three in each of car driver and public transport user. Two statements were common to all three models: 'Commute trip is a useful transition' and 'I like travelling alone'. For commuters who walked/cycled or drove, 'Getting there is half the fun' was significant while for public transport users, 'Shelters and other bus facilities are good quality' featured. 'I use my commute time productively' was also significant for drivers. Walkers/cyclists also valued their neighbourhood environment ('I like to live in a neighbourhood where there is a lot going on' and 'Neighbourhood is a community').

As was the case in the Redmond and Mokhtarian (2001) study and Calvert and Avineri (2009), Paez and Whalen (2010) assumed that if the ideal was greater than the actual, a student wanted to spend more time commuting, while a negative deviation (actual>ideal) meant a student preferred to spend less time commuting than they currently did. Paez and Whalen's analysis revealed that a student who preferred to spend more time commuting more likely used active transport (walk or cycle), thought getting there was half the fun, disliked travelling alone, and wanted to live in an active neighbourhood with sense of community.

2.8 Attitudes towards commute time

Gatersleben and Uzzell (2007) asked university staff in Surrey, England (N=389) to indicate on a 5-point Likert-type scale the extent to which their journey to work was usually stressful, exciting, boring, relaxing, pleasant, and/or depressing, as well as to identify the most pleasant and unpleasant experiences during their daily commute journey. They found some travellers valued the time they spent travelling, in that walkers and cyclists were more likely to say they enjoyed the activity itself, while (some) public transport and car users enjoyed the scenery, music and literature. Equally, some travellers did not value their travel time: these respondents indicated longer travel distances were a source of stress, and that use of cars was stressful when delays/traffic queues were experienced. Similarly public transport was stressful due to delays and wait times for service.

Turcotte (2006) analysed the 2005 Canadian General Social Survey on time use to determine how pleasant/unpleasant the experience of commuting was for workers. Using an ordered logit model, he

7 Young and Morris analysed commute satisfaction through a home interview survey of 1049 Melbourne residents, while Calvert and Avineri's findings are based on analysis of 1305 Francisco full- and part-time workers, a subset of the 1998 dataset Mokhtarian and her colleagues compiled through a large survey studying travel patterns.

estimated the probability that a 'commuting worker' with a particular characteristic (eg driving his/her car to work) would like or dislike commuting, after all the other factors in the regression model were kept constant. Turcotte found that workers on the whole had a relatively positive attitude towards commuting (38% said they liked commuting while 30% disliked it to some extent). One out of six workers (16%) said they liked commuting 'a great deal'. Drivers were more positive than public transport users, who tended to be younger, lived in larger cities and had longer commutes. As Paez and Whalen (2010) found, cyclists were much more likely to enjoy their commute, followed by walkers, car drivers, and public transport users. However, for equal commute times (holding other factors constant), public transport users and drivers were equally likely to enjoy commuting. Duration had the greatest impact on the probability of liking/disliking the commute to work, as well as whether or not the person liked their paid work. According to Turcotte's modelling, the predicted probability that a worker who liked their paid work 'a great deal' would also like travelling to work was 64%, compared with only 10% for a worker who disliked their paid work 'a great deal'.

Respondents were asked to identify, among all the activities in which they participated during the day, the one they liked best. About 3% of all workers reported that the time they spent commuting was their favourite activity of the day. Further analysis revealed the primary distinguishing characteristic amongst these workers was mode choice: 19% of workers who rode bikes to work said their commute trip was the most pleasant activity of their day: by comparison, only 2% of workers who drove to work reported the same (Turcotte 2006).

In an analysis of German Socio-economic Panel data, covering the years 1985–1998 (N=27,015), Stutzer and Frey (2004) used data on subjective well-being as a proxy measure for people's utility of commute travel time. They wanted to assess whether or not commuters were compensated for the stress incurred by commuting longer distances (either by being more satisfied with their residence/dwelling location and/or with their job), as suggested in economic models. Their primary findings were that individuals with longer commutes were less satisfied with life, and people were not compensated for commuting by higher wage rates or lower residential costs; nor did they report higher satisfaction with either their job or their residence than those with shorter commutes. Stutzer and Frey treated the relationship between commute time and life satisfaction as a major finding, even though the variation in life satisfaction between the first quartile of commuters (whose travel time was <10minutes) and the fourth quartile (whose travel time was >50minutes) was 7.24 to 7.00, respectively, on a scale of 0–10. In other words, there was very little difference in overall life satisfaction between those who commuted <10minutes and those who commuted 50 or more minutes.

Mokhtarian and Salomon (2001) observed that large groups of people 'possess an intrinsic desire to travel', citing as evidence the responses to their 1998 survey; namely, more than 75% of the sample reported sometimes/often travelling 'just for the fun of it' and over two-thirds disagreed with the statement 'the only good thing about travelling is arriving at your destination'. They suggested if people were not consistently time- or cost-minimisers with regard to travel, particularly when commuting to and from work, the existing application of VTTS in economic evaluations could be overstating the benefits of transport network improvements such as capacity enhancement. Subsequently, using data from a self-administered mail-back survey of 1682 North Californian residents, Cao et al (2009) found evidence specifically for 'travel liking', in that some non-work (non-commuting) travel was undirected – ie it was travel for the sake of travel. This was particularly true for walking and cycling, although a 'non-negligible' amount of vehicle travel had the same characteristic.

Ory and Mokhtarian (2005) identified a commute 'benefit', which was not mode dependent, based on the productive use of travel time and its value as a 'transition period' between home and work.

Subsequently, Ory et al (2007) completed an analysis of full- and part-time workers' (N=1358) perspectives on subjective mobility, based on their response to the question 'How would you describe the amount of travel you do?' (with a 5-point ordinal scale of response options ranging from none to a lot) and other descriptive variables. They concluded that people who 'like travel a lot' would have a different value of travel time from those who 'dislike travel a lot'. Ory and Mokhtarian (2005) summarised it thus:

> *Those who view travel as a useful buffer between activities, and/or are able to use travel time productively, will have a smaller disutility for travel than would be predicted by the conventional measures of travel time and cost alone, which at a minimum would reduce their incentive to reduce their travel, and at the extreme could prompt them to increase it.*

We consider that current economic evaluation may account for this variation through the typical travel time values, which are a 'mean' of a range of values. However, as part of the current research project, we wanted to examine the possible range of values, whether or not there was an even distribution of these values around the mean, and the appropriateness of using the mean in project appraisal. If it is true there is a lot of taste variation in value of travel time, as the above studies suggest, the implication for value-of-time studies is to allow for it, and similarly evaluations must allow for it. Zero or even negative values of TTS are possible.

Paez and Whalen (2010), Ory and Mokhtarian (2005) and Mokhtarian and Salomon (2001) all raised the issue that when individuals are asked about their enjoyment of their travel to a particular destination, they may not be responding to any positive utility of travel, but could be responding according to their feelings about their destination. Hence an apparent desire for longer trips could be confounded by the trade-off for a higher-quality activity at the end of a trip. In order to avoid this confusion, respondents in our fieldwork were asked specific questions about the time they spent commuting, rather than about their commute trip – for example:

- I enjoy **the time I spend commuting** to work (my study/training course).
- What are the reasons you enjoy/do not enjoy **the time you spend commuting** to work?
- **The time I spend commuting** is generally wasted time.

Questions about changing their commute trip were focused on the current travel time. In addition, respondents were asked to rate the statement 'I enjoy my current job (study/training course)' so we could examine the relationship between satisfaction with and enjoyment of commute travel time with their attitude toward work.

Another potential confounding factor might be that the desire for longer trips could be related to wanting to live further out in the countryside (eg on a rural lifestyle block or near the beach). This was not explored in our survey but could be part of future research.

2.9 Summary of literature review findings

The focus of the literature review and this research project was on the commute trip, particularly the travel from home to work/study.

Currently, economic appraisal in New Zealand and elsewhere assumes that travel time, irrespective of the mode used, has a disutility to the individual and a cost (in time and money) to be reduced or

minimised. Because congestion is a major issue in many areas globally, a significant focus of evaluation for transport projects is measuring and valuing TTS. The VTTS are generally acknowledged to vary by mode, trip purpose and time of day. Researchers have also found VTTS can vary by purpose; time budget/time spent; income; gender; household composition; age; reliability/variability of travel time comfort or quality (eg comfort, convenience and security); and speed of transport mode.

Based on our experience with 'travel behaviour changers' (discussed in section 1.1), we hypothesised that travel time and TTS could not be paramount for all travellers all of the time – otherwise, no one would shift from the quick option of driving a private vehicle to 'slow modes' such as walking, cycling or public transport. The literature review found evidence for an argument that travel times for different modes vary in their utility/disutility for travellers. Indeed, it may be that some people do not have positive utility for travel on any mode, but rather they have a lower disutility for one particular mode than for other modes. For example, cycling might have positive utility because of health benefits but equally, those health benefits might just mean cycling has less negative utility than others modes, but not positive utility.

One argument was there is a constant TTB for all travel in a day, meaning that individuals will not save their TTS, but will use it to travel and maintain their TTB. This is not to say travellers do not value TTS, as the reduced travel time for a particular trip may mean they can use that time to travel somewhere else, or to participate in an additional activity. While the existence of constant TTB is debated, the reviewed material suggested there may be an 'ideal' or 'minimum' commute time for travel to work, which commuters may or may not consciously acknowledge. This commute time is generally greater than zero and varies from individual to individual, dependent on several possible factors including demographic characteristics, the perceived utility of the trip, activities conducted while travelling, attitudes, mode used, and potentially habitual behaviour. Where an existing commute trip takes longer than the IC, it has some disutility (and hence TTS would have a positive value). Where the existing commute time matches or is less than the IC, the value of TTS could be said to be zero or negative. In these instances, a commuter may be a 'non-trader', unwilling to pay to change their commute time.

There were two distinctions in the value of travel time – the opportunity cost of time spent travelling (ie the trade-off between spending time travelling and the other activities the traveller could do if they did not travel, or spent less time travelling) and the disutility or utility of the travel time itself (ie the activities conducted while travelling, which may or may not make the trip useful/worthwhile for the commuter). The review showed that doing an activity while travelling did not necessarily give the travel time a positive utility, as the traveller may simply have been making the best of a 'bad' situation; similarly, pure 'monochronic' travelling did not mean the travel time was wasted, nor that it had a disutility to the traveller.

To date, none of the studies discussed here have been emulated in New Zealand. Our exploratory fieldwork was designed to investigate what aspects of these findings might be relevant in the New Zealand context, and to expand on the findings of the overseas research as discussed in each of the preceding sections.

2.10 Development and content of online survey

As noted in the preceding discussion, the development of the online survey took into account the findings of the international and New Zealand literature review plus discussions with external peer

reviewers and our steering group. Where feasible and relevant, we used or modified questions and response categories from earlier empirical studies.

Table 2.3 outlines the fieldwork objectives based on the questions we said we would explore (plus ones identified through the literature review and by our external peer reviewers), the proposed analysis, and the data collection required to undertake the analysis. Note that for each objective, we compared and contrasted commuters travelling (1) to work v study; (2) by different modes; and/or (3) from different residential locations (inner city; Auckland and Wellington city; other Auckland/ Wellington metropolitan areas) and, where relevant and feasible, identified any correlated demographic or other characteristics.

A copy of the questionnaire is available in appendix A.

Table 2.3 Fieldwork objectives, proposed analysis and data required

Objective	Proposed analysis	Data required
Understanding whether or not their current time spent commuting (EC) has any utility	• Identifying the range of modes used and their usual mode • Identifying how respondents regard their reasons for this (ie whether they enjoy it or not), and what they do while travelling that makes it enjoyable • Research to date has largely focused on utility of travel time for rail users, with only one study considering this for walkers and cyclists (Paez and Whalen 2010)	• How often do they use various modes for travelling to w/s? What is their usual (most frequently used) mode? • Is their time spent commuting enjoyable? What are the reasons they enjoy/do not enjoy it? What activities do they do while commuting? • Is there a relationship between enjoying their current job/course of study and enjoying their commute?
Understanding the desirability (or not) of TTS Understanding the distribution of their commute travel time valuation	• Establish IC • Distribution: IC and EC; halving their EC; doubling it; reducing it to zero • How does their IC relate to EC? • Is there an amount of commute travel time below which TTS become irrelevant?	• What would be their ideal commute time? Do they prefer their EC, or one that is half the time? Do they prefer their EC, or one that is double the time? • If they could be teleported, would they do it? What would they do with their TTS? If they choose not to teleport, what is their minimum preferred travel time between home and work? Does what they would do vary with the amount of time saved? Or with their socio-economic status?
Understanding whether the value of their commute travel time is affected by mode	• Does the amount of travel time influence the choice of mode? Or are both of these factors influenced by other (possibly unidentified) factors? • Willingness to 'trade' – if time and cost are held constant, will car drivers change modes for travelling to work/study?	• Usual travel time compared with usual mode Ask drivers: • If they could have the same EC and cost, would they use public transport? If they could have the same EC, would they walk? • Is travelling by a different mode a better or worse use of their time?
Understanding attitudes towards TT	• Effect of attitudes on travel time (eg IC ; whether they want EC shorter/ longer) and on mode choice	• Attitudinal statements; 5-point Likert scale

Objective	Proposed analysis	Data required
Identifying correlated demographics		• Possibility that underlying demographics influence responses. Ask about employer paying vehicle costs; household composition; holding of driver's licence; number of household vehicles

We asked all respondents who commuted to work or study/training to 'Please estimate the amount of time it usually takes you to commute from your home to your workplace (to your study/training)'. This was their 'estimated commute' time (EC). We also asked them 'Ignoring any commuting costs, what would be your ideal ONE-WAY, DOOR-TO-WORK (DOOR-TO-STUDY) travel time?' We termed this their 'ideal commute' time (IC).

Finally, we asked respondents to choose between their existing commute trip (same mode, same cost, and same travel time) and an alternative commute trip. Depending on the scenario, the alternative trip offered varied in terms of mode and/or travel time. Cost was either the same as their current commute trip, unspecified (where the choice was existing commute or walk) or zero in the case of the option to teleport. Car drivers were asked all five scenarios, while all other mode users (passenger in a motor vehicle, walking/jogging, bicycle, public transport (bus, train, ferry)) were only asked the first three, as shown in table 2.4.

Table 2.4 Simple stated preference scenarios for commuting to work/study employed in the questionnaire

Reference trip (ie current commute trip)	Alternative trip[a]		
Usual mode	**Mode[b]**	**Cost**	**Travel Time**
Any[b]	Same as current commute trip	Same as current commute trip	Half of current commute trip time
Any[b]	Same	Same	Double current commute trip time
Any[b]	Teleport (instant travel)	Zero	Zero minutes
Drive a motor vehicle	Public transport; public transport some of the time	Same	Same as current commute trip time
Drive a motor vehicle	Walk; walk some of the time	Not specified	Same

a) Yellow highlights changes from reference trip

b) Drive a motor vehicle (car, van, truck, motorcycle), passenger in a motor vehicle, walking/jogging, bicycle, public transport (bus, train, ferry)

3 Exploratory fieldwork

3.1 Fieldwork approach

We originally proposed to undertake either semi-structured interviews and/or focus groups to validate/verify the composition of the travel time utility and distribution of travel time valuations in a New Zealand context. However, based on early discussions with our steering group and peer reviewers, we revised our methodology to incorporate an online self-completion survey. The target sample size was 600 and a minimum of 120 respondents were recruited from the inner cities of Auckland and Wellington, with the remainder from the greater metropolitan areas of Wellington and Auckland.[8] The online survey provided a stronger basis of comparison for the topics we were concerned with than a small number of face-to-face interviews or focus groups would have done.

3.2 Overview of data collection and the resulting dataset

The data was collected via an online survey over a two-week period beginning 20 January 2011. The online survey was hosted and conducted by PermissionCorp, using its research panel 'SmileCity'. At any one time, SmileCity has approximately 190,000 panelists who are considered to be representative of the New Zealand population. SmileCity fully complies with ESOMAR, the international research organisation, standards and principles in the conduct of online market and social research, as well as with the ISO 20252 Market and Social Research Standard.

The targeted audience was Auckland and Wellington metropolitan area residents, aged 18 and over, who were either employed or studying on a full- or part-time basis. Because the data was being collected for two separate research projects[9], we wanted to create a stratified sample of respondents who lived in the inner city area of Auckland or Wellington, to sit alongside a sample of residents living 'everywhere else' in the metropolitan areas of Wellington and Auckland. We set a target of 120 respondents (approximately 20% of the sample) from the inner city areas. Because the Auckland/Wellington inner city populations form approximately 1% of the total population for the two metropolitan areas, the overall response rate for the survey was reduced, as the quota proved a challenge to fill.

The survey was initially sent to 1595 panel participants, with 605 (38%) completing the survey. At this point, the quota was filled for non-inner city residents, and the focus was on (literally) finding inner city respondents, given that PermissionCorp does not classify its panel members by location apart from city (eg Auckland or Wellington). About 1500 further panel members were contacted, with many screened out based on their residential location, until the quota of 120 inner city respondents was met.

8 Metropolitan Wellington includes the four cities of Wellington, Porirua, Lower Hutt and Upper Hutt. Metropolitan Auckland includes what were formerly known as the four cities of North Shore, Waitakere, Auckland and Manukau, including Papakura and part of Rodney District.

9 The other research project is reported in the NZ Transport Agency (NZTA) report 'Living in intensified urban environments: residential self selection and travel behaviour' (O'Fallon and Wallis 2012).

Overall, the response rate for those attempting the survey (N=1698) was good, with 40% fully completing the survey (N=679). Thirteen percent of those attempting the survey were screened out (as not living in Auckland or Wellington) while 44% were screened out as 'quota full' in the effort to obtain inner city respondents. In the process of cleaning the data, 13 respondents and their data were removed as respondents were less than 18 years old. This left a total of 666 respondents, of whom 512 were either working or studying and thus became the core respondents for this report. Inner city respondents formed 21% (N=107) of the study population for this research project.

Given the exploratory nature of the fieldwork, we were not overly concerned that relying on an online survey could result in a bias in the sample towards those who were more comfortable with electronic media (eg younger tertiary students, or professionals on a higher income). However, we noted that a recent survey suggested home-based internet access has become the 'norm' in New Zealand: some 80% of households in Auckland and Wellington regions had access to the internet at home in 2009 (Statistics New Zealand 2010).[10] If access to the internet at work or other locations was included, this figure would be much higher. Indeed, 80% of all New Zealanders aged 15+ reported having used the internet at least once in the last 12 months. The older age groups (aged 65+) showed a much lower propensity to use the internet, but as the focus of the study was primarily on those working or studying and who were most likely to be younger than age 65, this was not considered a significant issue.

3.3 Demographic characteristics of respondents

Full-time workers formed 65% of the sample, with part-time workers and students (both full- and part-time) being 17% each. The respondents were evenly split between Auckland and Wellington, with 21% living in the inner city areas. The age of the sample was skewed towards the younger adult population (18–39 year olds formed 59% of the sample), which was not surprising given the bias created by having a quota for inner city residents. The most common living arrangements were couple (26%); couple or extended family with some children under age 18 (25%), or adult living with other adults (18%). Eighty-two percent (82%) of respondents held full driver's licences, which was lower than the national average of 91% (O'Fallon and Sullivan 2009). A profile of the respondents is shown in table 3.1.

Table 3.1 Profile of respondents (N=512)

Demographic characteristics		Number of respondents (N)	% of sample[a]
Which best describes you?	Working full-time (30+ hours per week)	335	65
	Working part-time (less than 30 hours per week)	87	17
	Full-time student	77	15
	Part-time student	13	3
Which city do you live in?	Auckland	260	51
	Wellington	252	49

10 The Household Use of Information and Communication Technology (ICT) Survey collected information from New Zealand households and individuals about access to, and use of, computers, the Internet, and mobile phones. The survey was carried out from October 2009 to January 2010 (the December 2009 quarter) via personal and telephone interviews, achieving a response rate of 80%, which represented 13,713 households.

Demographic characteristics		Number of respondents (N)	% of sample[a]
Which area do you live in?	Inner city Auckland or Wellington	107	21
	Auckland or Wellington City (not CBD)	202	39
	Auckland or Wellington metropolitan area (excluding Auckland or Wellington Cities)	203	40
Gender	Male	246	48
	Female	266	52
Which best describes your current household?	Couple living alone	132	26
	Couple or extended family living with children, some aged 0–17	128	25
	Couple or extended family living with children, all aged 18 years or older	40	8
	Single adult living with children, some aged 0–17 years.	15	3
	Single adult living with children, all aged 18 years or older	10	2
	Adult living alone	57	11
	Adult living with other adults	91	18
	Living with my parents/guardians	39	8
Age group	18–29	182	36
	30–39	119	23
	40–49	94	18
	50–59	76	15
	60–69	37	7
	70+	4	1
Is your current driver's licence a...	Learner's licence	56	11
	Full or restricted licence	418	82
	I don't hold any driver's licence	38	7
Number of household vehicles	None	70	14
	1	168	33
	2	172	34
	3 or more	102	20

a) Some variables may not add to 100% due to rounding.

3.4 Typical mode use for commute to work or study

Respondents were asked 'In a typical week, how often did you use each of the following travel methods to commute to work?' The choices were largely based on the New Zealand census. The response choices were '5–7 days a week', '3–4 days a week', '1–2 days a week', 'less than one day a week', and 'not at all'. Where relevant, in analysing the results we combined 'Less than one day a week' and 'Not

at all', as we were interested in modes regularly being used for commuting to work/study. The overall results are reported in table 3.2.

Table 3.2 Frequency of modes used to commute to work in a typical week (N=422)

Modes used to commute to work	5–7 days a week	3–4 days a week	1–2 days a week	Less than one day/not at all	Total
Driving a motor vehicle (car, truck, van or motorcycle)	46%	13%	8%	33%	100%
Passenger in a motor vehicle	6%	4%	8%	82%	100%
Walking/jogging	14%	7%	6%	73%	100%
Bicycle	1%	0%	4%	95%	100%
Public transport (bus, train, ferry)	12%	6%	9%	73%	100%
Worked from home	5%	3%	9%	84%	100%

We identified the main mode for each respondent as the mode used most frequently for commuting to work/study in a typical week as shown in table 3.3. The main mode for commuting to work in a typical week was driving (59%), while for commuting to study it was public transport (49%). Driving a car to work was more common in Auckland than Wellington (66% compared with 52%), while using public transport was more common in Wellington (25% compared with 12% in Auckland). Commuting to work as a car passenger, walking, cycling, and working from home all occurred at similar rates in both cities.

Table 3.3 Main mode commuting to work or study (mode used most frequently in a typical week)

Usual mode	Work[a]	Study[a]	Work/study combined[a]
No. of respondents (N)	**422**	**90**	**512**
Unknown	0%	1%	0%
Drive a motor vehicle (includes walk)	59%	19%	52%
Car passenger	4%	6%	5%
Walk	12%	17%	13%
Bicycle	1%	1%	1%
Public transport (includes park & ride or walk)	18%	49%	24%
Work from home	5%	8%	5%

a) Totals may not add to 100% due to rounding.

Most respondents (57%) used one mode to travel to work in a typical week, although 26% used two modes (refer to table 3.4). In most cases where two modes were used, the reported use of the second mode was minor (1–2 days per week or less). Where this was not the case, people were using two modes on a daily basis to commute to work, with the most common mixtures being walk and public transport; drive and public transport; and drive and car passenger.

Table 3.4 Number of modes used commuting to work in a typical week

Number of modes used	
No. of respondents (N)	**511**
1	57%
2	26%
3	11%
4 or more	6%
Total	**100%**

3.4.1 Employer-paid costs for vehicle drivers

Regular drivers (N=248) were asked if their employer paid for any or all of the costs associated with owning and operating their vehicle. The most common financial support was the provision of, or payment for, car parking at work (33%). As table 3.5 reveals, very few respondents (14%) had the purchase and maintenance of the vehicle paid for by their employer.

Table 3.5 Commuters who regularly drove to work, by employer-paid costs

Does your employer pay for any or all of your costs for:	Yes	No
Buying and maintaining your motor vehicle (leasing, car allowance, company car, warrant of fitness, registration, etc)	14%	86%
Fuel	21%	79%
Parking your car at work	33%	67%

3.5 Estimated time spent commuting to work or study

We asked respondents to 'Please estimate the amount of time it usually takes you to commute from your home to your workplace (to your study/training)'. Estimates for workers ranged from 0–120 minutes, while for students the range was 0–100 minutes.[11] As has been reported for other travel surveys (eg Rietveld 2002, NCHRP 2008, Armoogum et al 2007), respondents had a strong propensity to estimate the time spent commuting in 5-minute intervals – in fact, 89% gave times ending in '0' or '5' minutes. These two factors led us to use the median, rather than the mean, in discussing estimated (and later ideal) commute time in this report.

The median is the value that divides the distribution into halves, where half of the trip segments are above the median length and half are below it if the data is arranged in numerical order. Where the data is known to not have a normal distribution (the current dataset is skewed towards shorter

11 We considered filtering outliers (eg excluding those who reported zero minutes commuting and those who reported their estimated commute time as being longer than 75 minutes). However, excluding those who said they commuted zero minutes per day made a negligible difference to the mean, and to the standard deviation (and if rounded to the nearest whole integer, made no difference at all) and no difference to the median of 20 minutes for the estimated commute time. Excluding those who said they commuted zero minutes or whose commute was >75 minutes shortened the mean commute time for workers or students by 1 minute. Given the exploratory nature of the study, and the way in which the question was asked, we chose to include all values.

commuting times rather than longer ones, as well as being reported in round rather than exact times), the median is an appropriate choice for describing the typical person or situation. The median is less susceptible to outliers than is the mean.

The median EC to work was 20 minutes (the mean was 24 minutes), while the median EC for study/training was 25 minutes (with a mean of 30 minutes). The median EC for all commuters was 20 minutes.

Table 3.6 Median and mean EC, by mode used most frequently in a typical week (in minutes)

Mode used most frequently in a typical week commuting to work or study	Work	Study	All
Any mode	**N=407**	**N=90**	**N=497**
Median	20	25	20
Mean	24	30	25
Minimum	0	0	0
Maximum	120	100	120
Std deviation	16	20	17
Drive (includes walk)	**N=249**	**N=17**	**N=266**
Median	20	30	20
Mean	22	27	23
Minimum	2	7	2
Maximum	120	60	120
Std deviation	15	14	15
Walk	**N=52**	**N=15**	**N=67**
Median	15	10	15
Mean	17	22	18
Minimum	5	5	5
Maximum	60	100	100
Std deviation	13	25	16
Public transport (includes park & ride and walk)	**N=77**	**N=44**	**N=121**
Median	30	35	30
Mean	32	37	34
Minimum		10	
Maximum	80	90	90
Std deviation	18	20	18

Table 3.6 reports the median, mean, maximum and minimum and standard deviation (in minutes) commute times for the primary modes used in a typical week. A typical worker spent 20 minutes commuting as a driver, 15 minutes as a walker or 30 minutes via public transport. The typical student spent slightly longer driving (30 minutes), less time walking (10 minutes) and 35 minutes on public transport. There were too few car passengers (N=23) and cyclists (N=7) for meaningful comment. It appeared that cyclists spent a similar amount of time commuting as walkers, while car passengers

were in between drivers and public transport passengers, spending a median time of 25 minutes. The median EC to work (20 minutes) was the same for Auckland and Wellington, while the median EC to study was 30 minutes in Auckland and 20 minutes in Wellington, perhaps reflecting the smaller urban area of the capital city.

3.6 Utility of travel time

One aim of the survey was to identify whether or not the existing travel time of commuters to work or study had inherent utility (apart from the obvious fact that the trip delivered them to work/study, where they earned money, and then home again). To do this, workers and students were asked to rate their time spent commuting to work, the reasons for their rating, and what they did while travelling that made it enjoyable. The exact wording of each statement and question is provided in the sub-sections that follow.

3.6.1 Enjoyment of commute

Respondents were asked to rate, on a 5-point Likert scale, their agreement/disagreement with the statement 'I enjoy the time I spend commuting to work (to study/training)'. About 40% of workers and 37% of students agreed/strongly agreed they enjoyed the commute to work (or study). Similar proportions of people reported they neither agreed nor disagreed with the statement.

As shown in table 3.7, respondents who primarily walked/cycled to work were nearly twice as likely to agree/strongly agree (A/SA) that they enjoyed the time spent commuting than either drivers or public transport users (68% compared with 35% and 35% respectively). This was similar to the findings of Turcotte (2006) and Paez and Whalen (2010).

Table 3.7 Enjoyment of commute to work by mode used most frequently [a]

I enjoy the time I spend commuting to work	Mode used most frequently in a typical week commuting to work			
	Drive a car (includes walk)[b]	Walk/cycle[b]	Public transport (includes park & ride and walk)[b]	Total[b]
No. of respondents (N)	**249**	**58**	**77**	**384**
Strongly agree	6%	28%	4%	9%
Agree	29%	40%	31%	31%
Neither agree nor disagree	38%	24%	36%	35%
Disagree	20%	5%	25%	19%
Strongly disagree	8%	3%	4%	6%

a) Excludes commuting as a private vehicle passenger and working from home.

b) Totals may not add to 100% due to rounding.

As the estimated commute trip time lengthened, table 3.8 reveals workers were less likely to A/SA that they enjoyed their trip, and more likely to disagree/strongly disagree (D/SD). The median EC time for those who A/SA was 15 minutes, while the median for those who D/SD was 30 minutes.

Table 3.8 Enjoyment of time spent commuting compared with estimated length of commute trip to work

I enjoy the time I spend commuting to work	Estimated commuting time to work/study (categorised)[a]					
	0–9 min	10–19 min	20–29 min	30–39 min	40+ min	Total
No. of respondents (N)	**53**	**120**	**92**	**69**	**73**	**407**
A/SA	58%	47%	39%	32%	24%	40%
Neither agree nor disagree	30%	38%	35%	41%	38%	36%
D/SD	11%	15%	26%	28%	38%	24%

a) Totals may not add to 100% due to rounding.

The Pearson's r statistic calculated for the correlation between EC (using individually-reported commute times, not the collapsed categories shown in table 3.8) and enjoyment of the time spent commuting was 0.211, meaning that there was a weak relationship between the two variables (changes in one are not related to changes in the other). Separately, we calculated a partial correlation between the same two variables, but this time holding the mode used most frequently for commuting to work/study constant and excluding missing values. The r statistic was 0.232.

While Auckland and Wellington workers/students enjoyed the time that they time spent commuting in similar proportions (37% versus 43% respectively), Wellington residents were far less likely to disagree (12% compared with 24%) or strongly disagree (3% compared with 8%) with the statement than Auckland workers/students. Separating the responses by current residential location (inner city, city, metropolitan area) revealed further differences. Inner city workers/students of Auckland and Wellington (combined) were far more likely to A/SA (57%) that they enjoyed the time spent commuting than were residents of Auckland/Wellington (AKL/WLG) cities outside the CBD (38%) or the wider metropolitan areas of AKL/WLG (31% – refer to table 3.9). Given that residents in the inner city AKL/WLG areas were far more likely to walk/cycle to work/study (42% compared with 12% in AKL/WLG cities and 4% AKL/WLG metropolitan areas) and that frequent walkers/cyclists were more likely to agree/strongly agree they enjoyed the time spent commuting than other mode users, this finding was not all that surprising.

Table 3.9 I enjoy the time spent commuting, by current residential location

I enjoy the time I spend commuting to work/study	Current residential location			Total
	Inner city AKL/WLG	AKL/WLG cities	AKL/WLG metro	
No. of respondents (N)	**106**	**199**	**192**	**497**
Strongly agree	14%	8%	5%	8%
Agree	43%	30%	26%	31%
Neither agree nor disagree	27%	36%	42%	36%
Disagree	11%	19%	22%	19%
Strongly disagree	4%	7%	5%	6%

Comparison with other demographic characteristics (gender, age, household composition) did not reveal anything of interest.

Enjoyment of the time spent commuting was related to whether or not the respondent enjoyed their current work (refer to table 3.10).[12] Respondents who A/SA with the statement 'I enjoy my job' were far more likely to A/SA that they enjoyed the time they spent commuting to work than to disagree with that statement (46% compared with 19%). Conversely, those who did not enjoy their current job were far more likely to not enjoy the time they spent commuting (58% D/SD compared with 22% A/SA). Unfortunately the sample sizes were too small in either of the two categories to provide meaningful comment on the characteristics of those enjoying their current job and time spent commuting (N=47), or those not enjoying the same (N=18).

Table 3.10 Comparison of enjoyment of work with enjoying the time spent commuting

I enjoy the time I spend commuting to work	I enjoy my current job			
	A/SA[a]	Neither agree nor disagree[a]	D/SD[a]	Total
A/SA	46%	28%	22%	40%
Neither agree nor disagree	34%	50%	20%	36%
D/SD	19%	22%	58%	24%

a) Totals may not add to 100% due to rounding.

3.6.2 Reasons for enjoying or not enjoying the time spent commuting to work

Workers were asked to provide up to three reasons for (1) agreeing/strongly agreeing or (2) disagreeing/strongly disagreeing with the statement 'I enjoy the time I spend commuting to work'. The most common theme for respondents who A/SA that they enjoyed their commute time was to do with having time to 'transition', 'be alone', 'think' and 'relax' – while shown separately in table 3.11, these formed 35% of all responses given for all modes. This response was more common for drivers (40%) and public transport users (41%) than walkers (25%), who were much more likely to say they enjoyed the exercise/getting fit (23%) than were drivers and public transport users.[13]

12 Students were also asked to rate their agreement/disagreement with the statement 'I enjoy my current study/training course' – to which 85% responded that they agreed/strongly agreed. Given that there were 90 respondents in total, there was no further analysis that could be done on this population segment.

13 Remember this was based on the mode used most frequently during the week (so a driver or public transport user might sometimes use a different mode) and that it included those who drove, parked and walked, as well as those who walked/drove to public transport stop/station, rode public transport, then walked to their destination.

Table 3.11 Reasons for enjoying the time spent commuting to work (up to three reasons given per person)

Reasons enjoy commuting	Total	Mode used most frequently in a typical week commuting to work			
	No. of respondents (N)	Drive a car (includes walk)	Walk	Public transport (includes park & ride and walk)	All modes
Transition/time alone/prepares me mentally for the day	43	13%	4%	17%	11%
Relax/wake up/stress free/peaceful	51	15%	8%	15%	13%
Thinking time	43	12%	13%	11%	11%
Listen to radio/music	46	16%	12%	5%	12%
Like mode used/quick/easy/short	43	14%	6%	3%	11%
Exercise/build up energy/fitness	33	2%	23%	8%	9%
Catch up with friends/family	22	3%	5%	11%	6%
Reading time/work	13	2%	4%	8%	3%
Enjoy scenery/fresh air	38	9%	13%	9%	10%
Saves petrol/saves money	7	1%	3%	3%	2%
Other	43	13%	9%	11%	12%
Total	**382**	**100%**	**100%**	**100%**	**100%**

By contrast, table 3.12 shows that those who did not enjoy the time spent commuting most frequently gave traffic or traffic delays (30%) and 'waste of time' or 'better things to do' (23%) as their reasons for not enjoying it. Traffic/delays were especially identified by drivers, while 'waste of time' was identified by all modes, and most commonly by walkers. Eleven percent (11%) of the total responses identified some aspect of public transport services (uncomfortable, unreliable, not liking close proximity to other users) as reasons for not enjoying their time spent commuting – the majority of these (30 of the 49 responses) were made by 27 respondents who used public transport three or more days a week.

Table 3.12 Reasons for not enjoying the time spent commuting to work (up to three reasons given)

Reasons for not enjoying commuting	Total	Mode used most frequently in a typical week commuting to work			
	No. of respondents (N)	Drive a car (incl walk)	Walk	Public transport (includes park & ride and walk)	All modes
Traffic/delays	133	38%	12%	15%	30%
Waste of time/better things to do/the time it takes/could be sleeping/have to get up early	103	22%	32%	24%	23%
Public transport uncomfortable/unreliable/ people around me	48	1%	0%	41%	11%
Boring/repetitive/stressful	39	10%	9%	6%	9%
Fuel consumption/cost of petrol/expensive	35	10%	9%	3%	8%
Other drivers/bad driving	26	8%	0%	2%	6%
Bad weather	12	0%	12%	7%	3%
Don't really mind	7	2%	0%	1%	2%
Other (it's going to work/too far/too short/my radio's broken/don't like driving)	37	9%	15%	1%	13%
Total	**440**	**100%**	**100%**	**100%**	**100%**

3.6.3 Activities undertaken while commuting

All commuters were asked 'In a typical week, how often do you do the following activities while you are commuting to work (to your study/training course)?' and offered a series of activities and frequencies (never/rarely, less than half the time, about half the time, more than half the time, always/almost always). Each respondent could select up to three activities. The activity most regularly (about half the time, more than half the time, always/almost always) undertaken by 70% of commuters using any mode was 'listen to music/radio', distantly followed by 'window gazing/people watching' (34%) and 'chat with people around me' (20%). This may reflect the fact that nearly two-thirds of commuters (62%) frequently drove a motor vehicle to work.

Very few commuters indicated they were monochronic in their travel: 27 respondents (7%) in the sample reported they 'never/rarely' or 'less than half the time' did any of the possible activities listed while also commuting.

As shown in figures 3.1 and 3.2, there was little variation in activities undertaken by commuters on their way to work, by mode: two of the three most common activities in each case were 'listen to music/radio' and 'window gazing/people watching'.[14] Drivers most regularly 'listened to music/radio' (85%), then 'window gazed/people watched' (21%) and 'chatted with people around them' (19%). Walkers were 'getting fit/exercising' (54%), 'listening to music/radio' (44%) and 'window gazing/people

14 Passengers in private motor vehicles and cyclists were excluded from this analysis, as there were too few of them to comment (N=18 and N=6 respectively).

watching' (40%), while public transport users were 'window gazing/people watching' (69%), 'listening to music/radio' (44%), and 'reading for leisure' (27%).

Activities that might be perceived as using travel time to extend the work/study day – eg 'work/study (reading/writing/typing/thinking)' or more marginally 'catch up with friends/colleagues (texts/calls)' did not feature very highly among activities undertaken while commuting, with 22% of public transport users and 21% of walkers reporting they regularly did some 'work/study (reading/writing/typing/ thinking)' while commuting.

Figure 3.1 Activities regularly done by commuters on their way to work, by mode

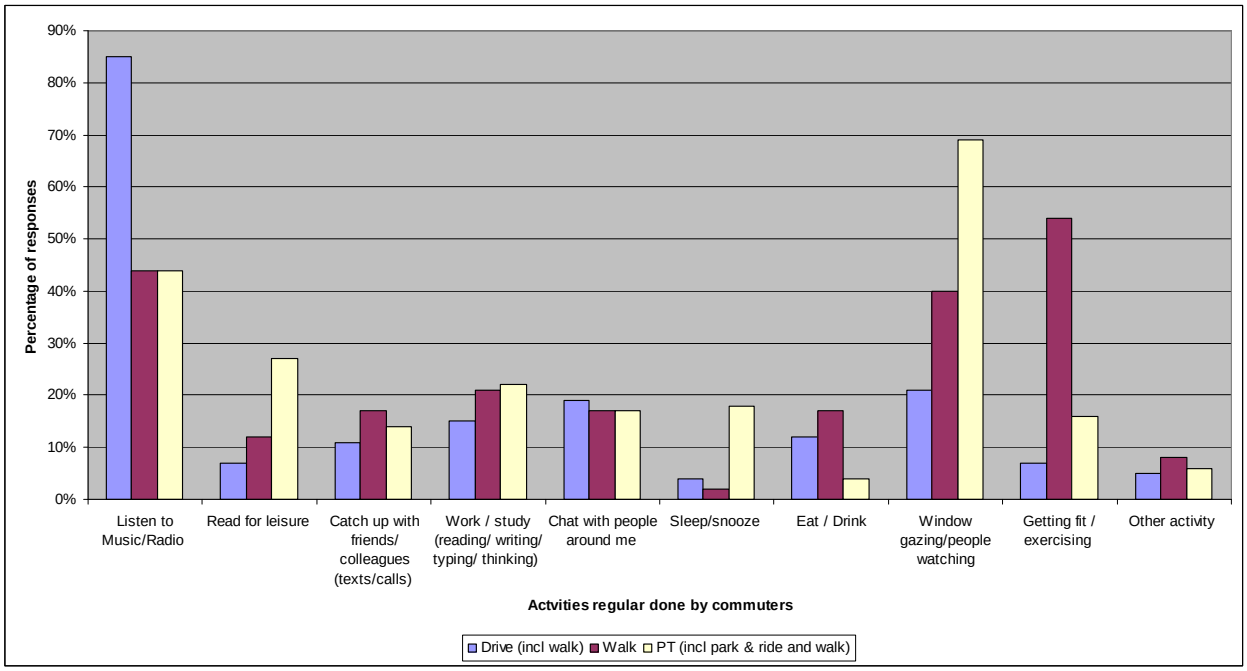
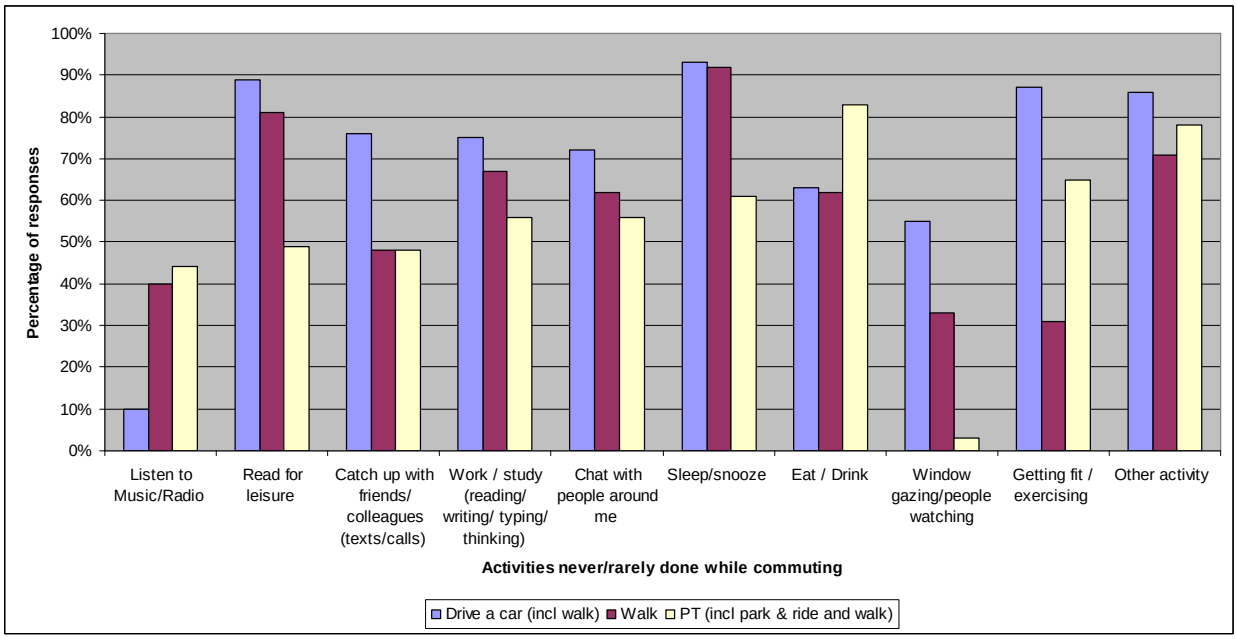


Figure 3.2 Activities never/rarely done by commuters on their way to work, by mode

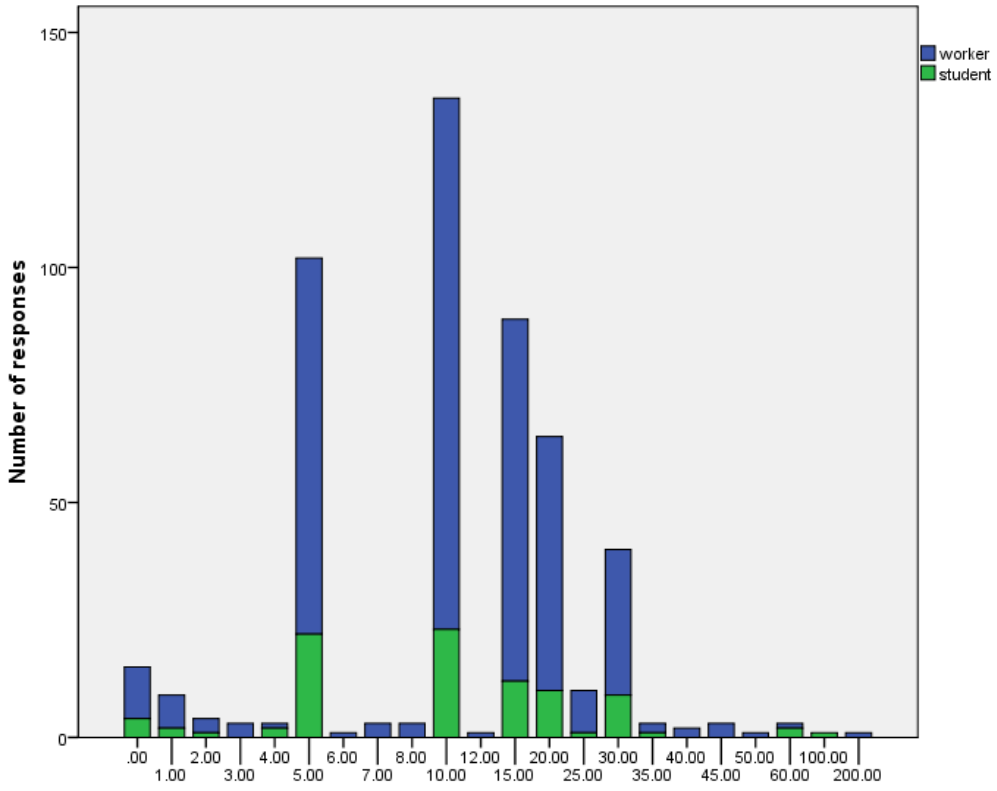


The activity that work commuters found particularly valuable was 'listening to music/radio' (34%), followed by 'work/study (reading/ writing/typing/thinking)', 'chat with people around me', 'window gazing/people watching' and 'getting fit/exercising', all with 10% of responses. Twenty-five percent (25%) of commuters to study found 'listening to music/radio' to be a particularly valuable use of their time, while 16% valued 'work/study (reading/writing/typing/thinking)' and 15% valued 'catch up with friends/colleagues (texts/calls)'. Commuters to work spent the most time 'listening to music/radio' (63% compared with 54% of students commuting) followed by 'window gazing/people watching' (9%, compared with 20% of students).

3.7 Ideal commute time

Respondents were asked 'Ignoring any commuting costs, what would be your ideal ONE-WAY, DOOR-TO-WORK (DOOR-TO-STUDY) travel time?' As shown in figure 3.3, responses tended to be in 'round' figures (eg 5, 10, 15, 20 minutes) and ranged from 0–200 minutes. Hence the median was the most appropriate average to focus on. The median IC was 10 minutes for both students and workers, and the mean IC was 14 minutes. This contrasted with the median EC of 20 minutes and mean EC of 25 minutes for all commuters, suggesting that, on average, commuters were spending 10 minutes more per day commuting *one way* than they would like to be spending.

Figure 3.3 Distribution of ideal commute time (in minutes) by workers and students



A very small proportion of commuters (3% or 15 respondents) wanted zero travel time: the most commonly identified IC was 10 minutes (28% of workers and 26% of students stated this), while 5 minutes was the second most commonly given time by 20% of workers and 24% of student commuters.

All in all, table 3.13 shows 75% of all commuters' IC was stated as ≤20 minutes. Nearly three-fifths (59%) of all respondents preferred an IC of 10–20 minutes. This replicated the findings of Young and Morris (1981) and Calvert and Alvineri (2009), as reported in section 2.7.

Table 3.13 Ideal commute time (in categories) by workers and students

Ideal commute time for all commuters (compressed)	F/T and P/T workers and students[a]		Total
	Workers	Students	
0–9 minutes	28%	34%	29%
10–19 minutes	47%	39%	46%
20 minutes	13%	11%	13%
25 minutes	2%	1%	2%
30 minutes	8%	10%	8%
35+ minutes	3%	4%	3%

a) Totals may not add to 100% due to rounding.

The median IC for motor vehicle drivers and walkers/cyclists commuting to work was 10 minutes, while the median IC for public transport users was 15 minutes. The median for student commuters most frequently fluctuated by mode used: drivers' median was 10 minutes, walker/cyclists 5 minutes and public transport users 12.5 minutes.

Comparing the median IC with the EC (refer to table 3.14), it appears that broadly, the median EC was double that of the median IC, irrespective of mode used to commute to work or study.

Table 3.14 Ideal commute time, by mode most frequently used when commuting to work or study

Mode used most frequently in a typical week commuting to work or study	Work – IDEAL commute time	Study – IDEAL commute time	All – IDEAL commute time	All – ESTIMATED commute time
Any mode	**N=407**	**N=90**	**N=497**	**N=497**
Median	10	10	10	20
Mean	14	14	14	20
Minimum	0	0	0	0
Maximum	200	100	200	120
Std deviation	13	14	13	17
Drive (includes walk)	**N=249**	**N=17**	**N=266**	**N=266**
Median	10	10	10	20
Mean	13	12	13	23
Minimum	0	0	00	2
Maximum	60	30	60	120
Std deviation	9	8	9	15
Walk/cycle	**N=52**	**N=15**	**N=67**	**N=67**
Median	10	5	10	15
Mean	13	14	13	18
Minimum	0	0	00	5
Maximum	45	100	100	100
Std deviation	9	25	14	16

Mode used most frequently in a typical week commuting to work or study	Work – IDEAL commute time	Study – IDEAL commute time	All – IDEAL commute time	All – ESTIMATED commute time
Public transport (includes park & ride and walk)	**N=77**	**N=44**	**N=121**	**N=121**
Median	15	13	15	30
Mean	18	16	17	34
Minimum	0	1	00	00
Maximum	200	60	200	90
Std deviation	23	13	20	18

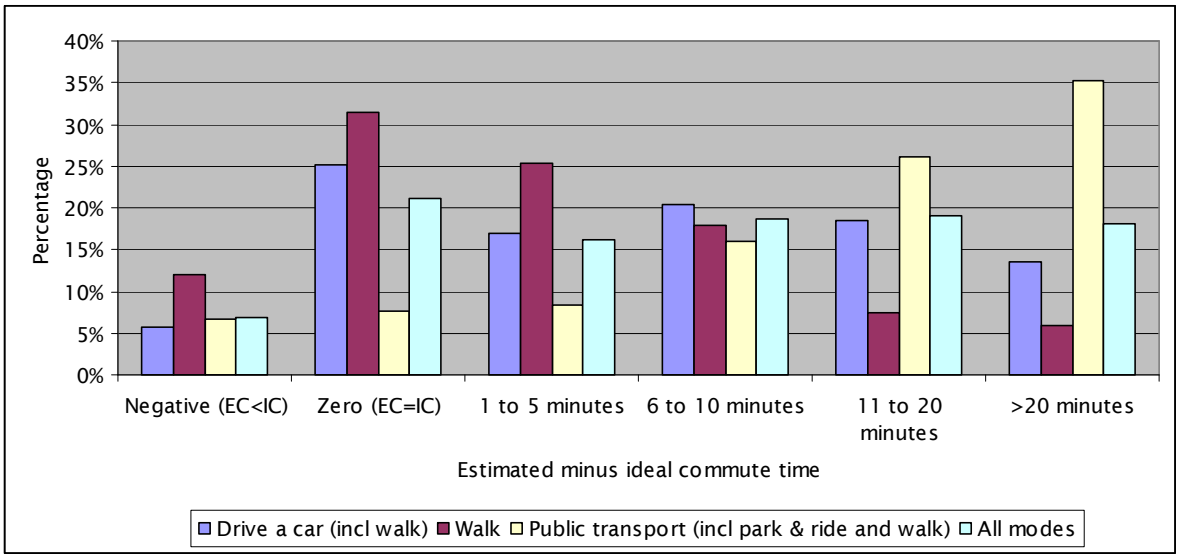
More than three-quarters of drivers (79%) and walkers (76%) chose an IC of <20 minutes, while only 50% of public transport users chose the same IC.

For 24% (N=97) of the working respondents, their EC equalled their ideal commute trip time (EC=IC), while 8% (N=31) gave an IC greater than their current commute trip time. Those responding that EC=IC were more likely to have estimated commute trip times of <20 minutes and walk to work as their usual mode of transport than those whose EC was greater than their IC (71% compared with 28%, and 23% compared with 9% respectively). There were no notable differences with respect to gender, age, or city of residence.

Like those whose EC=IC, workers who said their EC was shorter than their IC (EC<IC) were more likely to have an EC of <20 minutes and be walkers (and less likely to commute by driving) than those who reported an EC>IC.

As shown in figure 3.4, public transport users were much more likely to have an EC that exceeded their IC by more than 11 minutes and much less likely to have EC=IC than were walkers or car drivers. Thirty-one percent (31%) of walkers had EC=IC (a difference of zero minutes) and an additional 26% had an EC within 5 minutes of their ideal time, Drivers were not that much different: 25% had EC=IC and 17% were within 5 minutes of their ideal time.

Figure 3.4 Comparing the difference between the estimated and ideal commute time, by mode

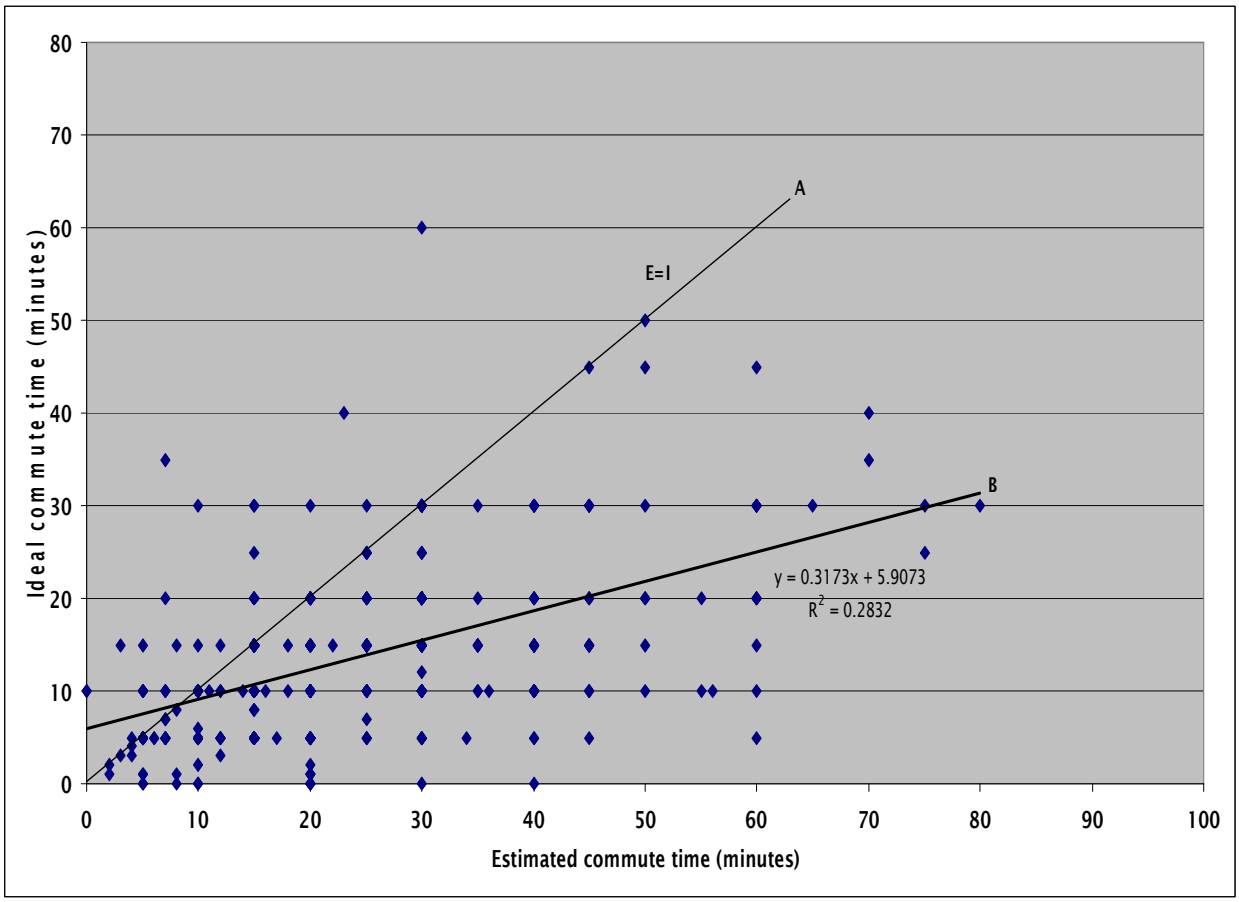


The choice of IC seemed to bear some relationship with the EC time to work. For example, 97% of those whose EC was less than 10 minutes, and 94% of those whose EC was 10–19 minutes, had an IC of less than 20 minutes, while only 73% of those whose EC was 20–29 minutes wanted the shorter commute of <20 minutes – and fully 24% of these people wanted to maintain a similar commute time to their current one.

Figure 3.5 is a scatterplot representing the relationship between the EC and IC for workers. Trendline 'A' is the line where EC=IC (ie IC and EC are consonant), showing that the vast majority of working commuters lay below this line – ie EC>IC, indicating that the preference was for ideal commuting times that were shorter than the (current) actual times. This could be interpreted as a 'degree of dissatisfaction with actual commuting time on the part of many travellers' (Paez and Whalen 2010). The pattern shown here was remarkably similar to those of Redmond and Mokhtarian (2001), Calvert and Avineri (2009) and Paez and Whalen (2010). In all cases, there was a small proportion of travellers who preferred to have a longer commute than currently, while the vast majority preferred to have a shorter commute time.

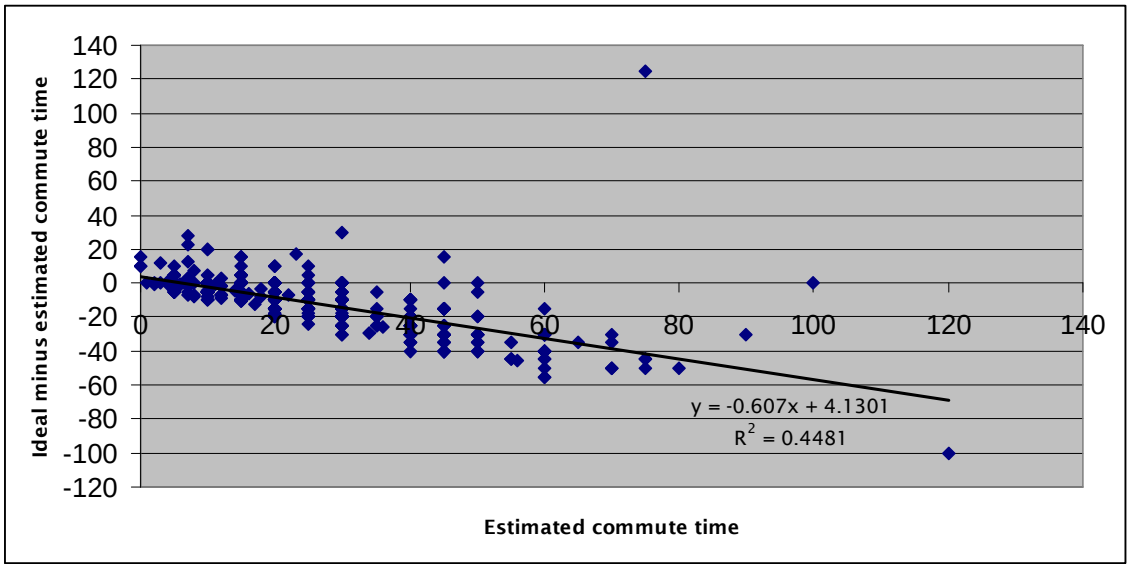
Trendline 'B' is the best-fit regression equation. It reveals that the smallest IC was greater than zero minutes (about 7–8 minutes), while the slope of the line indicates that as the EC increased, the IC also increased, but at a slower rate: eg the IC for someone travelling 30 minutes currently was 15 minutes (IC is 50% of EC), while for someone travelling an estimated 60–75 minutes, the IC was 25–35 minutes, or approximately 40% of the EC.

Figure 3.5 Relationship between estimated and ideal commute time



Regressing the EC against how much respondents wanted to change their commute (ideal minus estimated commute time) demonstrates, in a different way, the strong linear relationship between the IC and EC variables. As shown in figure 3.6, the value for R was 0.669, and R squared equalled 0.4481. Thus, approximately 45% of the variance in IC minus EC was linked to the variation in the EC.

Figure 3.6 Regression line showing ideal minus estimated commute time v estimated commute time



Calvert and Avineri (2009) concluded 'the longer one currently commutes, the higher one's ideal commute time tends to be', observing that this could be related to reference point theory. They proposed that people with longer actual commute times may have, on average, higher ideals than those with shorter actual commutes. Their example compared the relative proportional reduction of someone with a 2-hour commute and imagining a 30-minute commute, who might be happier with the idea than an individual currently commuting for 40 minutes and imagining a change to a 30-minute commute.

As shown in table 3.15, those whose estimated commute equalled their ideal commute (EC=IC), or whose EC<IC, were much more likely to A/SA that they enjoyed their commute than those whose EC was longer than their IC (59% and 71% compared with 30% – note that EC<IC was only true for 37 respondents).

Compared with workers whose EC>IC, workers whose EC=IC were much more likely to A/SA with the statements 'I enjoy my current job' (80% compared with 64%) and 'My commute trip is a useful transition between home and work' (58% compared with 35%). Conversely, respondents whose EC=IC were less likely than those whose EC>IC to A/SA with the statement 'The time I spend commuting is generally wasted time' (20% compared with 39%).

On the whole, it could be said that compared with those whose EC>IC, working commuters whose EC=IC enjoyed their work and their commute more, and found the commute a useful transition between home and work rather than a waste of time. This was comparable to the findings in the Canadian GSS study reported by Turcotte (2006). There was a notable consistency in the relationship between the EC and IC with a respondent's attitudes towards their commute.

Table 3.15 Enjoyment of time spent commuting with estimated v ideal commute time[a]

I enjoy the time I spend commuting to work	Ideal v estimated commuting time to work			Total
	EC>IC	EC=IC	EC<IC	
No. of respondents (N)	**279**	**91**	**37**	**407**
Strongly agree	5%	16%	16%	8%
Agree	25%	43%	55%	31%
Neither agree nor disagree	40%	29%	23%	36%
Disagree	24%	6%	7%	18%
Strongly disagree	7%	6%		6%

a) Column totals may not add to 100% due to rounding.

3.8 Trading between modes when time was not a factor

Commuters who drove to work or study on a regular basis (a minimum of 3–4 days a week) were asked to consider the possibility of using public transport or walking as an alternative, given certain conditions. There were 263 commuters in this category.

First, they were asked:

> 'If the cost and travel time (assume public transport services run frequently and are on time) from door-to-door were **exactly the same** whether you drove or took public transport to work/study, would you:
>
> - usually drive to work/study
> - usually take public transport (bus, train or ferry) to work/study
> - sometimes drive/sometimes take public transport.'

Forty-eight percent (48%) of vehicle-driving commuters responded that they would continue to usually drive, while a further 29% stated they would sometimes use public transport. Just under a quarter (24%) said they would usually take public transport in this situation. When asked if using public transport would be a better or worse use of their time than driving, 70% of those who opted for 'usually drive' said using public transport would be a *worse use* of their time. On the other hand, 92% of those who said they'd usually take public transport and 76% of those who would take public transport at least some of the time said public transport would be a *better use* of their time than driving. There was no distinctive effect of EC on the choice to use public transport or to drive.

The responses to the question about walking were quite different. The regular vehicle driver commuters were asked:

> 'If you could walk to work/study in the same amount of time as it usually takes you to drive there, would you:
>
> - usually walk to work/study
> - usually drive to work/study
> - sometimes drive/sometimes walk?'

Forty-three percent (43%) said they would usually walk and a further 30% said they would sometimes drive/sometimes walk. Less than a quarter (24%) said they would continue to usually drive. Almost all (99%) of those opting to usually walk stated that walking would be a better use of their time than driving, contrasted with 73% of those who said they would continue to usually drive and who viewed walking as a worse use of their time than driving. The length of their existing commute trip (in minutes) had no distinctive effect on the choice to walk or drive.

It was difficult to find a consistent effect of attitude on the responses to the mode choice questions. For example, while 86% (N=77) of those who A/SA with the statement 'It's important to me to use environmentally friendly travel methods (walking, cycling and public transport)' chose to usually or sometimes walk (and sometimes drive), only 43% (N=38) chose to usually or sometimes take public transport. Thirty percent (N=26) chose to both usually walk and usually take public transport, rather than to drive. Of the 155 respondents who A/SA that 'Being environmentally responsible is important to me as a person', 78% chose to usually or sometimes walk, while 60% chose to usually or sometimes take public transport. Only 17% chose to both usually walk and usually take public transport.

Even those who A/SA with 'If I could, I would drive to work (my study/training course) every day' (N=134) were inconsistent in their choices, as 68% (N=91) chose to usually or sometimes walk, and 42% (N=56) chose to usually or sometimes take public transport. Only 28% (N=37) chose to usually drive in both questions.

We considered the effect of employer-paid costs for buying and maintaining a vehicle (N=34 were in this situation), fuel (N=51), car parking at work (N=82) on a respondent's choice of whether or not to usually drive or to use public transport or walk. The availability of employer-paid car parking at work did not appear to deter drivers from choosing to use public transport or walk at least some of the time. However, in the case of public transport, those drivers who had vehicle purchase/lease costs and/or fuel costs covered by their employer were far less likely to use public transport under the conditions described (over 80% selected 'usually drive'). By contrast, workers whose employers did not pay any vehicle costs were more receptive to using public transport, with over 50% choosing to use it sometimes or usually.

With respect to walking, the influence of employer-paid costs was less pronounced, with about half (53%) of those whose employer's paid vehicle purchase/lease/maintenance costs and 40% of those whose fuel costs were paid stating they would continue to drive, while the remainder said they would walk 'sometimes' or 'usually'. Approximately 75% of workers whose employers did not pay any vehicle costs stated they would walk 'sometimes' or 'usually' in these circumstances.

Overall, the responses to these two questions by vehicle drivers suggested the choice of mode was influenced not only by cost, the amount of travel time required, and to some degree by whether or not employers would bear some or all of the vehicle-operating costs (either lease/purchase and/or fuel costs), but also by a driver's perception of the mode itself in terms of its comfort or quality (Li 2003, Litman 2008, Mackie et al 2003, Fosgerau et al 2007) or, alternatively due to the endowment effect (Morrison 1998, Hoorens and Bloem 1997). Hoorens and Bloem observed that encouraging people to switch from a current situation (in this case, mode) to another could require a higher payoff or benefit than what they already had: merely offering the same conditions but on a different mode (eg same amount of time, cost, level of comfort) as our scenario did, may not have been sufficient to induce a change. List (2004) noted that experienced consumers made more economically rational choices, which could explain why some respondents in our study did choose to switch modes.

Keeping the travel time 'constant' (ie the same as their existing commute time), drivers were asked to choose between driving and using public transport, or driving and walking, In the case of the public transport scenario, the travel costs for driving and using public transport were stipulated to be 'exactly the same'. Considering the responses to the two scenarios together, 54 drivers (21% of the 263 regularly driving commuters) said they would usually drive in both scenarios, and 40 drivers (15%) said they would usually use public transport and usually walk, as opposed to driving in the two scenarios. A further 42 (16%) said they would usually drive rather than use public transport, and would usually walk rather than drive.

Drivers clearly favoured walking over public transport (43% said they would usually walk, compared with 24% who said they would usually use public transport), even for those with long EC times of >30 minutes. One implication for public transport policy is that strategies to reduce public transport trip times – even while costs are comparable to those of driving – may not be sufficient to entice vehicle drivers to use public transport.

The question we asked about using public transport created a scenario where the travel time *and costs* were exactly the same and public transport services ran frequently and on time. While the response of drivers could be viewed as favourable in that 24% said they would usually take public transport and 29% said they would sometimes use public transport, it would be interesting to explore this further, perhaps with questions where public transport costs were less than fuel and/or parking costs, and/or the issues of service frequency, comfort, and routing were better specified. In addition, exploring the reasons why some drivers in either situation would not choose to use public transport but would choose to walk or drive could provide some insight into factors influencing mode choice.

3.9 Trading off commuting trip time

3.9.1 Halving or doubling existing commute times

We further explored the parameters of respondents' preferences for commuter trip times by asking them to choose between their existing commute trip time and (a) a commute trip time half of the existing one and (b) a commute trip time double the time of their existing one. Any costs incurred were held constant across all options and all 497 workers/students were asked the series of questions. Only 11 respondents (2%) indicated they might double their commute trip time: 6 of the respondents had existing commute trip times of less than 20 minutes and 6 usually commuted as a vehicle driver.

When offered the choice between their usual commute trip time and one that took half the amount of time, 28% chose their usual time and 72% preferred the trip that was half the time. The median EC for those who wanted to halve their commute time was 25 minutes, compared with a median EC of 15 minutes for those who preferred their usual commute trip time. As might be expected, only 31% of those who preferred the shorter commute trip time had an EC of <20 minutes, compared with 64% of those who preferred their usual commute time. Conversely, 42% of those selecting the shorter commute time had an EC of >30 minutes, compared with 24% of those who preferred their usual time.

Those preferring a commute trip of half the time also had a preference for a shorter IC (10 minutes compared with 15 minutes for those who preferred the status quo). There was no difference between students and workers who preferred the shorter commute trip, as both groups had a median IC of 10 minutes. The group of students preferring their usual commute time was too small (N=14) for additional comment.

Table 3.16 Median, mean and standard deviation of IC and EC, by preference for status quo or shorter (one-half) commute trip time

Assuming that any costs were the same in both situations, which would you prefer: your usual commute trip time, or one that takes half the amount of time? (For example, if your current commute trip time to work/study is 30 minutes, then the half time one would be 15 minutes.)		IC to work	IC to study	IC (all)	EC (all)
I'd prefer my usual commute trip time	**No. of respondents (N)**	**124**	**14**	**138**	**138**
	Median	10	20	15	15
	Mean	16	24	17	19
	Std deviation	20	24	20	16
I'd prefer a commute trip that takes half the amount of time	**No. of respondents (N)**	**283**	**76**	**359**	**359**
	Median	10	10	10	25
	Mean	13	13	13	27
	Std deviation	8	11	9	17

Considering the mode used most frequently to travel to work/study, public transport users were more than twice as likely as other mode users to choose a commute that was half the time than to keep their usual commute time. Walkers and car drivers were somewhat less likely to prefer a shorter (one-half) commute trip time.

Where EC>IC, the vast majority (84%) preferred a commute trip half the usual time, whereas those whose existing commute was either the same length or shorter than their reported IC were more likely to choose to keep their existing commute time (58% and 57% respectively). Respondents were remarkably consistent in their choices: more than 95% of those whose EC>IC and whose EC was >30 minutes preferred to have a commute trip of half the usual time. Similarly, those whose existing commute was >40 minutes were much more likely to have EC>IC (where the median specification of IC was approximately 40% of their EC) and to want to halve their commute time.

Respondents selecting 'I'd prefer a commute trip that takes half the amount of time' were asked: 'What additional activities could you do with the time you saved?' The responses were then coded as shown in table 3.17. Very few intended to engage in work or study activities: 9% of the 358 respondents identified more work or study as the sole 'additional' activity they would undertake using the time saved, with a further 15% stating that work/study would be one of the two or more activities they spent time on. For the most part, 24% of respondents provided a list of various combinations of non-work activities (eg sleeping, socialising, household chores, gardening, and/or reading), while the remainder identified a single activity, the most common being sleeping longer (14%), spending more time getting ready, including eating breakfast (7%), spending time with family/friends (6%), or relaxing/reading/ watching TV or dvds (6%). A few (2%) said they would start work and leave work earlier.

Table 3.17 Additional activities to use time saved by halving the commute trip time

Additional activity	No. of responses (N)	Percent
Exercise	13	4%
Get ready (includes eating)	25	7%
Family time/socialise	20	6%
Household chores	17	5%
Relax/read/play games/watch TV or dvd	22	6%
Sleep	48	14%
Various (not work/study)	86	24%
Various (includes work/study)	52	15%
Work/study	33	9%
Other (includes 'nothing', & 'I don't know')	37	10%
Total	**353**	**100%**

3.9.2 The ultimate travel time saving: instant travel from home to work

Workers and students were asked 'If you could use a Star Trek-like teleporter to instantly travel from home to work/study (and back again), what would you want to do?' Nearly four-fifths (79%) stated 'I'd teleport', while 21% said 'I'd want to spend some time travelling between home and work/study'. Commuters who walked to work/study on a regular basis were less likely to choose to teleport than were commuters using other modes (67% of walkers chose teleporting compared with 81% of drivers and 83% of public transport users). The median EC for teleporters was 20 minutes, compared with 15 minutes for non-teleporters. Overall, commuters whose EC was <20 minutes were less likely to choose to teleport than those who commuted >30 minutes each day (72% compared with 86%). The median IC for teleporters was also shorter (10 minutes) than for non-teleporters (15 minutes). Over one-half (52%) of those who did not want to teleport had EC=IC or EC<IC, while 78% of those choosing to teleport had EC>IC (hence, 22% had existing commute times that were equal to or less than their ideal commute time).

As was the case for respondents choosing to halve their commute time in response to the question 'Assuming that any costs were the same in both situations, which would you prefer: your usual commute trip time or one that takes half the amount of time?', respondents choosing to teleport were asked 'How would you use the time you saved by not having to commute?' The responses were coded as for the earlier question. Table 3.18 shows even fewer than those who had previously opted to halve their commuting time intended to use the time saved by teleporting in work or study activities: 7% of the 387 respondents identified work or study as the sole activity they would undertake using the time saved, with a further 10% stating that work/study would be one of the two or more activities they spent time on. The most common response (27%) was to provide a list of two or more non-work/non-study activities they would engage in, while a further 19% indicated they would sleep longer in the morning.

Table 3.18 Additional activities to use the time saved by not having to commute (ie by teleporting)

Additional activities	No. of responses (N)	Percent[a]
Exercise	16	4%
Getting ready (includes eating)	24	6%
Family time/socialise	30	8%
Household chores	12	3%
Relax/read/play games/watch TV or dvd	30	8%
Sleep	75	19%
Various (not work/study)	104	27%
Various (includes work/study)	40	10%
Work/study	29	7%
Other (includes 'nothing' & 'I don't know')	27	7%
Total	**387**	**99%**

a) Column total may not add to 100% due to rounding.

The 103 respondents[15] who chose to spend some time travelling between home and work/study were asked 'What is the minimum amount of time you want to spend travelling from home to work/study?' and 'What are the reasons you want to spend this time commuting to work/study?'. For the most part, the minimum commute times were identified in 5-minute segments (eg, 5, 10, 15, 20 minutes). The median 'minimal commute time' identified was 10 minutes. Ten minutes was also the most commonly identified time (26% of responses), followed by 5 minutes (23%) and 15 minutes (21%). Only one person proposed a minimum travel time of 1 minute, while two people suggested a minimum travel time of >30 minutes. Nearly half (47%) of non-teleporters gave the same value for their minimum travel time and their ideal travel time. Proportionately, more full-time workers, young people (aged 18–29), and people living in houses with four or more other adults aged 18+ chose to teleport than to not teleport.

Respondents were encouraged to provide up to three reasons for choosing to spend some time commuting (rather than teleport). As shown in table 3.19, the reason given most commonly (19% of all responses) was they wanted the transition/down time/time alone to 'have a mental break between work and home' or 'prepare me mentally for the day'. The next most common reasons were that having some commuting time gave the respondent thinking or reading time (14%) and that the proposed minimum commute time was quicker/shorter than the current commute time (14%).

15 Two of the 105 respondents who selected teleporting were excluded from the analysis of mean and median, as they chose commute times of 75 minutes – ie considerably longer than anyone else in the sample.

Table 3.19 Reasons for wanting to spend [a minimum amount of] time commuting to work or study

Reasons for preferring to spend some time commuting	No. of responses (N)	Percent
Listen to radio/music	11	6%
Catch up with friends/family	7	4%
Like/enjoy driving/cycling/bus/walking	9	5%
Exercise/fitness	16	9%
Transition/downtime/time alone	33	19%
Enjoy scenery/fresh air	8	5%
Relax/de-stress	18	10%
Thinking time or reading time	25	14%
Work/study	7	4%
Quicker/shorter than current commute	24	14%
Other	18	10%
Total	**176**	**100%**

Those who preferred to spend some time commuting to work were far more likely to A/SA that 'I enjoy the time I spend commuting to work' (64% compared with 33% of teleporters), 'No matter where I live, I intend to walk, cycle or use public transport to travel to work' (38% compared with 22%), and 'My commute trip is a useful transition between home and work' (66% compared with 35%). Perhaps unsurprisingly, teleporters were much more likely to A/SA with 'The time I spend commuting is generally wasted time' (39% compared with 9% of non-teleporters).

3.9.3 Satisfaction with existing commute time

We segmented the study population into four categories based on their responses to the two questions: 'Assuming that any costs were the same in both situations, which would you prefer: your usual commute trip time or one that takes half the amount of time?' and 'If you could use a Star Trek-like teleporter to instantly travel from home to work/study (and back again), what would you want to do?' as shown in table 3.20.

Table 3.20 Categorising study population based on responses to questions re: shortening their commute

		Response to question on teleporting	
		Yes	**No**
Response to question on halving the commute time	**Yes**	'Too much now, could give it up' (N=314)	'Too much now, but want some' (N=45)
	No	'Got it right, could give it up' (N=78)	'Got it right, leave my commute time be' (N=60)

The people who were satisfied with their existing commute time (described as 'Got it right, leave my commute time alone') had a matching IC and EC median time of 15 minutes: sixty percent (60%) had an EC time that matched or was less than their stated IC time (EC≤IC). Compared with the other three groups, they were more likely to A/SA that they enjoyed the time spent commuting and valued the

commute trip as a transition between home and work. They were far less likely to A/SA that their commute trip was wasted time.

Fifty-nine percent (59%) of the 'Got my commute time about right, but could give it up if the right offer came along' segment had an EC time that matched or was less than their stated IC time (EC≤IC). However, they differed from the first segment of commuters in that their median IC was 10 minutes rather than 15 minutes. As table 3.21 shows, compared with the 'Got it right, leave my commute time alone' segment, this group enjoyed the time spent commuting at a lower rate (54% compared with 67%); were less likely to A/SA that the commute trip was a useful transition (46% compared with 62%); and were more likely to state that their commute trip was wasted time (28% compared with 5%).

Table 3.21 Characteristics of commuters segmented by their responses to shortening their existing commute

	Category of commuter (based on time spent commuting)				
Characteristics	**'Got it right, leave it be'**	**'Got it right, could give it up'**	**'Too much now, but want some'**	**'Too much now, could give it up'**	**Total**
No. of respondents (N)	**60**	**78**	**45**	**314**	**497**
Proportion of all commuters	12%	16%	9%	63%	100
Median EC (mins)	15	15	20	25	20
Median IC (mins)	15	10	15	10	10
EC>IC	40%	41%	60%	87%	53%
Distinctive mode use characteristics		More drivers & fewer public transport users		Fewer walkers & more public transport users	
Enjoy the time I spend commuting *to work* (A/SA)	67%	54%	60%	27%	40%
The time I spend commuting *to work* is generally wasted time (A/SA)	5%	28%	14%	42%	32%
Commute trip is a useful transition between home and *work* (A/SA)	62%	46%	71%	32%	42%
Distinctive demographic characteristics	More likely a part-time worker	More likely a full-time worker; more likely male	More likely female	Less likely to live in inner city AKL/WLG; more likely to be in AKL/WLG metro; more likely to be aged 18–29	

The smallest group in the sample (9% of all commuters) were those who had 'Too much time spent commuting now, but want to have some time commuting'. More likely to be women than the other types of commuters, they had a preference for a commute half of their current commute time, which would bring their EC in line with their stated IC, but they did not want to do away with commuting altogether (they responded 'no' to teleporting).

The majority of commuters (63%) fell into the 'Too much time spent commuting now, and definitely could give it up' category: at 25 minutes, their median EC was clearly too long (their median IC was 10 minutes) and they responded favourably to both reducing their commute trip time by half and to teleporting. Far fewer A/SA they enjoyed the time spent commuting (27%) – they were less likely to

A/SA the commute trip was a useful transition (32%) – and over two-fifths (42%) stated their commute trip was wasted time. It may be that these attitudes could change if their commute time matched their stated IC. This segment was generally composed of younger respondents: about 41% were in the 18–29 age group, compared with a mean of 27% in the other commuter categories. They were less likely to walk to work/study and more likely to use public transport than other types of commuters.

4 Discussion and conclusions

4.1 Overview of findings

The following are highlights of the analysis as reported in chapter 3:

- The median estimated commute time (EC) for all commuters was 20 minutes – for workers it was 20 minutes and for students, 25 minutes. The typical worker spent 20 minutes commuting as a driver, 15 minutes as a walker or 30 minutes via public transport.
- The median ideal commute time (IC) of 10 minutes for all commuters suggested that, on average, commuters were spending 10 minutes more per day commuting *one-way* than they would like to be. Approximately 75% of commuters gave an IC of <20 minutes.
- There was a correlation between IC and EC. As the EC increased, IC also increased, but at a slower rate: the ideal commute time for someone whose current commute took 30 minutes was 15 minutes (IC was 50% of EC) while for someone whose current commute took an estimated 60–75 minutes, the IC was 25–35 minutes, or approximately 40% of EC.
- Walkers were more likely than drivers to have EC≤IC and EC<20 minutes. They were also twice as likely to agree/strongly agree (A/SA) that they enjoyed their commute than either drivers or public transport users (68% compared with 35% and 35% respectively).
- About 40% of workers and 37% of students A/SA that 'I enjoy the time I spend commuting to work (to study/training)'. People who walked/cycled (as opposed to driving or using public transport), had shorter commutes (median was 15 minutes compared with the disagree/strongly disagree (D/SD) median of 30 minutes), lived in Wellington and/or in the inner city, and enjoyed their current job were more likely to A/SA they enjoyed their commute time.
- The reasons people enjoyed their commute time included: a transition time, a time to think and/or relax (35%); being able to listen to radio/music; being out in the fresh air and/or enjoying the scenery; and for exercise. The primary reasons given for not enjoying the commute were the traffic (29%) and that it was a 'waste of time' (20%).
- The most common activity done while commuting, using any mode, was 'listen to music/radio', distantly followed by 'window gazing/people watching' and 'chat with people around me'. Twenty-two percent (22%) of public transport users and 21% of walkers reported they regularly did some work or study activity, namely 'work/study (reading/writing/typing/thinking)', while commuting.
- Respondents who A/SA with the statement 'I enjoy my job' were more than twice as likely to A/SA they enjoyed the time they spent commuting to work than to disagree with that statement (46% compared with 19%).
- Public transport users were more than twice as likely as other mode users to prefer a commute that was half the time.
- Respondents were remarkably consistent in their choices: more than 95% of those whose EC>IC and whose IC was >30 minutes preferred to have a commute trip of half the usual time.

- Of the 350+ respondents who would prefer to have either half their current commute trip time or teleporting, or both, very few intended to engage in work or study activities: 9% or 7% respectively identified work or study as the sole activity they would undertake using the time saved, with about 15% including work or study in a list of two or more activities they would undertake. The more common responses identified non-work/non-study activities such as sleeping, more time getting ready for work, eating breakfast, family time, household chores and reading.
- The 103 respondents who would prefer not to teleport identified a (median) 'minimum commute' time of 10 minutes. Their reasons for choosing not to teleport included wanting transition time/downtime between home and work, and wanting some thinking or reading time.
- Holding the travel time constant showed 21% of drivers would continue to commute by driving. However, 15% said they would 'usually use public transport' or 'usually walk', and a further 16% would 'drive rather than use public transport' or 'walk rather than drive'.
- Twelve percent (12%) of respondents were satisfied with their existing commute time: they would prefer to keep their existing commute time rather than halving it or teleporting, compared with 63% who were clearly dissatisfied and would prefer to halve their commute time and to teleport. The commuters satisfied with their commute time had a median EC of 15minutes, while the dissatisfied commuters had an EC of 25minutes.
- Proportionately, more full-time workers, young people (aged 18–29), and people living in houses with four or more other adults aged 18+, would prefer to teleport than to not teleport.

There was a lot of variation in preferences and attitudes across individuals.

4.2 Categorising commuters by attitudes

Bringing together a combination of several variables (eg existing commute characteristics, responses to questions about preferred commute characteristics, demographics and attitude statements) analysed in chapter 3, we were able to segment commuters into three distinct categories, as shown in table 4.1.

Table 4.1 Categories of commuters (based on attitudes toward time spent commuting)[a]

Category		I enjoy the time I spend commuting to work (to study/training)	My commute trip is a useful transition between home & work	The time I spend commuting is generally wasted time
Contented (value travel time) 34%	25%	A/SA	A/SA	Neutral or D/SD
	5%	Neutral	A/SA	D/SD
	4%	A/SA	Neutral	D/SD
Discontented (travel time is wasted) 19%	9%	D/SD	D/SD	A/SA
	5%	Neutral	D/SD	A/SA
	5%	D/SD	Neutral	A/SA
Ambivalent 47%		Respondents who selected Neutral for two or more statements plus those who selected A/SA or D/SD for both/all three conflicting statements		

a) A/SA = Agree/strongly agree; D/SD = Disagree/strongly disagree; Neutral = Neither agree nor disagree

Contented commuters (N=171) formed 34% of the commuter dataset. They clearly valued their commute time: they D/SD it was wasted, and A/SA with one or both of the statements about enjoying

their commute and it being a useful transition between home and work. Where they did not A/SA, their response was neutral ('neither agree nor disagree'). For 45% of them, their estimated commute time matched or was less than their stated ideal commute time (EC≤IC): their median EC of 20 minutes was closely aligned with their IC of 15 minutes. When offered a choice of (a) a commute trip taking half their usual commute trip time and (b) the option to teleport, one-fifth (22%) elected to maintain their usual commute trip time in both cases, unlike Discontented commuters, of whom only 1% opted for the same choice.

While similar quantities of Contented and Discontented commuters drove vehicles to work/study, the mixture of other mode use was quite distinctive, in that 21% of Contented commuters walked to work, compared with 6% of Discontented commuters. Twenty-one percent (21%) used public transport, compared with 34% of Discontented commuters. Contented commuters were more likely to be women (63%), while 60% of Discontented commuters were men. Contented commuters were also more likely to live in the inner city (27% compared with 7% of Discontented commuters).

The most common activity undertaken while commuting by all groups of commuters was listening to music/radio, although Contented commuters reported listening at lower rates than Discontented commuters (41% compared with 54%). One-fifth (21%) of Contented commuters reported 'getting fit/exercising' as a commuting activity, a much higher rate than Discontented or Ambivalent commuters, who reported 4% and 5% respectively.

Discontented commuters (N=99) were 19% of all commuters. They A/SA that the time they spent commuting was wasted time, and D/SD with one or both of the statements about enjoying their commute and it being a useful transition between home and work. Where they did not D/SD with the statement, they were neutral ('neither agree nor disagree'). Their median EC time of 30 minutes was half again as long as the Contented or Ambivalent commuters' EC, while their IC of 10 minutes was shorter, offering some insight as to why they might have been dissatisfied with their commuting experience. The actual commute time exceeded the IC time for 89% of Discontented commuters, compared with 55% of Contented commuters. When offered the possibility of altering their current commute, Discontented commuters were almost unanimous in choosing to teleport (96%) or to shorten their commute trip time to half of their existing commute (91%). Discontented commuters were less likely than Contented commuters to A/SA with the statement 'I enjoy my job/course of study' (60% compared with 79%).

Ambivalent commuters (N=232; 47%) gave mixed and/or non-committal ('neither agree nor disagree') responses to at least two of the three attitude statements. As might be expected, their responses as a group lay between the Contented and Discontented commuters: for example, 76% of Ambivalent commuters had EC greater than IC (compared with 55% of Contented and 89% of Discontented commuters). Their median EC was 20 minutes, the same as Contented commuters, but their median IC was 10 minutes, which was the same as the Discontented commuters and shorter than the Contented ones. The greater disparity between the EC and IC could explain why, when offered an alternative to their current commute time, they more commonly (than the Contented commuters) selected commute trips that were half their current ones, or to teleport.

Table 4.2 Characteristics of different categories of commuter

Characteristics	Category of commuter (based on attitudes toward time spent commuting)			
	Contented (value travel time)	Discontented (travel time is wasted)	Ambivalent (take it or leave it)	Total
No. of respondents (N)	**171**	**99**	**242**	**512**
Proportion of all commuters	34%	19%	47%	100%
Prefer ½ commute time?	59%	91%	74%	72%
Prefer teleport?	65%	96%	82%	79%
% preferring existing commute time & saying 'no' to teleporting	22%	1%	9%	12%
Median EC (mins)	20	30	20	20
Median IC (mins)	15	10	10	10
Half EC (mins)	10	15	10	10
EC>IC	55%	89%	76%	71%
Proportion of walkers	21%	6%	11%	13%
Proportion of public transport users	21%	34%	21%	24%
Distinctive demographic characteristics	Inner city – 27% F – 63% AKL – 44% 0 veh – 19%	Inner city – 17% F – 40% AKL – 58% 0 veh – 7%	Inner city – 18% F – 49% AKL – 53% 0 veh – 12%	
Zero vehicles in household	19%	7%	12%	14%
Activities while commuting	<listening to music/radio; >getting fit			
'I enjoy my current job' (A/SA)	79%	60%	61%	70%

4.3 Implications for valuing travel time and travel time savings

> *Time spent travelling is not all lost, especially in good quality public transport – some is spent on productive work, and some is spent on welfare increasing relaxation and thought* (Centre for Transport & Society and Centre for Mobilities Research 2007, p4).

The results of our research support the assertion by the Centre for Transport & Society that from the perspective of *some* commuters, time spent travelling *by any mode* may not be all lost.

The median IC time of 10 minutes identified by our sample of commuters meant that 68% spent more time commuting each day than they would have liked to. Their IC time varied by mode (eg 79% of drivers and 76% of walkers chose an IC of <20 minutes, compared with 50% of public transport users), and by length of existing commute (eg 96% of those whose EC was <20 minutes preferred an IC time of <20 minutes, compared with 73% of those whose EC was 20–29 minutes).

However, while they may have spent more time commuting than they wanted, most did not want to do away with their commute altogether. Very few (3%, ie 15 respondents) specified a 'zero' ideal commute time. The best-fit linear regression equation suggested a minimum IC time for the study population of 7–8 minutes, which was very close to the median IC time of 10 minutes. (It should be noted that at the same time, most (79%) also said, if provided with the opportunity, they would teleport to work/study, thus altogether avoiding the time spent commuting. The reasons for this could be explored in future research).

Similar to what Turcotte (2006) found for Canadian commuters, many people (40%) in the study population enjoyed the time spent commuting, which may partially explain why most respondents did not want to eliminate their commute entirely. As was the case with Calvert and Avineri (2009), walkers and cyclists were more likely to enjoy the time spent commuting than drivers or public transport users.

Job enjoyment was related to people enjoying their commute: those who enjoyed their jobs were also much more likely to enjoy their commute, while people who did not enjoy their jobs also reported that they did not enjoy their commute. The reasons people enjoyed their commute included it being a transition time, a time to think and/or relax (35%); being able to listen to radio/music; being out in the fresh air and/or enjoying the scenery; and for exercise. The primary reasons given for not enjoying the commute were the traffic (29%) and that it was a 'waste of time' (20%). Over half (54%) of walkers and cyclists identified 'exercising', 'getting fit' and 'fresh air' as both activities they undertook and as reasons for enjoying their commute.

Enjoying their commute time did not mean people used it to expand their work/study day. Rather, they spent the time on other activities: 93% of commuters who were 'polychronic' (undertaking one or more activities at the same time as travelling) were listening to music/radio, window gazing/people watching, and chatting with people around them. About one-fifth reported doing work or study activity, namely reading/writing/typing/thinking, while commuting.

We did not find evidence supporting the concept of a constant travel time budget over all activities[16], although it could be said that the identification of a (minimum) IC time indicates that there may be a budget for commuter travel. When asked what they would do with the travel time savings (TTS) from shortening or doing away with their commuting trip (by teleporting), few respondents reported their intention to use the time to travel to participate in other activities. For the most part, the activities identified were 'home-based', such as spending time with family, reading, watching TV/dvd, sleeping, and household chores.

Nor did shortening their commute time mean people thought they would use the time saved to do work or study, as has been supposed by some previous studies: less than 10% identified work or study as the sole activity they would undertake using the time saved, with about 15% including work or study in a list of two or more activities they would spend time on. The more common responses identified non-work/non-study activities such as sleeping, more time getting ready for work, eating breakfast, family time, household chores and reading.

There was a core of commuters for whom it would appear that TTS would have zero value: 12% selected to maintain their existing commute rather than halve it or teleport. They gave clear reasons

16 It is fair to say that our questionnaire was not designed to fully explore the issue of a constant travel time budget.

for being non-traders, the most common being wanting to have transition or 'down time' between home and work, and having thinking or reading time.

The wide diversity of values for TTS across a range of services, as uncovered in the literature review and through our fieldwork, suggest it may be inappropriate to use a mean value for TTS in economic evaluation. Not only do our findings point to a non-zero value for the IC time (which could also be described as a preference for a minimal commute time), indicating that reducing travel time for people whose commute is at or below this threshold may have no value to them, but we found evidence to suggest the distribution around the 'mean' is skewed and/or non-linear. One-third (33%) of commuters were contented with their time spent commuting, enjoying it and finding it a useful transition between home and work. Fewer (19%) were classed as discontented: ie they did not enjoy their commute and thought the travel time was wasted. The amount of time they currently spent commuting and their IC times offered some explanation as to their different status, in that the median EC of contented commuters was 20 minutes compared with a 15-minute IC (a mismatch of 5 minutes), while the median EC of discontented commuters was 30 minutes and their IC was 10 minutes – a mismatch of 20 minutes.

If travel time (and cost in the case of public transport) was held constant between driving and using public transport or driving and walking, many drivers in our study population were willing to substitute walking and/or taking public transport for driving a car to work/study – only 21% (N=54) of those who regularly drove said they would usually drive in response to either scenario, while 15% (N=40) said they would 'usually walk' and 'usually take public transport'. In all, 89% of the 263 regular drivers were willing to change modes at least some of the time. Walking was definitely preferred to taking public transport. Hence, we did not find strong evidence, with respect to regular car commuters, to suggest that the endowment effect was operating and, in fact, there were very few non-traders.

We did not find clear evidence of 'affective' attitudes affecting respondents' mode choice, in that those who said they wanted to drive every day if they could showed a strong propensity to shift to walking or public transport use when offered the opportunity of keeping the same travel time. Those who said being environmentally friendly was important to them (two different statements) showed a propensity to drive rather than use public transport, although they were more likely to choose to walk at least sometimes. Perhaps other statements could have elicited more distinctive responses. Other types of analysis, such as analysis of variance test (ANOVA), principal components analysis, or confirmative factor analysis used by Steg (2004), may have revealed linkages that we did not find.

The propensity of respondents to report both their estimated commute time and their ideal commute time in 5-minute intervals could indicate that very small units of travel time savings (eg several seconds, or a minute or two) may be relatively meaningless to them, and hence should not be valued.

Current practice in executing stated preference surveys for national valuation of travel time and TTS does not consider that some/many people may want to travel, may value their travel time, and may choose to drive rather than walk or cycle, not because it is the quickest method of travel, but because they derive some utility from it (or, at the very least, experience less disutility on that mode over another). For example, people may choose to spend more time travelling (eg walking rather than driving) for fitness, relaxation, transition or thinking time, or because they are concerned for the environment. If the trip fulfils another purpose, they may be willing to accept a longer travel time. Furthermore, while respondents may choose in a stated preference experiment to reduce their commute travel time, our results indicate they may have a journey time threshold below which time savings have no value (and they will 'lose' their other perceived benefits). Stated preference surveys

could explore this by including questions on time use and attitudes to it, as well as asking respondents to identify their ideal commute time, possibly by a given mode and trip purpose.

Hence, we conclude there is apparently much more variation (both random taste variation and variation systematically related to observed and attitudinal factors) across individuals than is currently recognised and accommodated in official evaluations. There are also indications there might be more thresholds and non-linearities in behaviour than are included in such analyses and appraisals. A core of commuters responding to our survey were very clear that they had a minimum threshold time for their commute and were unwilling to go below this threshold or abandon their commute altogether. This raises the potential issue that TTS for commuters whose existing travel time is below a certain threshold are incorrectly being counted as positive benefits to a project, when their actual value might be zero or even negative.

4.4 Limitations of research

Because available resources limited our ability to collect sufficient data to create a representative sample of the Auckland and Wellington metropolitan area worker and student populations, the fieldwork for this project is exploratory rather than definitive. In order to increase the size of our study population, we chose to (1) use an online survey to gather data and (2) to combine the fieldwork for two separate research projects. The second research project had a focus on comparing inner city residents' travel behaviour and attitudes with those of people who resided elsewhere in the Auckland and Wellington metropolitan areas. In order to have a sufficient number of respondents from the inner city areas, the data collection was purposely biased to inflate the proportion of these respondents in the dataset.

However, the effect of this over-representation may not be all that significant. For example, while inner city workers/students of Auckland and Wellington (combined) were far more likely to A/SA (57%) that they enjoyed the time spent commuting than were residents of AKL/WLG cities outside the CBD (38%) or the wider metropolitan areas of AKL/WLG (31% – refer to table 3.9), the proportion who A/SA in the overall sample was 40%, well within any confidence intervals that could be calculated for this study, or indeed any larger study.

Calvert and Avineri (2009) observed that non-zero values for IC may be due to respondents relating to a *reference point* when giving their ideal travel time: ie, it is possible that people gave non-zero commute times because they were imagining the fastest possible commute given their current residential address and job location, rather than what would be their ideal if any time were possible. This was not explored in the current research project.

4.5 Areas for future research

With respect to our existing dataset, the next logical step would be to develop some multi-dimensional models based on the dataset we have created, which could explore the relative strength of the interaction of different variables on respondents' choices vis-à-vis reducing their travel time, ideal v estimated commute time, and attitudes. The ideal, however, would be to expand the dataset to be more representative of the metropolitan area population and verify the findings here through more extensive modelling. The use of GPS or other technology to confirm the 'estimated' commute time would also be helpful.

More importantly, further work to verify our exploratory research results is required to ascertain the existence and values of:

1 potential minimum travel time thresholds for commuting and other purposes

2 the effect of current travel time, particularly for the commute trip, on the value of proposed TTS (eg do people who have shorter trips have different VTTS than those with longer journeys?)

3 variations in TTS values due to random and systematic taste variations of individuals, particularly including how the value of travel time varies with the use of travel time.

We consider that it is likely such variations in value of TTS, and the inclusion of minimum thresholds of travel time for commuting, can be accommodated in conventional evaluation and appraisal frameworks.

Expanding the data collection to explore other issues set aside for this research project could yield informative results. For example, Barrett (2010) used an internet survey (879 respondents, 18% response rate) and mail-back survey (242 respondents, 43% response rate) to specifically examine how the value of travel time was affected by the level of public transport infrastructure and services available to consumers resident in three Californian communities. Creating several discrete choice models, Barrett found that value of time was a function of the level of transportation infrastructure available to the commuter: it decreased with increases in bus stop density or increased frequency of service[17]. He also found demographic factors to influence the value of travel time, in that it increased with car ownership and decreased with age; the value of travel time increased with money income and decreased with increases in an individual's time budget.

The value of travel time may also be affected by the services offered on public transport, as indicated by Connolly et al's (2009) preliminary work assessing the effect of offering broadband connection on the rail network in the UK. In New Zealand, the opportunity would be to provide such services on buses, as buses carry the vast majority of public transport passengers. It is well known that value of time and TTS on public transport varies in crowded conditions (see, for example, Wardman and Whelan 2011). The same is true for motor vehicles in congested traffic conditions (eg NZTA 2010, Wardman and Ibáñez 2011). It is possible that the usefulness of travel time, and the value or otherwise of reducing it, will depend on the crowding and traffic conditions experienced.

Given that people make decisions on where they reside for many reasons (housing, schooling, access to other social and economic opportunities) that include their normal commute, it may be that most commuters do not expect to achieve their IC time. In addition, the cost of creating a transport system that does meet commuters' aspirations could be substantial. It could be useful to explore the 'tolerated' or 'acceptable' commute time rather than an IC time and to develop some understanding of the different components/trade offs associated with location decisions and commuting.

As noted in chapter 3, respondents had a distinct propensity to state their existing commute (and IC) times in multiples of five minutes. Rietveld (2002) explored this propensity in travel surveys and found that the probability of rounding up and rounding downward were biased, leading to reported travel times being higher than the average of actual travel times. The implications of such rounding for calculating the value of travel time and TTS has not been considered. For example, if commuters – or

17 Barrett (2010) did not include both in the same model, as he found they were too highly correlated.

travellers for other purposes – are not concerned with knowing precisely how much time they spend travelling, then it may be that they do not/would not value small savings in travel time.

Surprisingly few commuters chose to have zero minutes travel time for their IC time. It could be interesting to explore the reasons underlying this – eg is there an issue of realism: do people select a minimum practical time because they cannot conceive of a zero travel time?

In the fieldwork we explored the idea of eliminating the time spent commuting by offering the option of 'teleporting', as has been done in various other studies such as Young and Morris (1981) and Calvert and Avineri (2009). To date, however, no one has investigated whether or not respondents view the concept of teleporting as a realistic option and thus whether their responses are valid or not.

Another area for potential exploration is the concept of 'ish' (Copley et al 2002), wherein travellers are thought to schedule appointments with a degree of flexibility (ie 10'ish', rather than 10am) in recognition of the fact that travel time variability exists, is difficult to predict, and being late is acceptable for certain appointments. While Copley et al explored the concept for business appointments, it may be true also for commuting where employees have flexible starting times, and could explain some of the choices described here.

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Appendix A Value of time questionnaire – January 2011

A.1 Screening section

S1. Which best describes you? You may select up to 2 responses.

A	Working full time (30+ hours per week)
B	Working part time (less than 30 hours per week)
C	Full-time student
D	Part-time student
E	Looking for work/unemployed
F	Looking after home and family
G	Retired
H	Beneficiary
I	Other

S1b Which of these cities do you live in?

IF C OR D SELECTED IN S1 PLEASE USE 'Which of these cities do you live in term time?'

Auckland	1	Go to S2.1 (max N=300)
Wellington	2	Go to S2.2 (max N=300)
Christchurch	3	Terminate
Other location	4	Terminate

The skip is hierarchical (ie A overrides C overrides B overrides D overrides E-I)

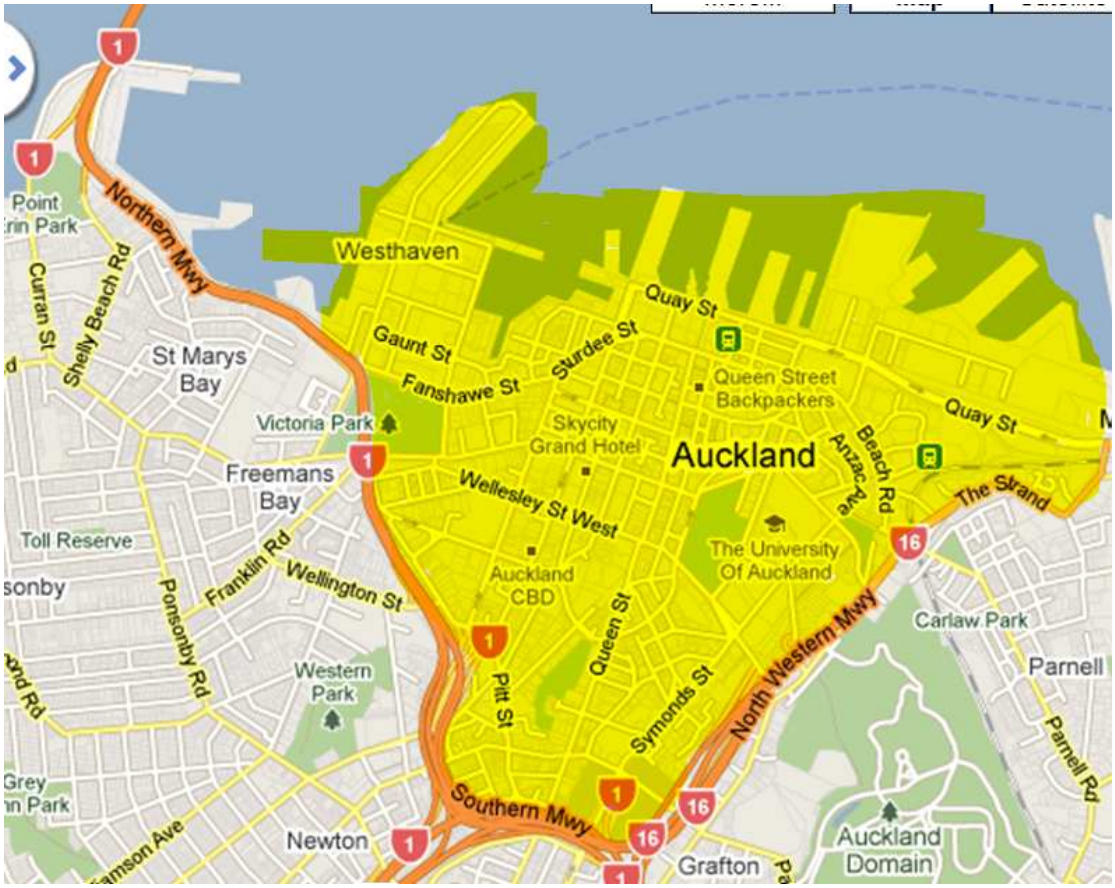
If one choice is A then WORK section.

If one choice is C then STUDY section.

If one choice is B then WORK.

If one choice is D then STUDY.

If choice is E-I →Go to Q26.



S2.1. Looking at the map above, please tell us where your residence is located.

A	In Auckland's central city area (as highlighted by yellow)	
B	Elsewhere in Auckland City	
C	In another Auckland Region city (Waitakere; North Shore; Manukau)	
D	Somewhere else (where?) _____	TERMINATE

S2.2. Looking at the map above, please tell us where your residence is located.

A	In Wellington's central city area (as highlighted by yellow)	
B	Elsewhere in Wellington City	
C	In another Wellington Region city (Lower Hutt; Upper Hutt; Porirua/Tawa)	
D	Somewhere else (where?) _____	TERMINATE

Programmer instruction

Need at least N=120 respondents residing in central city areas across both Auckland and Wellington. Eg minimum quota N=120 who answer EITHER A at S2.1or A at S2.2.

A.2 Main survey

A.2.1 WORK section

WK2. In the last 4 weeks, how often did you use each of the following travel methods to commute to work?

	5–7 days a week	3–4 days a week	1–2 days a week	Less than one day a week	Not at all
Driving a motor vehicle (car, truck, van, motorcycle)	A	B	C	D	E
Passenger in a motor vehicle	A	B	C	D	E
Walking/jogging	A	B	C	D	E
Bicycle	A	B	C	D	E
Public transport (bus, train, ferry)	A	B	C	D	E

For those who selected A or B for 'drive a motor vehicle':

WK3. Does your employer pay for any or all of your costs for:

Buying and maintaining your motor vehicle (leasing; car allowance; company car; WOF; registration; etc.)	Yes	No
Fuel	Yes	No
Parking your car at work	Yes	No

WK4. Please estimate the amount of time it usually takes you to commute from your home to your workplace.

_____ minutes

WK5. Indicate your agreement or disagreement with each of the following statements:

	Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree
I enjoy the time I spend commuting to work.	1	2	3	4	5
No matter where I live, I intend to walk, cycle or use public transport to travel to work.	1	2	3	4	5
I enjoy my current job.	1	2	3	4	5
The time I spend commuting is generally wasted time.	1	2	3	4	5

	Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree
My commute trip is a useful transition between home and work.	1	2	3	4	5
If I could, I would drive to work every day.	1	2	3	4	5

If select 1 or 2 for 'I enjoy the time I spend commuting to work.' → Go to WK6.

If select 3, 4 or 5 for 'I enjoy the time I spend commuting to work.' → Go to WK7.

WK6. What are the reasons you enjoy the time you spend commuting to work? Please provide up to 3 reasons.

1	
2	
3	

→ Go to WK8.

WK7. What are the reasons you don't enjoy the time you spend commuting to work? Please provide up to 3 reasons.

1	
2	
3	

WK8. In a typical week, how often do you do the following activities while you are commuting to work?

Activities	Never/ rarely	Less than half the time	About half the time	More than half the time	Always/ almost always
Listen to music/radio	1	2	3	4	5
Read for leisure	1	2	3	4	5
Catch up with friends/ colleagues (texts/calls)	1	2	3	4	5
Work/study (reading/ writing/typing/thinking)	1	2	3	4	5
Chat with people around me	1	2	3	4	5
Sleep/snooze	1	2	3	4	5
Eat/drink	1	2	3	4	5
Window gazing/people watching	1	2	3	4	5
Getting fit/exercising	1	2	3	4	5
Other activity → Go to WK8b	1	2	3	4	5

WK8b. What is the 'other activity' you do while commuting?

WK9. Which of the activities you do while commuting is a particularly valuable use of your time? You may select up to 3 activities.

A	Listen to music/radio
B	Read for pleasure
C	Catch up with friends/colleagues (texts/calls)
D	Work/study (reading/writing/typing/thinking)
E	Chat with people around me
F	Sleep/snooze
G	Eat/drink
H	Window gazing/people watching
I	Getting fit/exercising
J	Other activity

WK10. Which one activity you do while commuting do you spend the most time on?

A	Listen to music/radio
B	Read for pleasure
C	Catch up with friends/ colleagues (texts/calls)
D	Work/study (reading/writing/typing/thinking)
E	Chat with people around me
F	Sleep/snooze
G	Eat/drink
H	Window gazing/people watching
I	Getting fit/exercising
J	Other activity

WK12. Ignoring any commuting costs, what would be your ideal ONE-WAY, DOOR-TO-WORK travel time?

_____ minutes

A.2.2 STUDY section

Please answer the following questions as if you're living where you lived during your most recent term of study/training, even though you may have "gone home" for the summer break.

ST2.In the last 4 weeks of your most recent term, how often did you use each of the following travel methods to commute to your study/training?

	5–7 days a week	3–4 days a week	1–2 days a week	Less than one day a week	Not at all
Driving a motor vehicle (car, truck, van, motorcycle)	A	B	C	D	E
Passenger in a motor vehicle	A	B	C	D	E
Walking/jogging	A	B	C	D	E
Bicycle	A	B	C	D	E
Public transport (bus, train, ferry)	A	B	C	D	E

ST4. Please estimate the amount of time it usually takes you to commute from your home to your study/training.

_____ minutes

ST5. Indicate your agreement or disagreement with each of the following statements:

	Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree
I enjoy the time I spend commuting to my study/training course.	1	2	3	4	5
No matter where I live, I intend to walk, cycle or use public transport to travel to study/training.	1	2	3	4	5
I enjoy my current study/training course	1	2	3	4	5
The time I spend commuting is generally wasted time.	1	2	3	4	5
My commute trip is a useful transition between home and study/training.	1	2	3	4	5
If I could, I would drive to my study/training course every day.	1	2	3	4	5

If select 1 or 2 for 'I enjoy the time I spend commuting to my study/training course.' → Go to ST6.

If select 3, 4 or 5 for 'I enjoy the time I spend commuting to my study/training course.' → Go to ST7.

ST6. What are the reasons you enjoy the time you spend commuting to your study/training course? Please provide up to 3 reasons.

1	
2	
3	

→ Go to ST8.

ST7. What are the reasons you don't enjoy the time you spend commuting to your study/training course? Please provide up to 3 reasons.

1	
2	
3	

ST8. In a typical week, how often do you do the following activities while you are commuting to your study/training course?

Activities	**Never/ rarely**	**Less than half the time**	**About half the time**	**More than half the time**	**Always/ almost always**
Listen to music/radio	1	2	3	4	5
Read for pleasure	1	2	3	4	5
Catch up with friends/ colleagues (texts/calls)	1	2	3	4	5
Work/study (reading/ writing/ typing/ thinking)	1	2	3	4	5
Chat with people around me	1	2	3	4	5
Sleep/snooze	1	2	3	4	5
Eat/drink	1	2	3	4	5
Window gazing/people watching	1	2	3	4	5
Getting fit/exercising	1	2	3	4	5
Other activity → Go to ST8b	1	2	3	4	5

ST8b. What is the 'other activity' you do while commuting?

ST9. Which of the activities you do while commuting is a particularly valuable use of your time? You may select up to 3 activities.

A	Listen to music/radio
B	Read for pleasure
C	Catch up with friends/colleagues (texts/calls)
D	Work/study (reading/writing/typing/thinking)
E	Chat with people around me

F	Sleep/snooze
G	Eat/drink
H	Window gazing/people watching
I	Getting fit/exercising
J	Other activity

ST10. Which one activity you do while commuting do you spend the most time on?

A	Listen to music/radio
B	Reading for pleasure
C	Catch up with friends/colleagues (texts/calls)
D	Work/study (reading/writing/typing/thinking)
E	Chat with people around me
F	Sleep/snooze
G	Eat/drink
H	Window gazing/people watching
I	Getting fit/exercising
J	Other activity

ST11. Do you spend more or less time travelling from home to study/training now than you did in your previous residence?

A	More time commuting now than before
B	About the same time commuting now as before
C	Less time commuting
D	Does not apply (eg didn't do commute before)

ST12. Ignoring any commuting costs, what would be your ideal ONE-WAY DOOR-TO-STUDY travel time?

_____ minutes

A.2.3 Potential to use other travel methods (ALL)

For all who work or study (S1=A, B, C or D) and who usually drive (WK2 or ST2 – A or B for 'drive to work/study') → Go to Q13.

For all who work or study (S1=A, B, C or D) and who usually use other travel methods in WK2 or ST2)→ Go to Q17.

13. If the cost and travel time (assume public transport services run frequently and are on time) from door-to-door were exactly the same whether you drove or took public transport to work/study, would you:

A	Usually drive to work/study
B	Usually take public transport (bus, train or ferry) to work/study
C	Sometimes drive / sometimes take public transport

14. In this situation, would travelling by public transport (bus, train, or ferry) to work/study be…

A	A better use of your time than driving to work/study
B	A worse use of your time than driving to work/study

15. If you could walk to work/study in the same amount of time as it usually takes you to drive there, would you:

A	Usually walk to work/study
B	Usually drive to work/study
C	Sometimes drive/sometimes walk

16. In this situation, would walking to work/study be…

A	A better use of your time than driving to work/study?
B	A worse use of your time than driving to work/study?

Ask all who go to work/study (S1=A, B, C, or D):

17. Assuming that any costs were the same in both situations, which would you prefer – your usual commute trip time or one that takes half the amount of time?

(For example, if your current commute trip time to work/study is 30 minutes, then the half time one would be 15 minutes).

A	I'd prefer my usual commute trip time→Go to Q19
B	I'd prefer a commute trip that takes half the amount of time →Go to Q18

18. What additional activities could you do with the time you saved?

19. Assuming that any costs were the same in both situations, which would you prefer: your usual commute trip time or one that takes double the amount of time?

(For example, if your usual commute trip time is 20 minutes to work/study, then the double time one would be 40 minutes).

A	I'd prefer my current commute trip time→Go to Q22
B	I'd prefer a commute trip that takes double the amount of time →Go to Q20

20. What would make the extra travelling time worthwhile for you?

21. What activities (before or after your commute trip) would you have to reduce or give up because of the extra travelling time?

22. If you could use a Star Trek-like teleporter to instantly travel from home to work/study (and back again), what would you want to do?

A	I'd teleport. →Go to Q23
B	I'd want to spend some time travelling between home and work/study. →Go to Q24

23. If you teleport, how would you use the time you saved by not having to commute?

→Go to Q26

24. What is the minimum amount of time you want to spend travelling from home to work/study?

_____ minutes

25. What are the reasons you want to spend this time commuting to work/study? Please provide up to 3 reasons.

1	
2	
3	

(Show this message to respondents answering C or D to Q1)

Please answer the following questions as if you're living where you lived during your most recent term of study/training, even though you may have "gone home" for the summer break.

A.2.4 Background demographics (ALL)

26. Which best describes your current household? PLEASE TICK ONE BOX ONLY

A	Couple living alone
B	Couple or extended family living with children, some aged 0-17 years.
C	Couple or extended family living with children, all aged 18 years or older.
D	Single adult living with children, some aged 0-17 years.
E	Single adult living with children, all aged 18 years or older.
F	Adult living alone
G	Adult living with other adults
H	Living with my parents/guardians
I	Other (please specify……)

27. Including yourself, how many people in your household are aged 18 or older?

Please do NOT include anyone who usually lives somewhere else or is just visiting, such as a college student away at school.

0	1	2	3	4	5 or more people

29. How many motor vehicles (including motorcycles/motor scooters) are normally available for use by people in your current residence?

DON'T count vehicles that belong to visitors; or vehicles that this household borrowed occasionally from another household.

0	None
1	1
2	2
3	3 or more

39. When you do the following activities, where do you usually do them?

	Central city area	**Another area**	**Don't usually do this**
Your work	A	B	C
Your education	A	B	C
Supermarket shopping	A	B	C
Eating out/having coffee	A	B	C
Exercise or play sport	A	B	C

All:

54. Indicate your agreement or disagreement with each of the following statements:

	Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree
I prefer living in the inner city to living in a suburb.	1	2	3	4	5
I often use the telephone or the Internet to avoid having to travel somewhere.	1	2	3	4	5
I'd rather live in a suburban neighbourhood, even if it meant I had to drive to shops, schools and services.	1	2	3	4	5
Being environmentally responsible is important to me as a person.	1	2	3	4	5
I'd rather live in a neighbourhood where I can walk to some shops, schools, and services.	1	2	3	4	5
In the next 10 years, I intend to live in a house with a section in the suburbs.	1	2	3	4	5
It's important to me to use environmentally friendly travel methods (walking, cycling and public transport).	1	2	3	4	5

Here are a few questions to help us describe the groups of people who have responded to this questionnaire. All this information remains confidential. Each person's answers will be put together with those of others to show the results.

56. Gender	Male Female
57. Age (in years)	5-year bands

58. Is your current driver's licence a…

A	Learner's licence
B	Full or restricted licence
C	I don't hold any driver's licence

Appendix B Literature review summary

B.1 Reviews

Document	Topic	Summary	Comment
Amaoko-Tuffour, J and R Martinez-Espineira (2008)	The opportunity cost of travel time - estimates the value of access to parks, using the opportunity cost of travel time vis-a-vis the Travel Cost Method (TCM) - value of travel time based on a fraction of hourly earnings. (actually an empirical study, but it is the lit. review that is of interest).	At issue is whether leisure time is 'free' time or 'time with an opportunity cost attached'. 'The fact that leisure and free time are used interchangeably indicates that people consider time something concrete'; 'since time used for recreation can be allocated to alternative uses, even for these type of individuals time spent on a given recreational pursuit must have a cost.' The value of time, which is a key ingredient of the TCM, must be based on the notion of opportunity cost: the visitor to a site sacrifices cash costs AND the opportunity of using the time in an alternative manner. The working assumption is that the time used travelling to and from the site and the time spent on the site could have been devoted to other endeavours, so the cost of time is the benefit of the next best alternative forgone.	Offers two conclusions: an individual's value of time is virtually impossible for the researcher to observe and 'the valuation placed on travel time is highly subjective, varying from individual to individual and from situation to situation' - may be useful for context-setting/background in report.
Carrion-Madera, C and D Levinson (2010)	Value of travel time reliability - systematic review. Conducts meta-analysis of the reliability ratio (the marginal rate of substitution between (expected) travel time and travel time reliability) estimates in order to understand the differences of estimates between and within studies.	Reviewed 3 approaches used to measure travel time reliability: scheduling delays (departure time choice or trip scheduling); centrality-dispersion; and a combination of the two. Found several variables that could explain the differences: the time of day for collecting the data; regional differences; year of the study; and the route choice dimension (further exploration of latter two variables required).	

Document	Topic	Summary	Comment
Cavagnoli, D (2009)	Alternative view of travel time and valuing travel time.	Proportion of time allocated to travel activities has increased steadily since the early 1990s. Considers travel time as a necessity, thus travel time should be considered an input as well as an output of utility. Argues that travel time for household activities is a complement to these activities. Disaggregates demand for travel time by i) market and ii) household activities. Measures the 'price' of travel time in terms of quantity (eg hours per week; % of total hours in the week) rather than money, then says this measure 'reflects also the 'price' value of the budget of travel time out of total income, which needs to be constant'. Hypothesises: individuals whose value of travel time is greater than the minimum value required to buy time for household activities will spend more of their income to save travel time; hence, they will consume more of fast roads, and fast and efficient cars, relative to transport modes, and relative to other consumers. Argues that 'excess' demand (ie use of fast cars on fast roads) is the result of a decreased value of the consumers' travel time budget relative to the market value of the budget, travel time and recreation time not included as a necessity.	Main premise of interest here: people earning higher incomes, don't trade off work hours, but use faster modes of transport in order to fit more things in. There are lots of (unproven) assumptions and assertions made (eg doesn't illustrate key point about high- v low-skills women and how much time they spend travelling) - eg high-skill levels are a proxy for high income - while arguing travel time is a necessity, rather than a disutility, then observes that to limit the amount of it requires faster cars and roads, suggesting that spending more travel time would be a disutility ... note that growth in hours spent travelling appears to defy the TTB concept.
Cavagnoli, D and P Norman (2008) -1	Sets out a model to help transport professionals move away from SP surveys of the value of travel time based on tiny sample sizes, towards revealed preferences of trips captured by large-scale surveys, using the time use database for Melbourne as an example.	Generally, it is assumed that there is a positive relationship between the wage rate and consumption of social and recreational goods and services, and a negative relationship between the demand for leisure, including travel time, and the wage rate. Implies that if leisure time, including travel time, is a normal good then for every increase in the wage rate, a lower share of income is allocated to them; because wealth increases overall. Travel time has been increasing since 1990s – their analysis suggests that the time allocated to paid and unpaid work (travel time, housework, dependent care, take home work, and career development) has not decreased since the 1980s, and that highly-skilled (and highly paid) women do not have more free time than women did 30 years ago. Thus, they conclude leisure time (including travel time), is not perceived to be a normal good. Proposes that the reason why leisure time is not perceived as a normal good is addiction to work effort (extra time to work). 'The increased expenditures on fast cars, child-care services, home-time-saving appliances, for example, as well as the increase in the average working week, reveal that people are prepared to trade off time in non-paid activities for more time in paid work.' Since 1991, travel time outside working hours, for work and housework purposes, has remained fairly constant (+21 minutes and -25 minutes, respectively). Travel for consumption activities has become more important, having increased by 1.28 hours per week. Studies on travel demand have overlooked the importance of both the ratio of labour endowment to actual labour supply, and the ratio of leisure time to travel time, when valuing the shadow cost of travel time.	Interesting theory, but a number of holes in it, making it difficult to accept - eg no evidence of 'work addiction'; suggests (without providing evidence) women's paid and unpaid work hours are 5.7 hrs per week above the average (whose average?) and that leisure is 31 hours below - but doesn't say what is absorbing all the extra hours. States: 'Individuals do not minimise travel costs' - agreed: some people minimise travel time, which may cost more to do in absolute terms.

Document	Topic	Summary	Comment
Eddington, R (2006)	transport (infrastructure) role in productivity and sustaining economic growth	'Transport improvements can increase the variety of products available and create new leisure opportunities (eg low cost airlines to new destinations) and lifestyle choices (eg living in the suburbs). These benefits to consumers are known as productivity of consumption….Transport improvements that free up wasted travel time allow people to spend more time with friends and family, and enjoy more leisure activities.' (p5); 'The benefit of a transport improvement with regard to time savings is the value of the time that becomes available to do things that could not be done whilst travelling, and for business this translates directly into a reduction in costs and/or an increase in output.' (p20)	Perception that TTS will be used to travel for new leisure opportunities and lifestyle choices (NOT saved). Also perception that business TTS translates directly to productivity improvements. Does not question valuation of TTS.
Holley, D, J Jain and G Lyons (2008)	Reviewing concepts of travel time on employers' business.	Proposes that travel time may not be defined by the purpose of the journey and/or that travel time may not be a cost to employer (as economic evaluation assumes). Rather, there are positive or productive uses of travel time: eg travel time may provide 'unique opportunities for work' that individuals could not find or create elsewhere; it may act as a substitute for a traditional work break - providing anti-activity time which 'can assist productivity at other time periods and assist creativity by providing 'incubation' time'.	
Jara-Diaz, SR (2001)	Looks at unexplored elements behind the value that an individual assigns to TTS, with special emphasis on the value of leisure - challenges the idea that value of travel time = observed wage rate.	Leisure activities have been defined as those to which the individual assigns more time than the minimum required. Mandatory travel is not leisure as travel time cannot be diminished unilaterally. Moreover there is a WTP to reduce the minimum requirement. Jara-Diaz proves mathematically that subjective VTTS may have no relation to a wage rate. Rather, subjective VTTS (which is the value of doing something else instead of travel) is always equal to the value of travel time as personal resource minus the value of the marginal utility of travel. Jara-Diaz adds in the possible restriction of consumption by leisure (consumption requires time - usually occurs in wealthy groups) and the possible refusal to do extra work (more common in middle income).	Asks the Q: how much money should I offer an individual to stop enjoying something? Suggests further work to be done to analyse what really lies behind the WTP to diminish activities like travel - our survey includes Q: what would you do with extra time? what would you give up if trip took longer? Also suggests exploring individual's satisfaction with work/leisure - Q: rating of 'I enjoy my current job(course of study)' - also satisfaction with commute.
Li, Y (2003)	Perception of travel time and evaluation of urban commute experience.	Discusses the perceived time (ie psychological time) vis-à-vis objective clock time that one spends in daily commutes, and examines how it relates to the evaluation of one's travel experience - focuses on public transport. Consumption and perception of time is also situation bound - urban commuters moving through hassles of various kinds are liable to fluctuating affective states that influence their temporal judgement of the commute. Time judgement experiments show that relatively short intervals are lengthened by judgement, and relatively long intervals are shortened, meaning that objective commute duration is biased by commuter's perceived duration. Stages/interruptions in a commute (eg transfers, wait time, walking time) likely to lead to trip perceived as longer	Can perhaps be seen as providing a different theoretical approach (psychology; behavioural) to explaining value of time variation for different aspects of the commute, which largely appears to confirm the values already determined through conventional

Document	Topic	Summary	Comment
		duration; comfortable circumstances may result in perceived shorter duration; standing in public transport makes it seem longer.	valuation methods, and offers the explanation that users prefer the car for the certainty (of duration), minimisation of interruption/journey stages, and comfort it provides. On the other hand, offers poor explanation of bus use over rail.
Litman, T (2008). Also published (shorter version) as Litman, T (2007)	Valuing service quality impacts in transport planning (including value of travel time).	Argues that improved travel convenience and comfort tend to reduce unit travel time costs and so are equivalent in value to increased travel speed. Research indicates that travel time unit costs are quite sensitive to qualitative factors such as comfort, convenience and security. Travel time values may vary depending on individual and community needs and preferences. For example, some people or groups may enjoy walking or cycling and so place a lower than average value on time spent on these activities, while others may be particularly sensitive to the discomfort of standing while waiting or travelling on transit vehicles, so their unit costs would increase more. Paper 'describes practical ways to incorporate service quality into transport planning, by developing level-of-service standards for alternative modes that incorporate qualitative factors, and incorporate qualitative factors into travel time values'.	Doesn't provide sufficient evidence to justify claims - also suggests that transport planning doesn't include quality factors, although NZ does - argues that value of time varies by how much people enjoy a mode, as well as the environment they travel in - could be explored in fieldwork.
Litman, T (2009)	Summarising (without critiquing them) various documents/studies on travel time costs and VTTS and providing examples of value of travel time and VTTS estimates.	Stipulates: 'Clock time is measured objectively, while perceived (also called cognitive) time is how users experience travel. Paid travel time costs should be calculated based on clock time, but personal travel time costs should be calculated based on perceived time', though Litman doesn't justify where this notion comes from. Travel time costs often vary for different parts of a trip and depending on traveller needs and preferences (eg may vary from day-to-day, depending on trip purpose, and other time constraints). Discusses 'effective speeds' which consider total time devoted to travel, including both time spent travelling and devoted to maintaining vehicles and working to pay transport expenses) - argues that including 'total' time means that 'it is wrong to assume that shifting travel from driving to alternative modes necessarily increases total travel time costs'.	Notion of perceived or cognitive time is of interest in exploring value of travel time (his comments are based on Li 2003) – 'effective speeds' (which includes time spent to earn money to pay for mode use, time spent in maintenance activities) does not appear to reflect how users perceive travel time costs - hence ignored.

Document	Topic	Summary	Comment
Lyons, G and K Chatterjee (2008)	Reviews British commuting experience - more commuters; less-frequent commute trips but longer travel time; more cars used - and research contributing to understanding of attitudes towards it and use of time on journey.	Identifies costs of travel (including stress and fatigue; health impacts); place of commute in people's lives; 'tolerating' the commute. Discusses travel time as a gift rather than a burden: positive utility ('travel liking'; productive travel time; equipped time; transition time; time out – 'On the one side, the commute can be seen as a blight on society in terms of its imposition of traffic and pollution and thus economic, environmental and social costs, and on the individual in terms of sacrificed time, the burden of cost, and the potential physiological and psychological impacts of stress and effort (physical, cognitive and affective). On the other side, the commute can offer a journey with low cognitive and affective effort and represent a daily pocket of time that can fulfil an important social function in terms of the opportunity it presents for transition between life roles ('gearing up' and 'winding down') and for time out.' Improving travel experience may provide social, economic, and financial benefits (including reduced VTTS), but could also encourage long-distance commuting.	Possible area for exploration: One study asked motorists commuting for at least 10 min one-way why they do not live closer to work – most stated that they liked the area in which they lived (28%) or had never thought about it (27%). Others found people would tolerate (or be content with) up to 50 minutes (Dutch - US study=46 mins), then more likely to look for another job.
Lyons, G and J Urry (2005)	Thinkpiece on use and value of travel time - topics include: TTB; evaluation/appraisal of transport schemes and VTTS; travel time ratio/ travel time and activity time; technology use while travelling; car as extension of living space/mobile office.	Argues that if the working day begins when one boards the train, then it is not appropriate to class this time as non-work time and substantially reduce its value. It also means that productive use of travel time is enlarging the long-hours work culture in the UK: 'If employers formally acknowledged that commuting by collective transport enabled equivalent work per unit of time to be undertaken during the journey as would be completed at work, then this would massively improve staff morale and retention through offsetting long hours in the UK (compared with the rest of Europe). It might also shift the choice of travel mode for such commuting. An employee with a one hour commute each way by rail might be entitled to class the two hours of travel as part of their eight-hour working day. That same employee would lose two hours of non-work time each weekday if they travelled to work by car.'	
Mackie, P, T Fowkes, M Wardman, G Whelan and J Bates (2001)	VTTS - value of small time savings, VTTS for business travellers (briefcase travellers v those whose travel is part of their work - assumes that proportion of time spent working on a trip does not change in light of TTS, hence ignores issue of productive use of time).	Earlier study found that 'for any level of variation around the original journey time, gains (savings) are valued less than losses. For non-work related journeys, a time saving of five minutes has negligible value.' Adding an inertia term (suggesting that people have a preference for the status quo in order to simplify the task of answering stated preference questions) and re-analysing estimated utility functions found no significant differences between values of gains and losses remained. Also found that unit values of 'small' time savings come out very different from 'large'. For changes of 10+ minutes, value of travel time of around 5p per minute for non-work purposes; for changes <10mins, values are found to be close to zero or even negative - however, then conclude that values for both should remain the same because stated preference experiments may be at fault. Posit that small/negative values arise because SP exercises are 'artificial' and people doubt the veracity of the possible TTS or there may be a variability issue at play.	

Document	Topic	Summary	Comment
Mackie, P, M Wardman, A Fowkes, G Whelan, J Nellthorp and J Bates (2003) -1	VTTS (further expansion of some issues in Mackie, P, T Fowkes, M Wardman, G Whelan and J Bates (2001))	Examines evidence for VTTS for employers' business travel, including freight transport; relationship between the VTTS and sign and size of TS; approaches for value of non-work TTS for car users and public transport users; case for the standard value of non-working time in evaluation and for variations in the VTTS by journey length and mode of travel. Findings: fairly similar value of travel time for Commuting and Other; in both cases Commuting is slightly higher than Other at most distances or costs; significantly lower values for retired persons, other things equal; significant variation in VTTS by income and journey length which require further exposition; VTTS appears to be about 20% lower for passengers than for drivers; this is plausible, but concerned about the data definitions on which this result is based; for a given set of individuals, the VTTS varies across modes - regarded as a comfort or quality effect and include attributes such as reliability, ride quality, chance of a seat, crowding, information etc. Relative to the VTTS for car, it appears car users have a higher VTTS for bus and a lower VTTS for rail (not statistically robust); average VTTS on bus, rail and car vary because of the different socio and income composition of the users and the different journey length distributions. Rail and car generally similar, with bus at about half the values of the other modes. Some evidence that individuals value non-working TTS (for commuting and leisure) on bus mode more highly than for car, and these in turn more highly than TTS by rail, other things being equal. Posit these differences reflect differences in comfort, cleanliness, information and other characteristics of spending time on each mode - more research recommended. In principle, agree to move towards a differentiated 'value of travel time' by mode, inasmuch as they reflect users' valuations of these differences.	Finds that VTTS varies across modes for a given individual and 'regard' this as a comfort or quality effect and recommend 'that work is justified to define, quantify and value the modal characteristics involved' - Q for survey: Do respondents enjoy/not enjoy the time they spend commuting? what do they enjoy/not enjoy about the time spent commuting? are different modes substitutable, holding other factors (time and cost) constant? Is the time spent on other modes a better/worse use of time?
Mackie, PJ, S Jara-Diaz and AS Fowkes (2001) -1	What travel time price (or set of prices) is appropriate for the social appraisal of transport projects? Should time savings be valued at all? And what, if any, adjustments should be made?	Discusses impact/limitations of various 'typical' parameters to VTTS calculation & measurement. VTTS is composed of two effects – the benefit of a release of time for all other activities, and the benefit from a reduction in the disutility of travel. TTS potentially matters to the individual because of less travel, more of other activities, change in the consumption pattern, and change in activity schedule. If paid work is increased then there is also a change in the consumption level. If the sum of all these effects is positive, then there is a WTP to reduce travel time. No reason to expect that this WTP for a reduction in travel time to be equal to the (marginal) wage rate. No reason the value of individual's WTP to reduce travel time to be equal to the value that society as a whole attaches to the reassignment of time of that individual to other activities. Work may have positive or negative utility (hence value could be > or < than wage rate). TTS benefits may not accrue to traveller. When substituting travel time, the individual will increase only the time assigned to those alternative activities which are not constrained at a minimum necessary or work. Some (not all of) conclusions: Time is a scarce resource and should be valued. Using individuals' or groups' willingness to pay as their VTTS is inappropriate for social evaluation. Using a single social 'equity' VTTS would be appropriate if the marginal utility of TTS was constant over individuals or groups. Empirical studies could shed light on this. Theory cannot tell us the relationship between the value of non-working time and the wage rate; an empirical approach is required.	Notes that individual may re-assign TTS to work or nonwork/leisure activities - will be explored in our survey. Utility/disutility of work/study and commute to be explored (enjoyment of work/study; enjoyment of commute).

Document	Topic	Summary	Comment
Mendes, I (2002)	Opportunity cost of travel time in recreation	In recreation: the value of travel time as a commodity is the amount one is WTP to save time spent travelling and recreating on site. Two concerns re: value of travel time: 1. Time pricing - the economist's theoretical answer is given by the conventional labour supply model, according to which there is a continuous trade-off between work and recreation. In western societies, where many people work fixed hours and are commonly provided with weekends and paid holidays, the conventional theoretical trade-off notion is often irrelevant, and it seems much more likely that the trade-offs are between time for travel and time for leisure activities. Hence, the relevant opportunity cost of travel time to a recreation site will be equal to the value he placed on alternative uses of his leisure time. 2. Time rationing: Besides travel cost, distances ration travelling so that, if individuals do not give up opportunities of work, the opportunity cost of scarce time acts as an impediment to visiting more distant sites. This means that travel time is now interpreted as a resource rather than a commodity and therefore its value is equal to its scarcity. Hence, the value of travel time is redefined as the value one attaches to gaining additional units of it, which is the value of leisure time per se. Time rationing has a recreation visitor value time differently on a workday, versus a weekend or a vacation day. Value of travel time may vary deeply across the individuals of the same sample, because they have different time constraints. This weakens the argument for using wage rate as the base value for valuing travel time to recreation sites.	Time pricing: in commuting (or indeed any travel) - mode choice may be influenced by how much time people want to spend in leisure v at work (which would affect the value) - also assumes a disutility, that people want to minimise rather than enjoy or even spend a certain amount of time commuting. Economic evaluation assumes that TTS would be 'spent' in increased productivity, when they may be spent on leisure. At the margins: does mode choice tradeoff time on leisure or work or is it a reflection of (perceived or absolute) cost?
Metz, D (2003)	TTB	Average travel time per person has remained constant at about an hour a day for at least the past 30 years (note some variation as a function of age, gender, geographical area, household income and car ownership), over which period average distance travelled has increased by over 50%. The average number of trips per person has also held steady, at 1000 per year. It follows that the growth in travel has taken the form of longer journeys at higher average speeds (which tend to cost more). The phenomenon of constant average travel time (CATT) is explained in principle on the basis that, first, there is an intrinsic utility of travel, as well as a derived utility. That is, there is benefit in the trip itself as well as in reaching the desired destination. Second, time for travel is competing with time for all other activities, time which in aggregate is invariant and equally distributed. Accordingly, the marginal value of travel time will decline as travel time increases, thus constraining the amount of travel undertaken. >distances travelled within constant travel time is result of steady growth in average travel speeds. Provides 'ancient and modern' evidence for average travel time of about an hour a day, suggesting benefits from travel over and above those associated with what is found at the destination of the journey. Others have proposed that the total utility of travel time is the intrinsic utility of movement - limited by boredom, monotony, and fatigue - plus the derived utility associated with the destination or that there are 'destination independent' benefits of travel - including the psychological benefits of movement, exercise benefits and involvement in the local community - the loss of which lessen quality of life in old age. Metz considers the implication of TTB/CATT for scheme appraisal, induced traffic, modelling and planning, travel money budgets, and transport policy. key insight: the benefits from policy and operational measures that increase average speeds are taken wholly in the form of extra travel on longer journeys (not as TTS).	As an illustration, could calculate TTB (hours and km per day per person) for NZ as a whole, and for specific population/geographic/transport characteristics from 1989/90 (this dataset is more limited), 1997/98, mid-2003 to mid-2009. Note, while Metz concludes: 'devise new measures to improve transport system efficiency without increasing average speeds' - if there is a TTB, could encourage use of slower modes (eg active transport or public transport), where less distance is covered in same amount of time. Ideally, would compare TTBs of inner city (more likely to W/C) with non-inner city residents (more likely to drive).

Document	Topic	Summary	Comment
Metz (2008a)	Argues in favour of TTB and against the notion that travel time savings are in fact saved.	Metz argues that there is a TTB (his evidence: trend in average travel time over past 30 years (in UK) is about 380 hours per year - varies between people; distance travelled has increased greatly and average number of trips is about 1000 per person per year – he also indicates other international data illustrates this point), and that TTS are thus short-term benefits, as people will use the savings to travel for other more valued reasons. He argues that the value of these destinations/activities should be included in evaluation. He also argues that, given the constancy of the TTB, there are probably other values at play (eg travel liking, time out) but basically refers to other researchers' arguments rather than providing concrete evidence of his own. 'If people take advantage of infra improvements to travel farther (as they do), this is because the utility associated with the destination plus the intrinsic utility of the trip must be at least equal to the value of the TTS that might otherwise have been made'. (p37) Posits that there is a lack of direct evidence to support notion that people use TTS for something other than travel; suggesting economic benefit of long-lived investment is mis-specified - should be associated with the additional access to preferred destinations, ie induced traffic: 'induced traffic is generally the consequence of the choice of more distant destinations for the same journey purpose' (p.35) and 'less time spent traveling to work and other regular destinations would permit longer trips to optional destinations, given constant travel time' (p71).	Qs for our survey: 1. is the mode important or being on the move or the destination? asking would you walk or drive /use public transport or drive if it took same amount of time either way. 2. if spent less time travelling to work, what would people do with the extra time? (travel, or use it for other activities)
Metz, D (2008b)	Argues for concept of TTB - questions utility maximisation as the basis for decisions by travellers - also discusses induced traffic and implications of TTB for cost–benefit analysis	In revealed preference and stated preference data collection, where time savings are chosen, the empirical observations do not usually reveal whether the saved time is used for additional travel over the course of the week, or whether it is used for non-travel activities. Long-run evidence suggests TTS are used for travel (hence TTB argument). If this is true, the entire economic benefit arises from activities at the new destinations and none from time savings (leaving aside benefits associated with accident reduction and the possible reduction in vehicle operating costs) and travellers take benefits of investment in long-lived infrastructure as additional access, not TTS. Metz argues that if people take advantage of infrastructure improvements to travel farther (as they do), this is because the utility associated with the destination plus the intrinsic utility of the trip must be at least equal to the TTS that might otherwise been made.	While TTS may not be 'saved', there is no discussion of the possibility that the (longer) trips are re-timed or occur outside peak travel periods, such that congestion on the network is less, as trips are more distributed.

Document	Topic	Summary	Comment
Mokhtarian, PL and C Chen (2004)	Exploring constant TTB	The behavioural hypothesis is that people have a certain (generally non-zero) amount of time that they are willing (or may even want) to spend on travel, and that they will make adjustments to minimise departures from that budget in either direction. Supported by common observation that at the aggregate level, when travel speeds increase over time – whether due to improvements in technology or additions of capacity to the system – travel distances tend to increase so as to keep travel time approximately constant - also some consternation that TTB clashes with concept 'utility maximisation' (when really it may not: if individuals use TTS (through higher speeds or greater accessibility) to visit more destinations, and/or destinations that are farther away but more attractive, they are still increasing their utility and their demand for travel is still purely derived). Sources of bias in estimating TTB: exclusion of very slow (walking) and very fast (airplane & rail) modes; different methods of recording travel time; different basis (per person, per traveller, per household); types of trips included/excluded; type of analysis undertaken. Travel time expenditure is strongly related to individual and household characteristics (eg income level, gender, employment status, and car ownership), attributes of activities at the destination (eg activity group and activity duration), and characteristics of residential areas (eg density, spatial structure, and level of service). The claim of the definitive existence of constant travel time and money budgets in time and space is not supported. Believe that individual travel time expenditure is a behavioural phenomenon that can be modeled.	Beyond scope of current project to fully explore (possibly nebulous) concept of TTB - suggested future research direction: exploring ideal commute time because commute trip is regular (recognised as a partial measure); exploring relative desired mobility (do people want more or less travel for different activities than they have now?
Morrison GC (1998)	endowment effect	The endowment effect is a reference point effect usually attributed to loss aversion: ie the endowment effect is manifested in people having to be paid more to give up a good once they own it than they would be willing to pay to acquire the good in the first place. All things being equal, if an individual is asked to choose between two bundles, neither of which they own, then they have nothing to lose and the utility or value they ascribe to the bundles is a function of the goods in each. However, most methods used by economists require people to express their preferences for one good or bundle of goods/attributes in terms of their willingness to forego some of another good. The endowment effect was offered as an explanation for the disparity frequently found between WTP and willingness to accept (WTA) (compensation) measures of value.	Suggests that people are more likely to choose to stay with the familiar/what they know, rather than try an alternative – that said 'reference dependence' may be a more likely explanation
Schafer, A (2000)	Compares major mobility variables from about 30 travel surveys in more than 10 countries.	Confirms regularities in time and money expenditure shares for passenger travel (travel budgets for time and cost/money). Discussion of implications: suggests constant travel time budget (where distances have been increasing) requires higher speeds and faster modes of travel and could explain mode share shifts. Rising incomes and fixed TTB mean that people increase their mean speed and daily travel distance by allocating more money to travel.	May be useful for context setting - implies that use of private cars may be driven by desire to keep within TTB, rather than a higher value of travel time per se.

Document	Topic	Summary	Comment
Schiefelbusch, M (2010)	Current models treat travel as 'derived demand' - exploring non-rational component of mobility.	Discusses the concept of travel as a 'derived demand' (mobility is caused by reasons outside the act of travelling itself) and the adjunct beliefs/arguments that travel time is considered as 'wasted' or 'useless time'. Suggests that approach leads to a 'very simple model of human behaviour' where journeys made for their own sake are 'defined away'; qualitative dimensions of the travel environment and induced demand were ignored. Argues for inclusion of 'emotional' or 'experiential' dimensions to planning - discusses how the 'travel experience' could be disaggregated usefully for transport planning - possible elements include: comfort, relaxation, entertainment and stimulation, communication and contact possibilities; image and prestige, substitute friend or partner, physiological stimulation, feeling of freedom and thrill, regulation of aggression and mental imbalances, finding identity and meaning, regulation of privacy, occasion for other activities.	Context setting for exploring parameters of value of travel time.
Urry, J (2006)	Reviewing concepts of travel time - basically seems to argue that because people fill their travel time with various activities, it has utility for them.	In relatively technical literature relating to the nature of transport, it is normal to argue the following (Urry then refutes all of these): 1. The amount of daily travel time per person remains stable at a little over one hour per day. Faster modes imply that people are willing to travel further, but not longer. 2. Economically, the time that is spent travelling is unproductive and wasted - dead time. Urry: Even 'anti-activity' (relaxing, thinking) has value. 3. Activity time and travel time are mutually exclusive of each other. Not so - eg some commuters work on their commute trip, extending their workday. 4. In appraising new transport developments it is appropriate to assume that all the time saved would otherwise have been wasted. 5. People will always prefer to minimise journey times and hence even tiny increases in speed and reduced time are to be given high value. Walking, rail travel and car travel are not just means of getting from A to B. They are distinct social practices involving differing kinds of experience, performance and communications.	(Without evidence) Urry concludes: 'This further means that there is no simple sense of travel time since the amount, value and use of travel time vary enormously across these three mobility-systems [walking, rail and car use] and are to varying degrees intertwined with various 'activities.'

Document	Topic	Summary	Comment
Wardman, MR (2004)	Exploring the relationships between public transport and car values of in-vehicle time; and between the values of walk time, wait time, access, headway, and in-vehicle time.	Meta-analysis of British value of travel time evidence - regression analysis to determine 'key causal influences' – value of travel time is 'the ratio of the marginal utilities of time and money, and in turn the marginal utility of time is determined by the opportunity cost of time spent travelling and the actual disutility of time spent travelling'.	
Young, W and J Morris (1981)	NOT REVIEWED - points are taken from another article.	If travel has a positive utility and is not necessarily minimised by travellers, it follows that the value of travel time for those travellers would be negative. In a study in Melbourne they noted that satisfaction with commute travel time peaked in the range of 10-20 minutes. Travellers disliked trips longer than this, but also disliked trips shorter than this. They preferred to be close to work, but not too close.	Commute time of 10-20 minutes is preferred/enjoyed - longer trips are less satisfactory - Q in our survey explore this

B.2 Empirical studies

Study	Question	Data used	Analytical method	Findings	Potential relevance to current project
Barrett, J (2010)	Compares models that demonstrate how the value of time is affected by the level of transportation infrastructure and services available to consumers. A large amount of time spent commuting leaves less time for other activities. This suggests that the value of travel time spent in other activities may be higher or that people engage in fewer activities or spend less time spent in these activities in regions where transportation services are less available. Consequently, differences in peoples' value of travel time may be observable between areas which differ in the transportation amenities.	879 internet survey respondents (18% response rate) and 242 to mail-back survey (43% response rate) in Sacramento, San Francisco and Sonoma, CA - survey had 7 sections: Commuting options and choices for work; Activity diary; Travel diary; Opinions regarding importance of transportation attributes; Opinions regarding attributes of available transportation; Choice experiments (3 modes, varying in time and money cost at 4 levels); Demographics and automobile questions.	Discrete choice models were used to analyse peoples' transportation choices for work trips and to model the value of time.	Ran about 12 different models: general conclusion is that the value of time is a function of the level of transportation infrastructure available to the commuter. The value of travel time decreases with increases in the level of public transport infrastructure, consistent with the idea that better availability of transportation services relaxes the constraints on a consumer's travel choices. The value of time decreases with bus stop density, increases with car ownership, and decreases with age; the value of time increases with money income and decreases with increases in one's time budget.	Value of travel time and relationship to infrastructure (useful for conclusion).

Study	Question	Data used	Analytical method	Findings	Potential relevance to current project
Calvert, T and E Avineri (2009)	Examines whether there may be evidence for positive utilities within the commute trip. Focused on those who have an 'ideal' commute greater than their actual, and the differences in utility of the Am and Pm commute (which has not been explored in the literature).	1. Dataset of full- or part-time workers (N=1305) who commuted to work were drawn from a survey in 1998 of 1900 residents in San Francisco by Redmond & Mokhtarian (2001) - mode use not specified; 2. Interview-based and questionnaire-based research in Bristol, UK - 10 interviews with 10 commuters, discussing positive aspects of their commute; questionnaire distributed (non-randomly) – 61 completed.	Main method of the research was to separate those who wished to increase their commute from those who did not, and to analyse possible differences between the two groups.	2.6% had IC of 0 mins; 13% had IC>EC. There appears to be a cap in terms of IC and EC: 91.8% of those with IC>EC have an IC equal or less than 30 minutes and an EC equal or less than 20 minutes. Hypothesise that up to 30 minutes, added minutes add more positive utility than disutility, but after that added minutes add more disutility than positive utility. They note that people may have given non-zero commute times because they were imagining the fastest possible commute given their address and job location rather then what would be their ideal if any time were feasible. The longer one currently commutes, the higher one's IC tends to be. Interviewing found that some gave 'realistic' IC and others 'ideal' times. UK survey: all who IC>EC either walked or cycled to work; on average, all commuters irrespective of mode wanted to decrease average EC to an average IC.; 41 of 61 did not want to teleport.	Discussion of rationale for focus on commute trip: eg '[Commuting] often overloads the transport system and puts strain on certain points of the transport system at specific times of the day. The commute is also a type of trip that is often stereotyped as unenjoyable and without use'; scatterplot of Ideal v Actual commute time (p6); linear regression of IC minus EC against EC (p9). Variation of teleport Q: 'If you could use a Star Trek-like teleporter, to get from home to work instantly would you prefer an instant commute or do you prefer to spend some time travelling?' (ask after asking for IC). Possible Qs: what respondents would like and dislike about commutes of 'less than 10 minutes', '10 to 20 minutes' and 'more than 20 minutes'. If W/C want longer commutes, could justify lower value of travel time.

Study	Question	Data used	Analytical method	Findings	Potential relevance to current project
Cao, X, PL Mokhtarian and SL Handy (2009)	Intrinsic/autotelic value of NONWORK travel - undirected travel - explores environmental correlates of traveling out of the house with no particular destination in mind, controlling for attitudinal and sociodemographic factors.	Nonwork driving and walking/cycling. data collected from 12-page self-administered survey mailed in late 2003 to residents of eight neighborhoods in Northern California. N=1682 (25% response rate).	Correlational and multivariate analysis (ordered probit models); linear regression: dependent variables are the relative frequencies of undirected travel by driving and by walking/biking. Explanatory variables: neighbourhood preferences and neighbourhood characteristics; travel attitudes; sociodemographics.	While not definitive, undirected travel accounts for a small but non-negligible proportion of non-work vehicular trips, whereas it is a sizable component of walking/biking behavior.	Some travel is for the sake of travel - TTS unlikely to be relevant.
Centre for Transport & Society and Centre for Mobilities Research (2007)	Explores the contradiction that the invariance of travel time at the aggregate is empirically proven on the one hand (through an analysis of UK household travel survey statistics), and yet on the other, travel time continues to be treated conventionally in economic appraisal as a variable and something to be reduced and minimised. The UK statistics suggest that the long-run VTTS is zero, contrasting with the estimations made from stated preference and revealed preference studies that determine that TTS is significant.	Lit. review; in-depth stakeholder interviews; focus groups; national rail passengers survey; mobile ethnographies; diary study; travel remedy kit – the findings here are from the extensive rail passenger study.	See individual study report(s).	1. Travel time has value - Most rail passengers either make some use or very worthwhile use of their time travelling by train, suggesting that rail travel has positive utility for many travellers. Only 18% of passengers agreed with the statement that their travel time was wasted. Only 3% of rail passengers spent most of their time being bored or anxious. 2. There are varied uses of travel time 3. Travel time use is 'equipped time' - people bring computer and electronic devices and other materials on the train in order to have 'productive time use'. 4. Travel time use that is planned is more likely to be 'worthwhile' than 'wasted' 5. Travel time seen as a gift 6. Packed v unpacked passenger - former cannot make use of travel time 7. Ownership of travel time within a changing economy - cannot assume that commuting trip is 'personal time' (may be worktime tasks performed) and on-call nature of technology means that travel time is not necessarily down time.	UK example of research indicating that travel time has utility (rather than disutility) - for RAIL passengers at least - note: in UK surface rail is ≈5% of all trips; less in NZ. Identifies potential 'productive' uses of time (for survey) - Q: do other modes have utility in TT? what productive use do people make of it?

Study	Question	Data used	Analytical method	Findings	Potential relevance to current project
Chen, C and PK Mokhtarian (2006)	Travel time 'price' (TTP) is very similar to travel time ratio (TTR) of other researchers, except denominator only includes activity duration. TTR reflects a balancing process between the time spent on travel and activities - the choice of allocating time between activities and travel is based on a combination of preference and necessity. Due to spatial separation of various activities, people cannot allocate time to travel completely as they wish (if they could, under the presumption of a completely negative utility, everyone would allocate zero time to travel). TTP/R are affected by a wide range of variables such as household and person characteristics and urban/suburban contexts.	1996 San Francisco Bay Area Household Travel Survey. The survey consisted of a 2-day activity and travel diary, and questions obtaining data on household and person characteristics as well as vehicle characteristics. The sample contains about 3618 households and 7990 people. Four variables of interest (time allocation to maintenance (MAINT) and discretionary (DISC) activities and to travel for each of those types of activities over 2-day period) - 3906 observations.	Applied the Almost Ideal Demand System of demand equations - also calculates elasticities.	The average travel time price for maintenance activities (bm=0.04) is lower than that for DISC activities (bd=0.12). For everyone in the sample, at least 24% of their non-work, non-commute time was spent on MAINT activities and associated travel, whereas some people spent essentially no time on DISC activities/trips. DISC activities are more of a luxury for low income people than for people with higher incomes, but not much more so. If one had a finite amount of additional time, one would increase the amount of time allocated to MAINT activities disproportionally less, but would increase the amount of time devoted to DISC activities disproportionally more, reflecting that maintenance activities are a necessity and discretionary activities are a luxury.	In essence, this is about the allocation of TTB between subsistence, maintenance & discretionary activities, based on the amount of time spent on each type of activity. Could include Q on work duration in order to calculate TTP/TTR for comparison with Dutch and/or CA studies (see pp4-5); mode not considered at all - possible Q: does the TTP/R vary by mode used for particular activity/trip? Also, could assess on basis of overall amount of time spent travelling per day and then determine % for each type of activity, based on NZHTS - future research project? Not of high relevance to current one.

Study	Question	Data used	Analytical method	Findings	Potential relevance to current project
Cirillo, C and K Axhausen (2004)	Not clear that all travellers have negative value of travel time/VTTS at all times and for all trip purposes - may be zero or positive.	Data from Mobidrive study was collected in 1999 in 2 cities of Germany: Karlsruhe and Halle - involved 160 households and 360 individuals - data was collected for 6 continuous weeks. This study only used Karlsruhe data, organised into tours: a total of 5795 tours performed by 136 individuals belonging to 66 households was identified.	Discrete choice models developed - logit and mixed logit and Bayesian procedures - variables: household location; age; marital status; professional status; use of car/public transport; time budget (mins of travel time available after all other activities taken into account); TT; tour duration; level of service (cost, including parking cost; time).	About 10% of the population was interested in extending their travel time, especially during non-work tours. The interaction between the tour types, trip purposes or the time budgets/times spent, and the VTTS indicates that travellers respond according to their situational constraints (which may not be replicated in an SP experiment and is not necessarily reflected in cost–benefit analysis) - calculates VTTS for workers/students as 4 Euro, confidence interval 2-7 Euro; shopping & leisure had >VTTS, but much larger confidence interval; married with children and women had >VTTS; 10% had positive time parameter in model; zero/negative VTTS especially for non-workers, in middle of day and evening, although mean VTTS does not vary from 'all' in daytime of about 7 Euro (evening has lower value of 2.5 Euro); workers not found to have negative VTTS for principle home-work-home tour and to have higher VTTS in evening (due to time constraints) but also to have 10% with zero VTTS.	Suggests that some travellers might value the time they spend travelling (particularly for non-work trips) or like travelling in and of itself, depending on the tour type and purpose - in fieldwork: Q re ideal v actual commute time and doubling/ halving commute time - focus on commute, though this work suggests non-work more likely to be valued positively.
Connolly, D, B Caulfield and M O'Mahony (2009)	Considers how the value of travel time may change if individuals could partake in another activity while travelling.	83 respondents (21% response rate) on the Dublin-Ballina service, 25 January 2008 - mix of inter-urban and daily commuters - 2 scenarios: wi-fi on all of train; wi-fi in specified carriage (attributes: availability of computer; cost; time spent online) - 58% of respondents were students.	Multinomial logit (MNL) model to estimate the benefits individuals would derive from having access to the internet while they travel on public transport.	Multi-tasking while travelling by rail is extremely common, with the majority of respondents participating in two or more activities. The most frequent form of multi-tasking was the use of a mobile phone. Approximately two-thirds of respondents said if wi-fi internet access was available they would use it once or more every week.	Another study looking at value of travel time on UK rail - potential Q (variation of study Q - note: for which reasons were poorly thought through): what factors influence them to choose to travel by [mode] to work/study (5-point scale)?

Study	Question	Data used	Analytical method	Findings	Potential relevance to current project
Copley, G, P Murphy and D Pearce (2002)	Qualitative research: What does travel time variability mean to people and can it be represented? SP experiment to measure the value that people place on journey time variability. Journey time variability affected by two factors: how often delays occur and how big the delay is when it occurs.	Qualitative research: 6 in-depth interviews and 3 focus groups, plus 4 'mini-groups' (to test presentation of materials). Quantitative: 167 car commuters, travelling alone, departing for work within a 15-minute time band on most days - 2 week journey-to-work travel diaries plus 6 pairs of SP scenarios.	Qualitative: descriptive analysis. Quantitative: logit and scheduling modeling.	From qualitative: journey planning does not allow for extreme incidents. For fixed appointments, travellers value predictability of journey time (select routes with less known variability). Business appointments made with a degree of flexibility - the 'ish', recognising that travel time variability exists, is difficult to predict and being late is acceptable for particular appointments. In the SP experiment, the standard deviation of journey time is valued 30% more highly than journey time, though discrepancies exist using scheduling modelling approach.	Introduces concept of 'ish' to business appointments (although this has currently been set aside in fieldwork).
de Borger, B and M Fosgerau (2006)	Tests the theory of reference-dependent preferences (individuals interpret options in decision problems as gains or losses relative to a reference point), using binary choice stated preference data on the trade-offs between money and travel time - particularly considers loss aversion (losses relative to the reference point are valued more heavily than gains); if loss aversion holds true, then a status quo bias is implied. Also, as long as goods are normal, it will be the case that WTP<WTA; the size of the difference will depend on the magnitude of income effects. Standard preferences also imply that WTP equals the equivalent loss (EL), and WTA equals the equivalent gain (EG).	Data set with observations from more than 2000 individual car drivers who were offered repeated choices between alternatives, defined in terms of time and cost changes relative to the reference. The reference was a recent trip. Interviews were conducted over the internet or face-to-face in a computer-assisted personal interview. Each respondent had 8 non-dominated choice situations (total of 16,566 observations from 2132 individuals) and a dominated choice (where one alternative was both faster and cheaper) (total of 2062 such observations from 2057 individuals).	Estimate a series of models, gradually allowing for more general value functions (loss aversion, diminishing sensitivity, asymmetries). Each of the models is specified in an unrestricted version and a restricted version.	The difference between WTP and WTA is large (ie a factor of four), and considered unlikely to be result of the experimental setup or the presence of income effects. Found evidence that drivers are more loss averse in the time rather than the cost dimension. The high-income group appears to be more time-loss averse. The largest differences are found when the sample is split according to age, where the older group is significantly more loss averse for both time and cost. Their findings support earlier findings that choices are reference dependent, that loss aversion immediately implies WTA>WTP, and the two other measures (EL and EG) should lie in between, but their relative size cannot be determined a priori.	Provides one means of structuring choices offered to study participants; may be able to provide some confirmation of reference-dependence/loss aversion through the choices made and simple modelling (budget limitations mean that modelling will be limited).

Study	Question	Data used	Analytical method	Findings	Potential relevance to current project
de borger, B and M Fosgerau (2008)	Prospect theory and reference dependence: A fundamental ingredient of the theory of reference-dependent preferences is the value function, which has four general features: (i) it is increasing; (ii) it is reference-dependent: individuals interpret options in decision problems as gains or losses relative to a reference point; (iii) it exhibits loss aversion: losses relative to the reference are valued more heavily than gains; (iv) it has diminishing sensitivity: the marginal values decrease with size, both for losses and for gains.	Subjects in the choice experiments were car drivers that had to choose between two alternatives, characterised by travel time and travel cost. These alternatives were variations around a recent trip that was treated as the reference. Interviews were conducted over the internet or face-to-face in a computer-assisted personal interview. Dataset contains 16,559 observations of such choices from 2131 individuals - refer de Borger, B and M Fosgerau (2006)	Range of models estimated, including binary logit models.	Model of reference-dependent not rejected against more general alternatives; rather it explains the observed choices very well. Confirms the very large gap between WTP and WTA. Using model, it is possible to recover the underlying reference-free value of travel time (assuming acceptance of the loss aversion parameters, that gains are under-weighted as much as losses are over-weighted relative to the reference-free utility). In line with other value of travel time studies, the value of travel time per minute, as measured by the four valuation measures (WTP, WTA, equivalent gain, equivalent loss), increases with the size of the time difference, even though a constant reference-free value of time is used in the model.	
Fickling, R, H Gunn, H Kirby, M Bradley and C Heywood (2008)	Estimation of the degree of productive use of travel time; assessing the productivity of work done while travelling on the train relative to work done at workplace; examining where productive work occurs during the rail journey, and how this would be impacted on by marginal TTS or extensions; Assessing whether any personal welfare gain was enjoyed with any TTS, if so, assess business travellers' WTP for these personal benefits; assess impact of crowding on productivity.	Business rail passengers. >5000 self-completion questionnaires handed out on trains - N=1660 - scenarios: effect of TTS on working time/productivity.	Dependent variable: productivity during journey/% of journey time spent working - explanatory variables: journey time; travel choices at time of journey; occupation type; use of computer/ electronic devices; crowding on particular trip; income, age, gender.	Recommend that evaluation value of travel time be modified as estimated productivity gains for employers as a result of TTS for employees are much less than 100% - welfare benefits to travelling employees are greater.	RAIL business travellers (ie workers traveling to/from business meetings/appointments) use some time as work time and some time as personal time - may regard most of it as 'productive'.

Study	Question	Data used	Analytical method	Findings	Potential relevance to current project
Fosgerau, M, K Hjorth and SV Lyk-Jensen (2007) AND Fosgerau, M, K Hjorth and SV Lyk-Jensen (2010)	Conducts empirical test of the hypotheses of self-selection, comfort effects and strategic behaviour. Under the self-selection hypothesis expect respondents to carry their unobserved value of travel time with them to the alternative mode. Thus car drivers and train users would have higher value of travel time in bus than bus users, and bus users would have lower value of travel time in car (train) than car drivers (train users). However, if responses are strategic, would expect a decrease in the value of travel time of car drivers as they go to bus (train) and the converse for bus (train) passengers.	Danish value of time study people aged 15-59 - sample includes interviews conducted via Internet and computer-assisted personal interviews - each respondent was asked to report the mode, length, and purpose of all trips made during the last 8 days, and one of these trips was selected randomly based on the quotas. - SP experiments: Trade-offs between in-vehicle travel time and cost in the respondent's 1. current mode and 2. alternative mode - based on reference point (of one trip reported on) and 2 from each choice quadrant (WTP, WTA, EL and EG) - N=3945 choices.	Simple modelling of the choice behaviour in terms of value of travel time.	Train users' value of travel time in train is higher than car drivers' value of travel time in car. Car drivers in general have the highest value of travel time values: current car drivers have the higher value of travel time in car, in bus, and in train. Generally current bus users have lowest value of travel time values. Those who do not consider the bus as a possibility have a higher value of time in some modes based on comfort differences. Results indicate that self-selection effects are a main driver behind the variation in value of travel time across modes. Once user type effects are controlled for, no real mode effects are observed. Respondents groups having the lowest value of travel time (ie current bus users and respondents who would use the bus as alternative) had no significant mode effects. Respondents with high value of travel time were affected by the experiment mode, most notably - the value of travel time is significantly lower in car than in train, which is consistent with the differences in comfort.	It seems that comfort differences cause higher value of travel time in some modes, particularly for those who do not consider the bus as a possibility (eg train users or car drivers who would use car or train as alternative). The researchers reject the hypothesis of strategic behaviour in SP experiment responses.

Study	Question	Data used	Analytical method	Findings	Potential relevance to current project
Gatersleben, B and D Uzzell (2007)	Explores what people see as the main sources of positive or negative affect when they use different travel modes for their journey; how this affected by journey time, distance, and effort to make journey.	All modes - grouped to walk, cycle, car, public transport. online questionnaire to all staff at University of Surrey - respondents asked about their commute - travel mode, time, and distance. Affective appraisals of the commute were measured by asking respondents to indicate on a 5-point Likert-type scale to what extent their journey to work is usually stressful, exciting, boring, relaxing, pleasant, and depressing - asked for most pleasant & unpleasant experiences during their daily commute journey - N=389 (response rate 28%).	Relationship between the affective appraisals of the daily commute and travel mode use was examined by means of discriminant analysis - based on 4 groups (walk, cycle, car, public transport); content analysis to classify pleasant/unpleasant experience and cause.	W/Cs more likely to say they enjoyed the activity itself; all groups mentioned beautiful scenery; music and literature = sources of pleasure for public transport and car users. Stressfulness of journey positively related to travel distance. Use of private cars may be too arousing (stressful) particularly if delays/traffic queues, whereas public transport may be not arousing enough (boring) - due to wait times and delays. W/C score positively on arousal as well as pleasure (ie exciting and pleasurable).	Suggests that some travellers might value the time they spend travelling, and provides an indication of the reasons for this. Equally, suggests why some may not value their travel time and reasons for this.
Gunn, H and P Burge (2001)	Explored concept of latent classes of traveller (ie traders/non-traders) - distinguished by willingness (or not) to pay to save travel time or to avoid travel time increases, wish for travel time savings to compensate for cost increases, willingness to travel longer to avoid cost increases.	1994 UK VTTS database - contains transfer price (and transfer time) data and SP data. Eg transfer price questions: 'how much would you pay to obtain time savings x?' or 'by how much would you have to be compensated to endure time delay y?'	Traders/non-traders - discriminant analysis (in SPSS) of background variables (age, sex, income, journey purpose, length and cost of journey).	Some people unwilling to trade (zero response - denied having compensating evaluations in which they were indifferent between mixes of time and cost at some appropriate value of time). Discriminant analysis and cross-tabs of key background variables confirmed that non-traders are indistinguishable from the rest of the sample - also discusses possible presence of questionnaire-prompted inertia effect.	

Study	Question	Data used	Analytical method	Findings	Potential relevance to current project
Holley, D, J Jain and G Lyons (in press)	Business travel time is seen as time which, if it can be saved (ie the journey duration is reduced) will be converted from unproductive time to productive time. Thus slower journeys are seen as more of a hindrance to economic productivity than faster ones. Such investments have seemingly ignored the possibility that travel time may not be (as much of) an economic burden as supposed.	Refer: Centre for Transport & Society and Centre for Mobilities Research (2007)	See individual study report(s)	focus groups: found that train travel was perceived as ideal environment for working compared with other modes - otherwise: refer Centre for Transport & Society and Centre for Mobilities Research (2007)	
Hoorens, V and JG Bloem (1997)	The endowment effect is the phenomenon that people sometimes demand much more to give up an object of their own than they are, or would ever be, WTP to acquire the very same object. That is, when selling goods, people want to receive a higher price than the price they want to pay when buying identical goods. To demonstrate a 'classic' endowment effect, a direct comparison should be made between the subjective monetary value of travel time 'bought' versus 'sold' rather than an indirect comparison based on the monetary value of increases or decreases in time sold or lost.	120 subjects (aged 25-40, working 4+ days per week as professionals) completed a questionnaire in which they indicated how much they would want to pay and to get paid for doing daily shopping chores and moving chores, how agreeable they and a comparable found these chores, and how much time they and a comparable peer needed for them.	ANOVA	An endowment effect was observed in the value of travel time for daily shopping chores only - not moving chores (which would be less frequent and more time-consuming). The results showed an endowment effect (subjects wanted to get paid more than they were WTP) that could not be explained by perceived self–other differences in how effectively people use their shopping time and how agreeable they find shopping. Apparently one's own time is valued higher than other people's time merely because it is 'one's own'.	Endowment effect may mean that to encourage people to switch from one mode to another may require a higher value/payoff/ benefit than their current situation - that merely offering the same conditions but on a different mode (eg same amount of time, cost, level of comfort) - as we propose to do - may not be sufficient to induce a change.

Study	Question	Data used	Analytical method	Findings	Potential relevance to current project
Jain, J and G Lyons (2008)	Forms of time: 1. Transition time - a need for experiencing distance and the opportunity for gearing up to the demands when arriving at the 'destination' 2. Time out/time for - to escape from the obligations of co-presence by providing 'back-stage' time to be by oneself or for a specific activity (such as powerpoint preparation) 3. Scheduling time - time to make, remake and readjust schedules with others while one is on the move 4. Equipped time - the travel spaces, and related infrastructures (eg wi-fi), and the objects that accompany the traveller equip transition time and time out.	6 gender-defined focus groups conducted in London, Bristol and Cumbria provide a set of discourses from which the concept of travel time as a gift is developed. Participants represented a cross section of age, social class, and travel mode use (car and public transport users), and to include some people who take mobile information and communication technologies with them on journeys.		The focus groups support the claim by Redmond and Mokhtarian (2001) that people desire, on average, a 15–20 min commute to enact the transition between work and home roles. The commute into work was described as time to think and prepare for the activities ahead, while for the return journey it was about unwinding and 'shedding the stresses of the day to ensure that negative moods were not taken home and a clean break between each day is made....Thus, as Mokhtarian et al. (2001) suggest, 'anti-activity' (e.g. resting, daydreaming) is important to the utility of travel time....travel time is enacted and experienced in multiple ways and is context driven....travel time is a desirable time for many people in many instances, and is actively incorporated into the organization of everyday activities and work-related tasks.'	Travel time as a 'gift' is used to suggest there is a positive utility to travel time - focus groups are used to indicate that this utility exists and could take the forms suggested, rather than to empirically prove the values (later surveys undertaken to 'prove' utility of train travel).

Study	Question	Data used	Analytical method	Findings	Potential relevance to current project
Jara-Diaz, SR and CA Guevara (2000)	The subjective value of travel time (SVTT) calculated from discrete travel choice models as the trade-off between cost and time in modal utility represents the WTP to diminish travel time (either in vehicle, waiting or walking). This SVTT can be shown to reflect the sum of at least two effects; first, the willingness to substitute travel time for other more pleasurable or useful activities and, second, the direct perception of the reduction of travel time itself. Study formulates a framework to estimate the leisure or resource value of travel time, which is then applied using data from Santiago, Chile.	All modes - data on activities (time at work, at home and travelling) and on mode choice from a sample of users in Santiago (two income strata) - 1991 O-D survey in Santiago used to draw sample of those that presented a very simple activity scheme: home-travel-work-travel-home - N=366 data includes: time use (time spent at home, travelling to work, from work, and at work; also includes mode choice, level of service (walking, waiting, and in-vehicle travel times) and cost for all modes and socio-economic information, for each individual.	Revealed choice model is built on the condition that the individual will be willing to work at a higher wage rate the more he dislikes work and the more he likes leisure. It seems to be based on the following: 'On average, the high-income group assigns more time to home and less time to work and travel, which suggests that (if preferences are homogeneous) the former activity is more attractive and a higher income allows for a re-assignment of time.'	The main numerical results are that all individuals dislike both work and travel, and that the resource value of time contributes between 11% and 14% to the SVTT. Also, model showed that 'Leisure value is higher for the rich group, and they dislike work more than the individuals in the middle income group. Note also that in both groups people dislike travel more than work, which adds a positive value to the wage rate in the formation of the SVTT.' (This finding was reversed in 2003 paper by same authors.)	Conclusions about people liking and disliking activities/travel were made based on model outcomes, and despite the fact that no one was asked for their likes/dislikes. Q: Could the result be a reflection of the fact that higher-income earners were much more likely to have driven a car (65% compared with 35% of middle-income earners)? Or affective values (able to be realised due to > income)?

Study	Question	Data used	Analytical method	Findings	Potential relevance to current project
Jara-Diaz, SR and CA Guevara (2003)	Subjective or behavioural value of travel time savings (SVTTS) - travel (mode) choice and activity demand models come from a common microeconomic framework such that their specifications are linked: thus developed an approach to include time assigned to activities in the estimation of the components of the subjective value of travel time.	See Jara-Diaz, SR and CA Guevara (2000)	Time assignment model (equation 26 in paper) was estimated using the non-linear least-squares routine implemented in TSP. mode choice model (with aggregated travel time) were obtained using maximum likelihood techniques within the same package	Value of leisure time (or value of time as an individual resource - based on 24 hours period excluding travel time to/from work and working time) is relatively small for both groups, though value is larger for high-income group. The SVTTS is larger for the higher-income group. High-income group's disutility of work is greater than that of the middle-income group individuals. Both groups dislike work more than travel, which adds a negative value to the wage rate in the formation of the SVTTS. The marginal utilities of time assigned to work, travel, and leisure are in fact closer than their money values. In particular, the marginal disutilities of work are practically equal for both groups. Note that individuals were assumed to be in long-run equilibrium and their wages were assumed to be exogenous.	Actual mode use or choice not a factor in models - possibility of variable value of travel time not taken into account: 47% used bus in medium-income group and 35% drove cars, while 65% drove cars in high-income group; values linked to wage rates/incomes, not actual travel costs; assumption that travel time is a disutility and that people want to minimise it.
Kat, H (2006)	Examined the variation in the VTTS over travel time.	Randomly selected 3000 sample data from the Third Inter-regional Transport Survey, Japan, conducted in 2000. The data includes traveller's origin zone, destination zone, chosen travel mode and route, and socio-demographic information - only examined leisure-purpose travel.	Four multi-nomial logit models used for the parameter estimation of travel mode choice.	Empirical analysis of data of inter-regional travel mode choice in Japan shows that the VTTS decreases as travel time increases and that variation in the VTTS over travel time may differ across travel modes. In general, travellers who use higher-speed travel modes have higher WTP for TTS. The empirical analysis with the second-order approximation shows that airplane users have the highest VTTS, followed by rail users and automobile users who have the lowest VTTS. Presented some hypothetical reasons for these results which require empirical testing.	Modes examined: airplane, rail, automobile - VTTS highest for plane and lowest for car - VTTS varied by mode, even for leisure trips, suggesting that modes may not be purely substitutable (which is something we intend to test in our survey).

Study	Question	Data used	Analytical method	Findings	Potential relevance to current project
List, JA. (2004)	Evidence suggests that preferences are not independent of current entitlements - termed the 'endowment effect' in 'prospect theory'. Some economists suggest that this is the result of a mistake made by consumers and through time they will learn (with market experience) and their behaviour will more closely match neoclassical predictions.	378 subjects - dealer and nondealers for private and public good trading treatments (trading goods = mug or candy bar).		The data provides evidence that consumers learn to overcome the endowment effect in situations beyond specific problems they have previously encountered.	
Lyons, G, J Jain and D Holley (2007)	Survey examined how passengers used their time on the train, how worthwhile that time use was considered to be, and what supports travel time use and lends it positive value.	Add-on module 'passing the time on your journey today' to bi-annual National Passengers Survey of 26,221 rail passengers in UK in autumn 2004. Questionnaires were distributed at 680 of the 2500 stations in UK at different times of day and across all days of the week. 75,930 questionnaires distributed and 26,221 were returned (a response rate of 34.5 percent). Sought info on train journey characteristics and travel time use (eg actual activities; utility; potential to work on train; items on hand for use).	Correlational (bivariate) analysis; dependent variable: rail journeys; explanatory variables: trip purpose (commute; company business; leisure); weekday/weekend; activities while traveling; outbound v inbound journey; travel class; gender; journey duration; 'equipment' available; advance planning.	Wide variety of activities undertaken during travel - varies by: journey purpose (commute, business, leisure), whether it is outbound or inbound journey; first or standard class; gender and journey duration (increases the number of activities that may be undertaken and influences what activity most time is spent on). For >75% of passengers, their use of travel time was not entirely wasted. Peoples' interpretation of 'utility' varied: for some, reading was 'wasted time', for others it was 'worthwhile'; ditto window gazing and listening to music. Time spent working/studying was consistently considered productive/worthwhile. About one-half of people did some preparation for activities to do on train journey; many were 'equipped' with items to occupy themselves, though >50% of items were not used.	Provides evidence of some productive use of travel time. Note: rail/underground trips comprise approx 3% of all trips made in UK - car = 64% (driver or passenger); walk = 22%; bus = 2%; cycle/motorbike = 2%. Q: do people using the modes that comprise the VAST majority of trips also derive utility from their journey? If yes, what activities do they engage in? - provides a potential list of activities people engage in; Qs for NZ-based survey.

Study	Question	Data used	Analytical method	Findings	Potential relevance to current project
Mokhtarian, P and I Salomon 2001.	Explores the concept of 'undirected travel' or travel 'for its own sake' - essentially: 'travel is the activity, movement is the object, and a destination, if there is one (or more) in the usual sense of the word, is to varying degrees incidental' - undirected travel is 'for the most part a leisure activity' - suggests an affinity for travel incorporates 3 elements that are generally confounded: 1. Activities conducted at the destination; 2. Activities conducted while travelling (including 'anti-activity' ie shifting gears, relaxing); 3. Activity of travelling itself. Excess travel is undirected and undertaken because travel itself is viewed as having a positive utility.	1998 San Francisco survey - travel liking variables; 13 different 'indicators of excess travel': 'keeping in mind that travel is going any distance by any means, how often do you travel … to explore new places OR … to see beautiful scenery OR … just for the fun of it' etc.; personality traits; attitudes towards travel (eg 'getting there is half the fun' OR 'the only good thing about travelling is arriving at your destination'; ideal commute time; hypothesise that people have an unobserved desired TTB.	Bivariate analysis.	Attitudes towards travel: suggest there are a large group of people with some intrinsic utility for travel; who like travelling, irrespective of whether it is for 'chores', commuting or leisure; who engage in 'excess' travel. Ideal commute time is discussed in Redmond and Mokhtarian (2001) >75% of the sample reported sometimes or often travelling 'just for the fun of it' and more than 2/3rds disagreed that 'the only good thing about travelling is arriving at your destination' – doesn't refute that most travel is derived from demand, but argue that humans 'possess an intrinsic desire to travel'. Acknowledge that in self-reports of attitudes toward travel, respondents likely to confound their utility for travelling itself with their utility for the activities at the destination and for activities conducted while travelling.	Since undirected travel is for the most part a leisure activity, it is outside the ambit of this study focusing on the commute - however, note that if people are not consistently time- or cost-minimisers when it comes to travel (even in the congested commute periods), current methodology/application of VTTS may be overstating the benefits of capacity enhancement - also, it is unclear if TTS may be used elsewhere. Suggests applying the teleportation test to explore affinity for travel (see s6.1 for discussion on possible interpretation of responses).
Ory, D, PL Mokhtarian and G Collantes (2007)	Explores subjective mobility - refers to individuals' qualitative assessment of their travel amounts, controlling for the actual amount of travel they did. Importance of psychological factors well-known, eg reflected in valuing wait time for public transport as more onerous that in-vehicle time.	14-page self-administered survey of San Francisco Bay Area residents, sent to 8000 randomly selected households in 3 neighbourhoods in May. 1998 - 2000 returned survey: subset of 1358 part- or full-time workers and commute. Respondents asked: 'How would you describe the amount of travel you do?' with a 5-point ordinal scale of response options ranging from 'none' to 'a lot'.	Dependent variable: 10 subjective mobility variables (same Q asked for 10 different situations) - ordinary least-squares regression - explanatory variables - classified into 8 categories: objective mobility, travel liking, attitudes, personality, lifestyle, excess travel, mobility constraints, and socio-demographics.	The evidence mostly supported a quadratic, or 'affective intensity' relationship, in which elevated levels of affect in either direction (liking or disliking) had a positive impact on subjective mobility. Thus, seeing travel as either a burden or a pleasure tended to increase its subjective weight.	Results suggest that some people who like (or dislike) travel a lot would have different value of travel time. This is possibly already accounted for in typical value of travel time, which is a 'mean' of a range of values. Q: what is the range? And how many people are one way or the other?

Study	Question	Data used	Analytical method	Findings	Potential relevance to current project
Ory, DT and PL Mokhtarian (2004)	Focuses on single equation models for travel liking - possible reasons for travel having utility and leading to 'excess travel': adventure-seeking, variety-seeking, independence, control, status, buffer (transition time), exposure to the environment, scenery and other amenities, synergy (productive use of travel time or ability to conduct multiple activities at or on the way to destination), escape, curiosity, physical exercise, therapeutic value of movement/travel. Authors hypothesise: 'those who view travel as a useful buffer between activities, and/or are able to use travel time productively, will have a smaller disutility for travel than would be predicted by the conventional measures of travel time and cost alone, which at a minimum would reduce their incentive to reduce their travel, and at the extreme could prompt them to increase it.'	Subset of 1358 part- or full-time workers from 14-page San Francisco Bay survey (see Ory et al 2007). Travel liking measures (varied by distance, purpose, and mode) were captured in the survey by the following question: 'How do you feel about travelling in each of the following categories? We are not asking how you feel about the activity at the destination, but about the travel required to get there. Even if you seldom or never travel in a certain category, you may still have a feeling about it.' - responses on 5-point Likert scale (like/dislike) - short trip = <100 miles one way	Dependent variable: travel liking. Explanatory variables in 11 categories. 13 models estimated using ordinary least-squares regression – eight for short-distance travel and five for long-distance travel. The short-distance models categories of travel include: overall, commute to work/school, work/school-related, entertainment/recreation /social, personal vehicle, bus, rail, and walk/jog/ bicycle; the long-distance models include: overall, work/school-related, entertainment/recreation /social, personal vehicle, and airplane.	Short-distance results (of interest to our study): Daily commute is liked/strongly liked by 21.4% of the sample, 18.6% like/strongly like work/school-related travel. Those commuting long distances or durations tend to enjoy travel less than those with shorter commutes; in SF Bay area (where BART was located), those with longer commutes are more likely to enjoy public transport modes than those with shorter commutes. Those who view their commute time as productive and do not find it very stressful have a higher liking for different types of travel. 58.1% like/strongly like travel by personal vehicle; travel by non-motorised modes (walking, jogging, and bicycling) was higher (66.7%). Rail likers and dislikers each comprise about 30% of the sample. Bus dislikers outnumber likers nearly 8 to 1 (63.4% to 8.3%). Those who enjoy a high-density neighbourhood and/or are 'pro-environmental solutions' tend not to like travelling in an automobile. Local travel - irrespective of mode - found to be a productive and important transition period (commute benefit). The majority of explanatory power in the models is provided by the Attitude, Personality, and Lifestyle variables, thus confirming the primary hypothesis.	May be useful later: discusses some possible ways people could have confounded their liking for the activity with their liking for travel (pp8-10). – Q: how big is the group who like travel? What are their reasons for liking it? and do typical 'mean values' in the evaluation sufficiently capture the variation? Recommends use of teleportation Q (eg If you could instantaneously be teleported to a desired location, would you prefer doing that more than travelling there in the conventional way?) as a useful way to get respondents to identify the relative strengths of the various reasons for travelling.

Study	Question	Data used	Analytical method	Findings	Potential relevance to current project
Paez, A and K Whalen (2010)	Investigates how socio-demographic and attitudinal variables of university students affect their desire to increase or decrease their daily commute.	Online survey, based on Mokhtarian and colleagues' Californian study, directed to students at McMaster University, Hamilton, Canada – covered all modes - grouped to active (walk and cycle), car, public transport. - 23376 emails sent out - N=1251 usable replies (overall response rate ≈ 5%) - collected demographic info, availability of different modes, last commute trip to university (including actual commute time), ideal commute time, series of attitude statements.	Regression analysis. Dependent/objective variable = ratio of ideal to actual commute time for three different modes, active travel (walk/ cycle), public transport, and private car. Explanatary variables: socio-demographic variables (gender, age, vehicle ownership, licensing status, level of studies, and visa status) and attitudinal scores.	The typical commuter would like to decrease the commute time regardless of mode used. Active travelers less dissatisfied with their commute, followed by private car and public transport users. Some attitudinal responses impact the desire to travel more or less eg the social environment, availability of local activities, quality of facilities, productive use of the commute, and the intrinsic value found in the commute travel. A traveller who would like to spend more time commuting uses active transport, thinks that getting there is half the fun, dislikes traveling alone, likes to live in an active neighbourhood with sense of community. No socio-demographic variables were significant, except foreign/local student. Effect of attitudinal responses varies across transport modes. W/C more likely to want longer commute times (IC>EC); some car users who regard their time as productive would like longer commutes.	Some useful info on response rate research (p540). Histogram of ideal v actual commute time v mode (p542). Suggested separation of ideal and actual commute time questions (p541). Significant attitude statements: commute trip is useful transition; getting there is half the fun; I like traveling alone; I use my commute time productively.

Study	Question	Data used	Analytical method	Findings	Potential relevance to current project
Redmond, LS and P Mokhtarian (2001)	Purpose: to distinguish a relative desired commute time (more/much more than now or less/much less than now, about the same) and ideal commute time from the actual commute time of an individual (which can be described as the amount of time an individual is willing to commute). Propose that the difference between IC and actual commute time (or EC) represents one measure of commute satisfaction: the larger the difference (in either direction), the greater the dissatisfaction.	14-page self-administered survey of San Francisco Bay Area residents, sent to 8000 randomly selected households in 3 neighbourhoods in May 1998 - 2000 returned survey - subset of 1300 used in this analysis constitutes those respondents who worked either part- or full-time, and who completed the Ideal Commute Time and Actual Commute Time Qs. Note: mode use for commute was NOT asked for, although frequency of commute trip was collected.	2 dependent variables: ideal commute time (IC); relative desired commute - not time, distance, frequency specific. 80+ explanatory variables in 11 categories: Objective Mobility, Perceived Mobility, Relative Desired Mobility, Travel Liking, Attitudes, Personality, Lifestyle, Excess Travel, Mobility Constraints, Travel Modifiers and Demographics. Used linear regression to screen potential variables for models, then tobit and probit models developed.	Ideal commute was positively related to actual commute time and to 'liking and utility' of the commute and was related negatively to how often people commute. The more the statements 'I use my commute time productively' and 'My commute trip is a useful transition between home and work' were agreed with, and the more that 'My commute is a real hassle' was disagreed with, the longer the ideal commute would be. Conclude: it is possible (although comparatively rare - 7% of sample) to commute too little as well as too much. For 42% of the sample, their EC was within 5 minutes of their IC, 'indicating either that they have succeeded in achieving their ideal or that they have adjusted their ideal to fit reality'. The mean IC was 16 minutes.	As a check on IC, EC, and IC minus EC in survey, could ask for 'relative desired commute' - some attitude statements already included. Our proposed fieldwork includes some improvements suggested here: ie mode used for commute; desirability of activity (enjoy work/study); open-ended Qs about what is enjoyed/not enjoyed about commute; activities conducted on commute.
Richardson, AJ (2003)	Questions the traditional view that 'travel is a derived demand'. Rather than assuming that all the positive components of a trip are contained in the activity at the destination, while the trip itself only contains disutility, a view is emerging that some people actually enjoy the travel component of the trip or at least are not WTP for reductions in the trip duration.	3100 respondents (about 1850 public mode users and 1250 private mode users) answered 18 adaptive stated preference questions in the Singapore study - 2450 were considered valid respondents - each scenario comprised a trade-off between 2 attributes across 2 options.	Adaptive stated preference method (capable of providing unbiased estimates of the mean and the distribution of value of travel time from an assumed population of value of travel time at an individual level).	Mean value of travel time = 8.2¢ SG/ minute - range from 0¢SG (14% of sample) to >20¢ (8%) - varied by mode use - 0% of private mode users had 0¢/min while 23% of public transport users had 0¢/min; full-time or self-employed less likely to have 0¢ than those working part-time or not in the employed workforce (housewives, students and the retired); zero value of travel time more likely for low-income earners, more likely to be female (who are also less likely to be employed and more likely to be low income), young or old - gives a list of factors that may have an effect on the marginal utility of time.	Q: Do commuters have preference for zero minute commute (ideal commute time; teleport option) or do they prefer to have some travel time? Is there a difference between modes? Students v workers?

Study	Question	Data used	Analytical method	Findings	Potential relevance to current project
Steg, L (2004)	Examined motives for car use.	Car driver - general and commuters. 2 surveys in Groningen and Rotterdam, The Netherlands. 1st study: random selection of 185 respondents who possessed a driver's licence interviewed - rated the attractiveness of 33 positive aspects of car use on 5-point scale; 15 items reflecting the 3 meanings of material possession; attitudes to car use; how many km driven per year; socio-demographics. 2nd study comprised a random selection of 113 commuters who regularly travelled during rush hours and used different measures for instrumental, symbolic and affective motives.	Study 1: Analysis of variance (ANOVAs); principal components analysis; confirmative factor analysis; study 2: multiple regression.	People do not only drive their car because it is necessary to do so, but also because they love driving - symbolic and affective aspects significantly contribute to the positive utility of driving, more so than instrumental values/functions. Irrespective of whether they are frequent/infrequent drivers, symbolic and affective motives and independence/freedom play an important role in explaining the level of car use. Respondents commuted more often by car when others also drive to work, when their family expects them to do so, when they compare their commuter mode choices with others and think driving a car suits them better than travelling by public transport or bike, and when they think car use is less stressful.	Raises the Q: is value of travel time affected by how people perceive their mode in terms of instrumental, affective and symbolic functions? (possibly not overly relevant to CBA, but may provide insight into the range of values).
Steg, L and G Tertoolen (1999)	Examines which (instrumental and affective) motives are related to car use behaviour. 2 studies: 1. identifying different categories of car use motives; 2. examining the influence of affective motives on car use and on preferences for policy measures aimed at reducing car use. 'affective motives' = symbolic value of car use (such as status, freedom, power).	Car drivers - See Steg (2004) for sample details - 1st study: 3 methods employed to assess instrumental and emotive factors: episode cognition method, the Q-sort method and the semantic differential method - the latter is reported in Steg (2004). 2nd study: yet to be completed, to build on the first.	1. Factor-analysis was conducted to examine the correlation structure of the judgements of respondents.	Found 'the instrumental as well as the symbolic or affective value of car use and safety are important dimensions underlying the judgements of the similarity and attractiveness of car use episodes and aspects, respectively'. The more people used their car and the more positive their car attitude, the more favourably they evaluated the affective motives for car use, the independence of car use, the instrumental motives of car use, and the less unattractive they found the negative (personal and societal) consequences of car use.	Implies that TTS may not be relevant for a group of car drivers for whom the affective values are important. Q to explore: tradeoff between TTS and affective value; relative importance of both.

Study	Question	Data used	Analytical method	Findings	Potential relevance to current project
Stutzer, A and BS Frey (2004)	Analysed data on subjective well-being as proxy measures for people's utility to ascertain whether commuters are compensated for the stress incurred by commuting, as suggested in economic models. Hypothesised that if this is the case, would not find any systematic correlation between people's commuting time and their reported satisfaction with life.	German Socio-economic Panel data, covering 1985–1998 - Employed/self-employed respondents were asked 'How long does it normally take you to go all the way from your home to your place of work using the most direct route (one way only)?' as well as a Q on reported subjective well-being eg 'How satisfied are you with your life (dwelling, job, etc), all things considered?' A variety of demographic data was collected.	Ordinary least-square estimations and ordinal regression analysis.	Holding all other things constant, people who spend more time commuting report lower satisfaction with life - as commuting time increases, satisfaction with life decreases. People are not compensated for commuting by higher wage rates or lower residential costs and do not report higher satisfaction with either their job or their residence. Also found that commuting might even result in negative externalities for other family members. Compared with someone who does not commute, people who commute 23 minutes (one way), the mean commuting time in Germany, would have to earn 19%/month more in order to be fully compensated.	The range of value for life satisfaction is 7–7.24 (on a scale of 10) between first (commute <10 mins) and 4th quartile (commute >50mins), so really not all that much difference.
Susilo, YO and M Dijs (2010)	Explores travel time ratio (ie the ratio obtained by dividing the travel time to a particular activity place by the sum of travel time and activity duration for the same activity location) for different type of non-work activities, including the variation in TTR for different activity duration and the influence individuals' socio-demographic variables, household structure, built environment, modal choices and travel parameters on the TTR values.	Dutch National Travel Survey 2005 dataset which includes 49,583 individuals from 21,743 households. It contains 182,797 reported trips - included journeys (O'Fallon & Sullivan's (2004) definition = tours) whose origin was the individual's home or workplace - excluded the shortest 5% and longest 5% of trips.	Synthesis analysis using multi-level regression.	Value of TTR varies according to the nature of the journey, the type of the activities, individual obligation commitments, available travel mode, availability of activities location and many other factors. Each activity has different turn-over point. After a certain time investment, travel is increasingly becoming a disutility, which interferes with other activities individuals want to spend time on. Once an individual reaches that turn-over point, he/she would either find a closer activity location from their base or reduce his/her activity duration. TTR value not solely influenced by individual's activity commitments, resources and constraints but also the trade-off within household commitments and constraints; retail density and degree of urbanisation in home location.	Does not consider mode choice - it is possible that mode is selected to have travel and activity fit within the desired TTR range; this may imply that value of travel time is related to activity and TTR - hence travellers would be indifferent to actual mode used, provided the TTR remained within the desired parameters - to be explored in fieldwork for car drivers.

Study	Question	Data used	Analytical method	Findings	Potential relevance to current project
Turcotte, M (2006)	Atempts to determine, using the latest data from the 2005 General Social Survey (Canada), whether commuting is in fact an unpleasant experience for most workers. The main factors associated with a more or less pleasant commute are identified, focusing in particular on the mode of transportation used.	'Commuting workers' - ie people who made a round trip between their home and their place of work the day before the Canadian General Social Survey 2005 telephone interview.	Based on an ordered logit model, predicted probabilities representing the estimated probability that a 'commuting worker' with a particular characteristic (eg driving his/her car to work) will like or dislike commuting, after all the other factors in the regression model kept constant. Bootstrap weights used to estimate standard errors.	Workers on the whole have a relatively positive attitude toward commuting. Car drivers more likely to have positive attitude than public transport users (who are younger, live in larger cities and have longer commutes). Logit models showed that holding everything constant, the probability that public transport users will like commuting is lower than car drivers; cyclists much more likely to enjoy their commute; also walkers (not as much as cyclists). Duration has the greatest impact on the probability of liking/disliking commute to work, as well as whether or not the person likes their paid work. For equal commute times, drivers and public transport users are equally likely to enjoy commuting.	Fact that some commuters enjoy their commute suggests a positive utility and raises Q: what are the reasons for this? Q for survey: relationship between enjoyment of commute and enjoyment of work/study.
Waldo, A (1999)	The main question is why different ways of travelling are chosen ie how the households argue when organising their everyday travelling.	In-depth interviews with 25 households in Malmö, Sweden - households differ in location of housing, in access to means of transport (access to car(s) and different forms of public transport); in demographic characteristics (age, civil status and households with/without children); in socio-economic characteristics.	Descriptive analysis.	Results show that there is a range of factors influencing travel behaviour, but also that the chosen ways of travelling are much a result of habits - TIME is critical factor: actual travel time by different modes; waiting time perceived as wasted; time experienced as a 'stress factor'. Cites a Norwegian study that concludes travellers find it more important to reduce walking, waiting and exchange time than to reduce the actual travelling time.	

Study	Question	Data used	Analytical method	Findings	Potential relevance to current project
Ettema, D and L Verschuren (2007)	Investigates how the value of travel time is affected by the use of multi-tasking options and travellers' attitudes toward multi-tasking. – multi-tasking (MT) addresses time budget issues; makes time spent doing something else more enjoyable. Given that travel time is regarded as lost time (because it takes away time that would otherwise be spent on activities), the loss will be less if travel can be better combined with the execution of other activities. Theory: Greater access to technology provides greater opportunities to multi-task.	In Eindhoven, Netherlands: 191 questionnaires were collected from door-to-door survey and 35 were collected in trains (as representatives of public transport users) = total sample of 226 respondents.	Factor analysis (attitudes) and discrete choice models (value of travel time).	Commuters' attitudes toward multi-tasking affect the value of travel time. Commuters who are monochronic (prefer to only travel and not do any other activity while travelling) do have a higher value of travel time. Commuters who listen to music (make trip more enjoyable) have a lower value of travel time, whether in car or train, whereas those who read for work (contributing to work fulfilment) while travelling have a higher value of travel time. Provides illustrative values for value of travel time for 2 specific types of commuters (insert modified table in report).	Setting sample size issues aside, study suggests attitudes to multi-tasking appear to influence VTTS; those that listen to music (time rich/money poor? but it is true on car and train) have lower VTTS than average; those that read for work (time poor/money rich?) have higher values than average (for the trip in question); it does not appear to tell us to what extent the ability to multi-task and the availability of multi-task activities on a trip reduces (or increases) the VTTS of an individual.

B.3 Excluded studies

Document	Description	Comments
Abraham, J, S McMillan, A Brownlee and JD Hunt (2002) Investigation of cycling sensitivities. *Transportation Research Board Annual Conference*, January 2002, Washington, DC.	Empirical study (intercept survey & SP survey - ranking 3 alternative routes with different facilities, trip characteristics and costs (for facilities)) in Calgary; derived value of travel time from cyclists' WTP to reduce their journey time.	Potentially cite as an example of value of travel time research for cycling.
ARTA and Gravitas (2009) universities travel plan student qualitative research. Presentation to Auckland Regional Transport Authority (ARTA) Steering Group Committee, 2 December 2005.	Major factor = disposition towards non-car travel modes. Shaping factors considered = socio-economic status, CBD residence, family, work and study responsibilities. Developed student traveller profiles: public transport captive, cost-conscious driver, car-loving students, private vehicle hostage, 'better than driving' non-car driver.	Review profiles once we have data from our survey.
Axhausen, K, H Koll and M Bader (1999) Experiments with SP and CA approaches to mode choice. In *Proceedings of the European Transport Conference*, 27–29 September 1999, Cambridge.	Irrelevant (experimenting with stated preference v conjoint analysis methodology).	
Batley, R (2006) Valuing the reliability of arrival time by means of the risk premia. In *Proceedings of the European Transport Conference*, 18–20 September 2006, Strasbourg, France.	Develops a new method for assessing reliability of TT, the 'reliability premium' ie which measures, for a given departure time, the delay in arrival time that the individual would be WTP in exchange for eliminating unreliability in arrival time.	
Bliemer, MC, JM Rose and R Beelaerts van Blokland (2009) Experimental design influences on stated choice outputs. In *Proceedings of the European Transport Conference*, 5–7 October 2009, Leeuwenhorst, Netherlands.	Empirically compares the results obtained from the two different discrete choice experimental designs types that have been proposed and mainly used within the literature. Ultimate aim is to produce practical guidelines for the construction of DCE designs.	
Börjesson, M, A Levander and J Eliasson (2007) The value of time of car drivers choosing evidence from the Stockholm congestion charging trial. In *Proceedings of the European Transport Conference*, 17–19 October 2007, Leeuwenhorst, Netherlands.	Modelling for road pricing - not feasible to address in current study. The value of travel time in network assignment models for car traffic often has profound effects on forecasted effects of road pricing schemes, including effects on traffic flows and travel times, and anticipated revenues. Uses revealed preference data: drivers' route choice in the face of either a tolled route or a congested bypass. Calculates higher value of travel time than conventionally expected.	
Buehler, R (2010) Transport policies, automobile use, and sustainable transport: a comparison of Germany and the United States. *Journal of Planning Education and Research 30*: 76–93.		Not about value of travel time
Bureau of Transport Economics (1982) *The value of travel time savings in public sector evaluation*. Occasional paper. Canberra: Australian	Review of the state of practice for VTTS in Australia - in 1981.	

Document	Description	Comments
Government Publishing Service.		
Carrion-Madera, C and D Levinson (2010) Value of travel time reliability: a review of current evidence. University of Minnesota: Nexus Research Group. Working paper no.85. Accessed November 2010. *www.nexus.umn.edu/Papers/VORReview.pdf*	Systematic review of the valuation/measurement of travel time reliability, with a particular focus on understanding the differences of estimates between and within studies. They found several variables that could explain the differences: the time of day for collecting the data; regional location differences; year of the study; and the route choice dimension.	Review of value of travel time reliability.
Circella, G, PL Mokhtarian and LK Poff (2011) A conceptual typology of multi-tasking behaviour and polychronicity preferences. Paper presented to Transportation Research Board 90th annual meeting, January 23–27, 2011, Washington, DC. Accessed July 2011. *http://amonline.trb.org/*	Paper focused on defining a typology of 'multi-tasking', including that being done while travelling and/or waiting.	Not relevant.
Concas, S and A Kolpakov (2009) Synthesis of research on value of time and value of reliability. *Florida Department of Transportation contract no.BD549 46*.	Synthesis of current and past (theoretical and empirical) research on the value of time and the value of reliability of time, designed to provide practitioners with applicable ranges of estimates that can be used in project evaluations.	Review of value of travel time and value of reliability.
Dargay, JM and M Hanly (2003) A panel data exploration of travel to work. In *Proceedings of the European Transport Conference*, 8–10 October 2003, Strasbourg, France.	About commute trip mode use over time by same individuals in British household panel survey - found about 18% change mode in a 2-year period; over 9 years, nearly half have changed mode at least once. Moving house or changing job can increase/decrease travel time = important determinants of travel time and mode choice - changing homes, more increased travel time; increase/decrease in household vehicles associated decrease/increase respectively in commute travel time.	Provides useful background/ explanatory info on commute trip patterns, focused on the same group of people over a 9-year period.
de Jong, G, E Kroes, P Sanders, R Plasmeijer and P Warffernius (2004) The value of reliability. In *Proceedings of the European Transport Conference,* 4–6 October 2004, Strasbourg, France.	Review of international literature on reliability of travel time for passenger (car and public transport) and freight transport - found no generally accepted monetary values for reliability and other aspects of quality.	Sources cited from EUR, US and Brazil - not clear whether they reviewed material from AUS/NZ.
Department of International Development (DFID) (2005) The value of time in least developed countries: the African studies (unpublished report, July 2005).	Traditional value of time study, deriving values for driving, walking, and taking the bus in Africa by men, women and children.	

Document	Description	Comments
Gaker, D, Y Zheng and J Walker (2010) Experimental economics in transportation: a focus on social influences and the provision of information. *University of California Transportation Center UCTC-FR-2010-21*.	Exploring social influences on route choice, vehicle ownership and pedestrian safety.	Not about value of travel time
Gasparini, G (1995) On waiting. *Time & Society* 4, no.1: 29–45.	Hypothetical discussion about possible perceptions of 'wait time'.	Potentially cite as an example of research on utility of travel time in other disciplines.
Genter, JA., S Donovan, B Petrenas and H Badland (2008) Valuing the health benefits of active transport modes. *NZ Transport Agency research report 359*.		Not about value of travel time.
Goodman, R (2001) A traveller in time: understanding deterrents to walking to work. *World Transport Policy and Practice* 7, no.4:50–54.	Creates 7 types of time (eg work, leisure, travel) and then 'defines' them from the perspective of 30 in-depth interviews with 'employees in the public sector' (no further details given on these subjects).	Too general.
Handy, S, L Weston and PL Mokhtarian (2005) Driving by choice or necessity? *Transportation Research Part A: Policy and Practice* 39, no.2–3): 183–203.	Exploratory research on possible existence of 'excess driving' (not value of travel time) ie driving by choice - findings suggest drivers would value a reduction in time spent on necessary driving more than time spent driving by choice; and that any reduction in time spent driving in heavy traffic would be valued more than an equal TTS spent driving in uncongested conditions by both those driving by choice and those driving by necessity.	
Hensher, D (2008) Influence of vehicle occupancy on the valuation of car driver's travel time savings: identifying important behavioural segments. *Transportation Research Part A: Policy and Practice 42*, no.1: 67–76.	Investigates the role that the presence of the passenger plays in the VTTS of the non-commuting car driver.	In addition to Ian Wallis' current research project, cite as a reason for not particularly focusing on car passenger value of travel time.
Hess, S, A Erath and K Axhausen (2008) Estimates of the valuation of travel time savings in Switzerland obtained from pooled data. *Transportation Research Record* 2082: 43–55.	Improving VTTS estimates by pooling data from different studies.	Cite as recent review of VTTS literature.
Hunt, JD and J Abraham (2007) Influences on bicycle use. *Transportation: Planning, Policy, Research, Practice 34*, no.4: 453–470.	Stated preference experiments trading off cycle facilities, travel time and end-use facilities in Edmonton.	Potentially cite as an example of value of travel time research for cycling.
Wattam, M, R Flanary, F Ahmed, K Vaidya and M Wardman (2005) *How to*	Following empirical studies, developed *How to manual*.	Not relevant.

Document	Description	Comments
manual: the valuation of rural travel time savings in least developed countries. UK Department for International Development.		
IT Transport Ltd (2002) The value of time in least developed countries. *Knowledge and Research (Kar) 2000/01 DFID Research no.R7785*.	Exploring methodology for assessing VTTS and value of travel time in developing countries, by modifying current developed country methodologies.	Not relevant.
IT Transport Ltd (2005) *Valuation of travel time savings: empirical studies in Bangladesh, Ghana and Tanzania and a practical model for developing countries*.	Summary of empirical studies exploring methodology for assessing VTTS and value of travel time in developing countries.	Not relevant.
Kahneman, D and A Tversky A (1979) Prospect theory: an analysis of decision under risk. *Econometrica 47*, no.2: 263–292.	About risk in choice-making (not transport-related specifically, but would be more relevant to reliability/variability) - describes several classes of choice problems in which preferences systematically violate the axioms of expected utility theory (certainty effect; reflection effect). Argue that utility theory, as it is commonly interpreted and applied, is not an adequate descriptive model and thus propose an alternative account of choice under risk.	Not relevant.
Knetsch, JL and W Wong (2009) The endowment effect and the reference state: evidence and manipulations. *Journal of Economic Behaviour & Organisation 71*: 407–413.	Explores the influence of the reference state/point on the endowment effect and finds the disparity between people's valuations of gains and losses appears to be a pervasive but perhaps not universal characteristic of their preferences. Further, the persistence and size of the disparity may well be influenced by circumstances of their measurement.	
Kockelman, KM and S Krishnamurthy (2003) A new approach for travel demand modeling: linking Roy's Identity to discrete choice. Paper prepared for the 82nd Annual Meeting of the Transportation Research Board. Also published as Kockelman, KM and S Krishnamurthy (2004) A new approach for travel demand modeling: linking Roy's Identity to discrete choice. *Transportation Research Part B: Methodological 38*, no.5: 459–475.	Methodological paper exploring travel demand modeling.	Not about value of travel time per se.
Krizek, K (2006) Two approaches to valuing some of bicycle facilities' presumed benefits. *Journal of the American Planning Association 72*, no.3: 309–319.	Uses 2 methods (adaptive stated preference and hedonic modelling techniques to value the access to cycling facilities) to measure 1. How much travel time individuals are willing to spend to obtain particular features of on- and off-street bicycle facilities and 2. The effect of cycling facilities on home values.	Potentially cite as an example of value of travel time research for cycling (no monetary values set).
Laurier, E (2004) Doing office work on the motorway. *Theory, Culture and Society 21*: 261–277.	Ethnographic study - how people (one person) use time and space to work while driving.	Not relevant.

Document	Description	Comments
Lens, I and M Pandelaere (2008) Understanding the willingness-to-pay - willingness-to-accept gap: materialism as a moderator of the endowment effect. In *Proceedings of the 37th European Marketing Academy (EMAC) Conference*, Brighton UK, 2008.	WTP/WTA gap - A discrepancy (known as the endowment effect) exists between people's willingness to pay for an object and the least price they are willing to accept to sell this object if they own it - focuses on how people value objects (merchandise/goods) rather than time.	Other sources on endowment effect are more relevant.
Li, Z, D Hensher and JM Rose (2009) Valuation of travel time reliability in an extended expected utility theory framework. *Proceedings of the 12th International Conference on Travel Behaviour Research*, Jaipur, Rajasthan, India, December 13–18 2009.	Reviews previous and current methods in understanding travel time reliability, and estimating values of reliability using stated choice methods; discusses the limitations of these approaches, and proposes alternative approach - undertakes empirical study - presents an alternative approach that i) addresses respondent risk attitude, ii) accounts for nonlinearity in probability weighting, and iii) integrates VTTS and value of travel time reliability into a 'reliability-embedded value of travel time savings'.	Example of current value of travel time reliability research topics - value of travel time reliability is set aside for this project, as other research is focused solely on this aspect of value of travel time.
Lyons, G (2005). It's time we tried to understand more about what people do with their travel time. Viewpoint, *Local Transport Today*, 411, p.18.	Opinion piece (for travel time research).	
Lyons, G (2006) Report on workshop - travel time use: developing a research agenda. A paper based on a 1-day workshop hosted and sponsored by the UK Department for Transport.	An article written for the transport trade press led to an invitation from the DfT to organise and facilitate a specialists' workshop on 'Travel time use - developing a research agenda' in September 2005 - report from workshop.	Some definition/descriptions may be useful: working time & non working time, aggregation of TTS in economic appraisal; Hensher formula for business travel time explained.
Mabit, S and M Fosgerau (2008) Self-selection and the value of travel time. In *Proceedings of the European Transport Conference*, 6–8 October 2008, Leeuwenhorst, The Netherlands.	Follows on from Fosgerau et al (2007) - attempted to separate mode choice and user type effects but found that the method was unable to capture possible self-selection – another approach was needed.	

Document	Description	Comments
Marshall, A (2009) Traveling at good speed: transportation policy shouldn't be reduced to average commuting times. *Governing Magazine*, August 2009. Accessed November 2010. *www.governing.com/column/traveling-good-speed*	In comparing his commute experiences (35 minutes by car on the freeway v 45 minutes of walking, waiting, riding the subway and saying he prefers the latter as more relaxing), Marshall states: *I make this comparison to point out that, when it comes to transportation, time is an elastic, subjective, almost mystical thing. One minute spent travelling one way is not the same as another. Yet we seldom acknowledge this ...* *There is no objective way to pronounce that one way of travel is better than another. Transportation, or at least one's experience of it, is subjective. Ultimately, it depends on what you like. But if policy makers want to push one form of transportation over another, they'd do well to consider making that form of travel a primo experience.*	Definitely an 'opinion' or 'think' piece - eloquently expresses how perceptions of travel time can vary by mode.
Milthorpe, F (2007) Consistency in daily travel time – an empirical assessment from Sydney travel surveys. *Proceedings of the 30th Australasian Transport Research Forum*, 2007, Melbourne, Australia.	Investigates whether the constant 'daily travel time budget' phenomena can be observed for Sydney and compares the results with those found in international studies - 3 explanations of constant TTB: reductionist (need for movement); reconstructive (maximising utility); contextualising (evolutionary behaviour). Inner Sydney (up to 10km from CBD) had highest daily travel time, although average travel speeds are lower. Data (increasing daily travel time) doesn't support TTB for Sydney.	
National Cooperative Highway Research Program (2006) Guidelines for analysis of investments in bicycle facilities. *NCHRP Report 552*. 119pp.	Presents methodologies and tools to estimate the cost of various bicycle facilities and for evaluating their potential value (generally using WTP as measured in travel time) and benefits.	
Organisation for Economic Co-operation and Development (OECD) (2008) Household behaviour and the environment: reviewing the evidence. France: OECD. 264pp.	Reviews existing empirical evidence on the main drivers of household behaviour in 5 policy areas, including personal transport and value of travel time - for recycling, calculated based on wage rates; for transport, only considered in context of road pricing.	
Oxera (2009) Follow the white rabbit: do people care if their train is late? Agenda, February 2009, pp1-6. Accessed October 2009. *http://www.oxera.com/*	Value of travel time reliability of rail (WTP to increase journey reliability) - some potential bias/confounders to identifying/measuring unreliability.	

Document	Description	Comments
Oxera and M MacDonald (2003) *Passenger rail services and economic performance*. Report prepared for the UK Strategic Rail Authority.	Value of travel time reliability of rail (rather the impact of unreliability) - explores impact of poor rail performance (unexpected delays and unreliable journey/arrival/departure times) on passengers, employees, and business. Quantifies impact (disutility) on passengers using industry standard estimates for VTTS and data on train performance. 'Loss aversion' - arriving late has a greater impact than arriving early. Reviews (limited number of) studies considering stress and impact on health and productivity of commute trip.	
Palmquist, RB, DJ Phaneuf and VK Smith (2009) Short-run constraints and the increasing marginal value of time in recreation. NBER working paper series: Working Paper 14986. Accessed January 2010. *www.nber.org/papers/w14986*	Since decisions about time allocation are made in different contexts and with different constraints, the marginal value of time (for recreation) to an individual may vary depending on prior commitments, context and the needs of the specific time use. Premise: time for any given activity is not perfectly fungible (substitutable or interchangeable) - requires tradeoffs.	Q in our survey: ask what activities people would give up/engage in if commuting time changed.
Plott, CR and K Zeiler (2005) The willingness to pay–willingness to accept gap, the 'endowment effect', subject misconceptions, and experimental procedures for eliciting valuations, *The American Economic Review 95*, no.3: 530–545.	WTP/WTA gap - focuses on how people value objects (merchandise/goods) rather than time.	
Prideaux, B and D Carson (2003) A framework for increasing understanding of self-drive tourism markets. *Journal of Vacation Marketing 9*: 307–313.	Primarily useful for references – don't have tourism ones; do have a couple of others that refer to consumptive values.	
Richardson, T (2006) Estimating individual values of time in stated preference surveys. *Road and Transport Research 15*, no.1:44–53.	Explores stated preference survey techniques for WTP.	Outside project scope.
Rose, J and M Bliemer (2009) Sample optimality in the design of stated choice experiments. *Proceedings of the 12th International Conference on Travel Behaviour Research*, Jaipur, Rajasthan, India, 13–18 December 2009.	Systematically examines issues related to sample size in SC experiments - recommends that at a minimum, at least 30 respondents be sampled for any discrete choice study. S-error statistic provides a robust estimate of the minimum sample-size requirements for stated choice studies, although it is recommended that larger sample sizes than suggested by the statistic be collected to allow for different sources of mis-specification that can occur during the course of such studies.	Outside project scope.

Document	Description	Comments
Ryley, T (2008) The potential for car drivers to walk for short trips: evidence from West Edinburgh. *Transportation Research - Part A: Policy & Practice 42*, no.4: 620–628.	Investigates the trade-offs individuals make between the car and walking for short trips, based on three trip attributes: journey time, fuel cost and parking cost. With all other factors remaining constant, for short trips motorists are more likely to walk in response to an increase in parking costs than a rise in petrol prices. Parking cost is the most influential attribute for women, those living in flats and those on low incomes (£15,000 per annum or less). Journey time is the most influential attribute for men, high income earners (over £40,000 per annum), those living in detached houses, full-time employees and retirees. Value of travel time (representing WTP against the journey time component) for petrol and parking costs are 23.6p and 28.9p per minute respectively.	Uses SP experiment to derive value of travel time for petrol and parking costs.
Sánchez-Fernández, R and M Iniesta-Bonillo (2007) The concept of perceived value: a systematic review of the research. *Marketing Theory* 7: 427–451.	Systematic review of the various research streams and the individual studies within those research streams of perceived value, used in marketing (particularly for shopping). Utilitarian value has potential relevance - that the concept of perceived value implies an interaction between a subject (a consumer or customer) and an object (a product); value is relative by virtue of its comparative, personal, and situational nature; and value is preferential , perceptual, and cognitive-affective (rational-emotional) in nature.	Concept and definition of 'perceived value' - not directly transport-related.
Sener, I, N Eluru and C Bhat (2009) An analysis of bicycle route choice preferences in Texas. US *Transportation 36*, no.5: 511–539.	Empirical study - considers factors for route selection. Finds that travel time (for commuters) is the most important - based on WTP for attributes: how much additional travel time (money) bicyclists would be willing to travel (pay) to avoid/have the corresponding attribute on their route?	Potentially cite as an example of value of travel time research for cycling.
Stinson, AS and CR Bhat (2003) *An analysis of commuter bicyclist route choice using a stated preference survey.* , Washington DC: Transportation Research Board, National Research Council.	Stated preference experiment to derive the importance of factors affecting commuter bicyclists' route choices. Travel time most important factor in selecting a route.	
Talahun, EY, DM Levinson and KJ Krizek (2007) Trails, lanes or traffic: valuing bicycle facilities with an adaptive stated preference survey. *Transportation Research Part A, 41*: 287–301.	Stated preference experiment evaluates individual preferences for 5 different cycling environments by trading off a better facility with a higher travel time against a less attractive facility at a lower travel time, by measuring how many additional minutes an individual is willing to expend on an alternate facility if it were available and provided certain features that were not available on the base facility.	Potentially cite as an example of value of travel time research for cycling.
Tseng, Y-Y and ET Verhoef (2007) Value of time by time of day: a stated-preference study. *Transportation Research Part B: Methodological 42*, no.7-8): 607–618.	Stated preference experiment exploring an alternative method estimating time-varying values of travel time savings and values of schedule delay	

Document	Description	Comments
Tseng, Y-Y, ET Verhoef E and T van der Hoom (2007) A pilot study into the perception of unreliability of travel times using in-depth interviews. In Proceedings of European Transport Conference 2007, 17-19 October 2007, Leeuwenhorst, The Netherlands.	Purpose of the project: to design and test a methodology for measuring the value to society of travel time benefits and travel time reliability benefits in the Netherlands by empirical research. The paper reports on part of the testing process.	
Turcotte, M (2005) The time it takes to get to work and back. *2005 General Social Survey on Time Use: Cycle 19. Catalogue no. 89-622-XIE.* Ottawa: Statistics Canada.	Reports on journey to work data collected.	
van Wee, B, P Rietveld and H Meurs (2002) *A constant travel time budget? In search for explanations for an increase in average travel time. Research memorandum 2002-31*. Amsterdam: Faculty of Economlcs and Business Administratlon, Free University, Amsterdam.	Examines trends in Dutch travel time (using time use survey data) and speculates as to possible explanations for increasing average travel times & decreasing value of travel time.	
Vincent, M (2008). Measurement of valuation of public transport reliability. *Land Transport NZ research report 339*.	Value of travel time reliability - explores modelling techniques to find a method of measuring the value placed on public transport reliability in different contexts in New Zealand. Input data: stated preference survey.	
Wallis, I and C O'Fallon (in progress) Car passenger valuations of quantity and quality of time savings. NZ Transport Agency research report.		Cite as a reason for not particularly focusing on car passenger value of travel time.
Wardman, MR., MR Tight and M Page (2007) Factors influencing the propensity to cycle to work. *Transportation Research A 41*, no.4: 339–359.	Uses purpose-collected revealed preference data, 2 stated preference surveys and National Travel Survey data to forecast future trends in commuter cycling and how the propensity to cycle to work can be increased (through provision of different facilities) - willingness to change mode (from current to cycling). Also calculates value of travel time for travelling on routes with different facilities.	Potentially cite as an example of value of travel time research for cycling.
Watts, L (2007) The art and craft of train travel. *Journal of Social and Cultural Geography 9*, no.6: 711–726.	Ethnographic study - how people use time and space on a train journey.	Potentially cite as an example of research on utility of travel time in other disciplines.
Whelan, G, J Crockett, L Hunt and C Sinclair (2007) Willingness to pay for bus rapid transit: an examination of the influence of psychographics on choice. In *Proceedings of European Transport Conference,* 17 –19 October 2007, Leeuwenhorst, The Netherlands.	WTP for different public transport attributes.	Not value of travel time.

Document	Description	Comments
Calfee, JE and CM Winston (1998) The value of automobile travel time: implications for congestion policy. *Journal of Public Economics* 69, no.1: 83–102.	Stated preference models – drivers' WTP for a toll to reduce travel time. Found to be low, as drivers have adjusted behaviour in face of congestion.	Addresses value of travel time in very specific situation (outside purview of project).