TASMANIAN TRAVEL & PHYSICAL ACTIVITY STUDY 2017

Summary Report

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UNIVERSITY *of* TASMANIA | MENZIES
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Glossary and abbreviations

Glossary

Active Transport The combined total of walking, running, cycling, skating, skateboarding or other physically active (definition see below) travel modes. Includes travel to and from public transport.

Confidence level A measure of the reliability of a result.

Main mode The single transport mode used for the furthest distance in the journey.

Margin of error A measure of the accuracy of the results of a survey.

Modal share Also called mode split or mode share, modal share is the percentage of travellers or trips using a particular type of transport.

Multi-modal Multi-mode journeys involve more than one step/mode of transport in a journey from origin to final destination.

Physical activity Any bodily movement produced by skeletal muscles that requires energy expenditure

Moderate physical activity - this includes activities that take moderate physical effort and make you breathe somewhat harder than normal. While walking can be a form of moderate exercise we do not include walking in this category for this survey. Examples include - carrying light loads, cycling at a regular pace, doubles tennis, gentle swimming and pilates.

Vigorous physical activity - this includes activities that make you breathe much harder than normal. Examples include - heavy lifting, digging, weight training, aerobics, fast bicycling, running and lap swimming.

Trip A trip is travel on one route, on one mode. When a transfer to another route or mode is made, a new trip has commenced.

Journey A journey is the act of travelling from one major origin (e.g. home) to an endpoint destination (e.g. work). A journey may be one trip but may also consist of one or more trips where transfers occur between routes or modes. Undertaking a journey of more than one trip is also referred to as trip chaining or trip linking where the journey involves multiple trip purposes (e.g. travelling from home to work and dropping off children at school or stopping at the shops on the way).

Transfer	A transfer occurs at the end of a single trip. It is a change of transport mode or route, to another service or route to continue a journey.

Abbreviations

ABS	Australian Bureau of Statistics
ES	Eastern Shore
GHHT	Greater Hobart Household Travel Survey
GHR	Greater Hobart Region
GL	Greater Launceston
G-SB	Glenorchy to Sandy Bay corridor
KB	Kingborough (Local Government Area)
L-B	Latrobe to Burnie corridor
TAPAS	Tasmanian Travel and Physical Activity Study

SNAPSHOT

BACKGROUND

- Direct costs of inactivity approximate $1.5 billion/year nationwide.
- Public transport users average 8 to 33 minutes/day more physical activity than non-users.
- Increasing public transport use may increase physical activity.
- Tasmania has a low level of public transport use.
- It is difficult to determine how best to increase public transport use without understanding daily travel behaviour and its health implications.

METHOD AND PARTICIPATION

- This pilot study sought to demonstrate feasibility of participant recruitment methods, research instrument design and analytic strategies.
- 1,355 adult Tasmanians responded to an online survey and 31 participated in follow-up focus groups or interviews.

RESULTS

- 86% of respondents had a driver's license, of these 90% had regular access to a car or motorcycle they could drive.
- Over half of respondents reported either not having access to a bicycle they could ride or reported not being able, or inclined, to ride.
- The vast majority of respondents claimed to have rarely or never used the bus on the weekend in the past year.
- A higher proportion of bus users were: women, younger and older adults, the unemployed and students.
- Respondents in the Glenorchy to Sandy Bay corridor reported the highest share of active transport modes, being trips made as 'walk' or 'cycle'.
- Frequency or timetabling was the most common reason given for not using public transport more often.
- 10% of bus users found the service 'somewhat' or 'very' challenging…this was most commonly attributed to bus arrival and departure time uncertainty.
- There was notable interest in real-time information, the top rating initiative.

CONCLUSION AND FUTURE INQUIRY

- The findings demonstrated a relatively low rate of active and public transport use among respondents.
- Respondents were supportive of many strategies to increase public transport use that have been successful elsewhere, particularly the provision of real-time information and bus-only lanes in high frequency corridors in peak periods.
- This study has provided insights into factors underlying travel choices in Tasmania and points to many opportunities to increase public and active travel behaviours.

BACKGROUND

Physical inactivity substantially increases the risk of cardiovascular disease, stroke, type 2 diabetes, hypertension, colon cancer and breast cancer – six of the top 10 leading causes of death in high-income countries[1]. Direct costs of inactivity approximate $1.5 billion/year in Australia alone[2]. However, around half of Australian adults are not active at recommended levels[3]. Targeting 'incidental' physical activity – that is, activity accumulated as part of daily life – is a promising public health approach for shifting the population prevalence of physical activity in a more favourable direction.

Increasing public transport use may be one such avenue for increasing physical activity. The structure and design of the built environment and the transport options available can either deter or encourage individuals to be more active[4]. A systematic review of international studies concluded that public transport users average 8 to 33 minutes/day more physical activity than non-users and are 3.5 times more likely to be classified as sufficiently active compared to car drivers[5]. However, there is little evidence of effective strategies for increasing public transport use for public health benefit.

In Tasmania (with a population approaching 520,000 people[6]), more than half of residents live outside the capital city, many in dispersed but significantly sized regional centres. The predominant mode of public transport is bus, with most services provided by Metro Tasmania. Australian Bureau of Statistics (ABS) 2011 Population Census data suggest that only around 3% of Tasmanians use public transport regularly for the journey to work specifically[7], while The Greater Hobart Household Travel Survey 2008-09 (GHHTS) reported that 4% of trips for all purposes in the Greater Hobart Region were by public transport[8]. Both the ABS and GHHTS data sets point to a very low public transport user base in Tasmania, irrespective of the purpose. Further, both sets of data refer to the main (or primary) mode[9] of transport used for a trip, which tends to mask the complicated nature of much travel and that many journeys involve more than one mode or trip step. Reporting the primary mode under-reports the amount of walking undertaken within a trip, including walking to and from bus stops or parked cars.

It is this complexity and the implications of people's daily travel practices for physical activity and wellbeing that this study focused on. Without the understanding of these complexities and the factors associated with them, there is little evidence for transport and health providers and policy-makers, to base decisions about where and how best to direct their efforts to increase public transport use. This pilot study therefore aimed to build greater understanding of:

- Tasmanians' travel patterns, transport modes and journey types;
- the relationship between travel behaviours, physical activity and health;
- attitudes towards, preferences and perceptions of public transport use;
- the spatiality of travel patterns, behaviour and travel modes; and
- the perceived acceptability and potential impact of strategies to increase public transport use.

METHOD AND PARTICIPATION

Study Design

The *Tasmanian Travel and Physical Activity Study* (TAPAS) was a pilot study seeking to demonstrate feasibility of participant recruitment methods, research instrument design and analytic strategies. It consisted of an online survey and nested qualitative focus groups and in-depth interviews. The online survey was completed by respondents during the period March-April 2017 and follow-up focus groups and interviews were held in June-August 2017. The focus groups and interviews were conducted to gain a deeper understanding of the survey findings.

This pilot study sought to demonstrate feasibility of participant recruitment methods, research instrument design and analytic strategies...

Recruitment

To recruit survey participants, convenience methods were used including:

- social media (Facebook and Twitter);
- traditional media (local newspaper);
- promotion through a concurrent online travel behaviour survey for University of Tasmania staff and students;[10]
- promotion through key professional networks and organisations; and
- distribution of promotional flyers on buses, in the Hobart Metro Tasmania shop and on the windscreens of cars in Park and Ride locations.

To recruit for the focus groups and interviews, survey respondents were invited to express interest at the completion of their online survey. Those indicating interest were purposively recruited, ensuring diversity regarding age, gender, education level and public transport use. Focus groups and interviews were clustered around regions of interest, either due to new/altered bus services, low patronage or high growth (further detail below).

The online survey was conducted using the *Survey Monkey*[11] online tool. Respondents needed to provide consent, be 18 years or over and reside in Tasmania to participate. Participants reported:

- their travel behaviour for the previous week, particularly the trips they made each day (trip purpose, transport mode and trip length in time);

- their frequency in use of public transport over the previous year and their opinions about the challenges and quality of public transport services (including frequency, reliability, access, information and ticketing) used;

- their rating of strategies that would be most likely to encourage them to use public transport;

- their past week physical activity (days per week and minutes per week of walking, moderate physical activity and vigorous physical activity)[5];

- their general health; and

- sociodemographic information (employment status, household type, age, gender, postcode and suburb of residence and employment).

Survey question topics and response options are outlined more fully in Appendix A.

Participation and statistical confidence

Survey participation is outlined in Table 1. The data provide useful indicators of spatial and sociodemographic difference. While the findings may not be generalisable to the broader Tasmanian community because of the pilot nature of the project and recruitment method used, we have a high level of confidence in the data relating to particular areas within Tasmania.

The participation response was extremely positive, particularly for the Greater Hobart Region (GHR) [12], with the majority (84%) of survey respondents residing in the GHR. The GHR sample size provides a 90% confidence level and margin of error +/- 2.7 percentage points for the region[13]. Consequently, much of our reporting from the survey is focused on the GHR and areas within this region.

Table 1: Survey participation and completion

Survey sample area	Total survey responses (survey hits) *includes partial completions*	Total survey completions	Completion rate
Tasmania (TAS)	**1355**	**1091**	**80.5%**
Greater Hobart Region (GHR)	**1127**	**923**	**81.9%**
Other corridors/areas of interest			
Glenorchy to Sandy Bay corridor (G-SB)	611	513	83.9%
Kingborough (KB)	215	183	85.1%
Eastern Shore (ES)	154	117	76.0%
Latrobe-Burnie (L-B)	70	59	84.3%
Greater Launceston (GL)	62	48	77.4%

1,355 adult Tasmanians responded to an online survey and 31 participated in follow-up focus groups or interviews…

Survey participants came from a cross section of Tasmania in terms of gender, age group, employment status and household status. The survey participants' social profile is tabled in Appendix B, with some select variables presented in Figure 1.

Three focus groups were conducted in Hobart involving 26 survey participants residing in the GHR and telephone interviews were completed with five survey participants who resided in the north-west of Tasmania. The focus groups were stratified according to residence within three areas of the Hobart municipality - Kingborough (KB), Glenorchy to Sandy Bay (G-SB) and the Eastern Shore (ES).
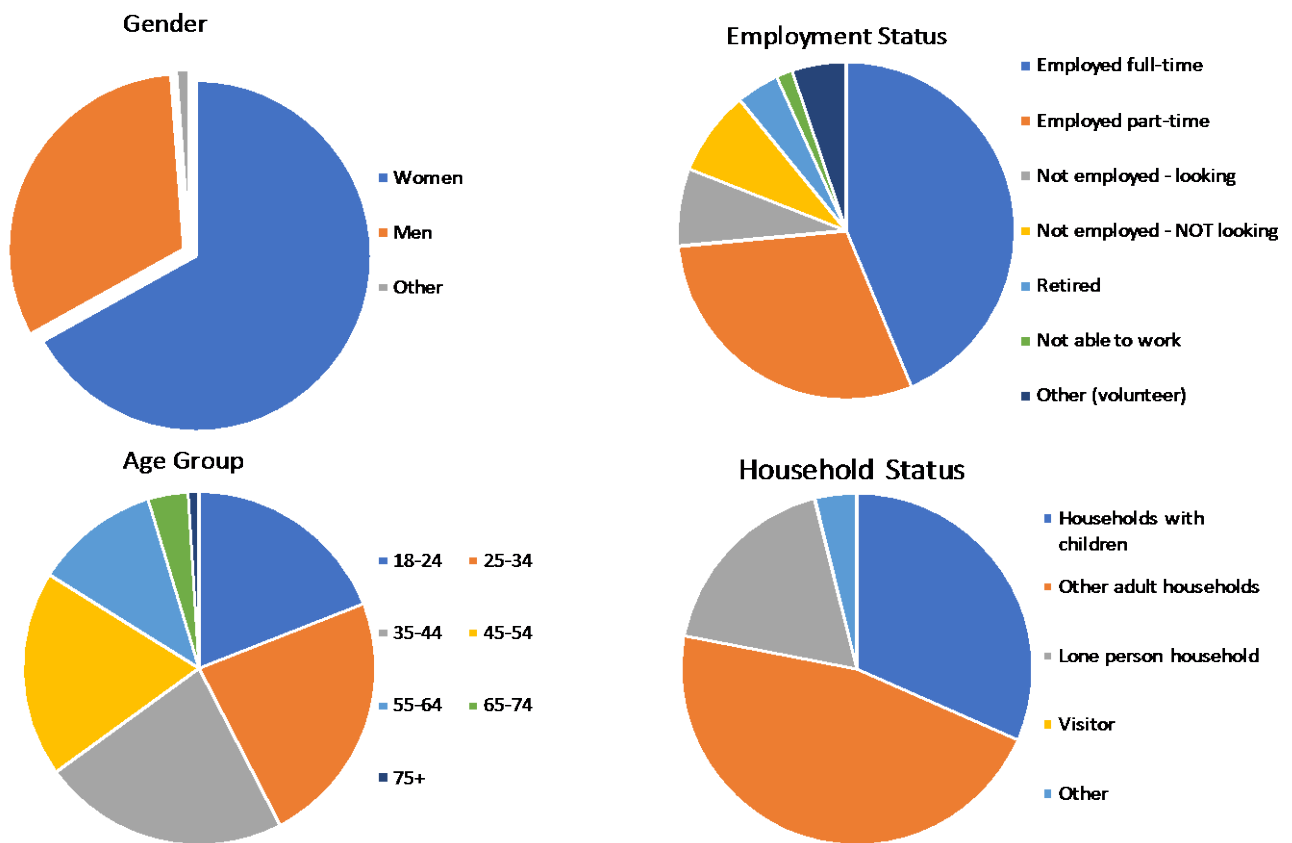
Gender

- Women
- Men
- Other

Employment Status

- Employed full-time
- Employed part-time
- Not employed - looking
- Not employed - NOT looking
- Retired
- Not able to work
- Other (volunteer)

Age Group

- 18-24
- 25-34
- 35-44
- 45-54
- 55-64
- 65-74
- 75+

Household Status

- Households with children
- Other adult households
- Lone person household
- Visitor
- Other

Figure 1: Survey sample social profile

Survey analysis areas

The survey collected participant postcode of residential origin. This enabled analysis of the data according to these locational indicators. We were particularly interested in exploring the differences in public transport use and physical activity according to residential location, acknowledging the impact of urban form and differences in public transport service offerings according to place. In collaboration with Metro Tasmania, we initially chose the following case study areas:

- G-SB corridor - a well serviced public transport corridor through middle and inner Hobart, in which Hobart's central business district is located as well as other significant employment and activity hubs (including the University of Tasmania at Sandy Bay, Moonah and Glenorchy).

- KB local government area – an outer urban area of the GHR and one of the fastest growing local government areas in Tasmania.

- Latrobe to Burnie (L-B) corridor - a public transport corridor in regional north-west Tasmania along which a number of towns are located.

Following favourable survey responses across the GHR, analysis was also possible for Hobart's ES and the inner Hobart and outer eastern and northern areas. The approximate boundaries for these areas are presented in Figure 2.
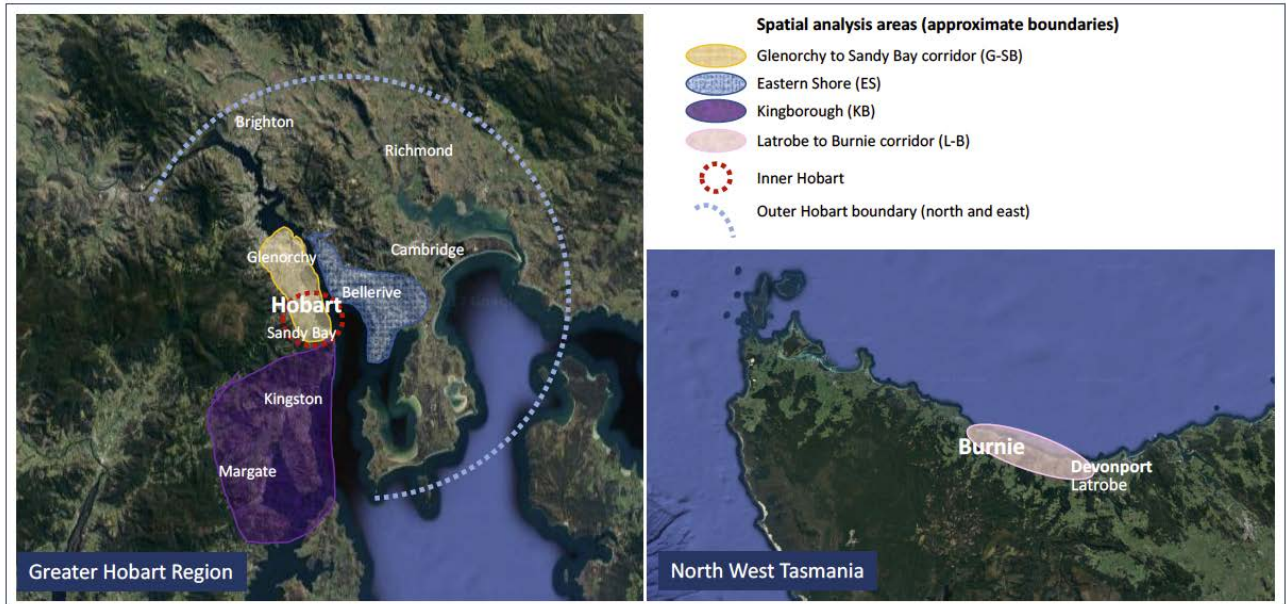

Figure 2: Indicative boundaries of case study areas

RESULTS

86% of respondents had a driver's license, of these 90% had regular access to a car or motorcycle…

Over half of respondents reported not having access to a bicycle or not being able, or inclined, to ride…

Presented here is a summary of results from the online survey with a specific focus on travel behaviour, public transport use and its relationship to physical activity. Also provided are quotes from the focus groups and interviews where appropriate to give readers greater insights into the survey findings.

Measures of accessibility – car, bike, bus

The survey asked about measures of accessibility to motor vehicles, bicycles and bus services. Some 86% of respondents had a driver's license, of these 90% had regular access to a car or motorcycle they could drive (Figure 3). These measures confirm the very high level of accessibility to motor vehicle travel options.

The survey also enquired as to the relative accessibility of respondents to a bicycle they can ride, to gauge the potential for cycling, as an active transport mode. Of all respondents, a little over half reported either not having access to a bicycle they can ride or reported not being able, or inclined, to ride (Figure 3).

Access to a motor vehicle to drive, or motorcycle to ride

- regular access to a car/motorcycle I can drive/ride
- access to a car/motorcycle I can drive but not regularly
- do not have access to a car

Access to a bicycle to ride

- regular access to bicycle I can ride
- access to bicycle I can ride but not regularly
- I do not have access at all to a bicycle I can ride
- don't/can't ride a bicycle
- Other

Figure 3: Access to motor vehicles and bicycles (all respondents)

The survey asked how long it takes to walk from home to the nearest bus stop (Figure 4). This question was intended as a measure of ease of accessibility to a bus service. For the GHR, 86% of respondents reported being at most 10 minutes away from a bus stop, with 64% being five minutes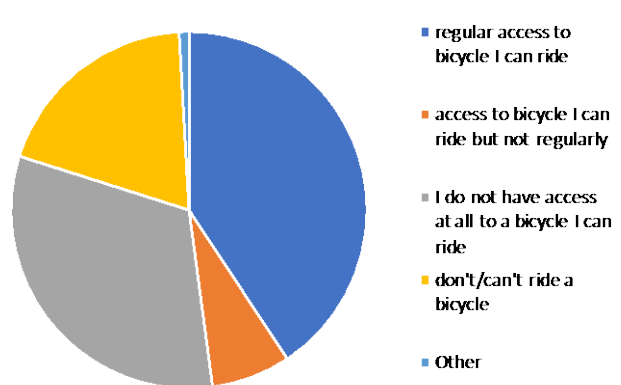 or less away from a bus stop. For the G-SB corridor, which includes the inner most suburbs of GHR and areas of highest residential density, this rose to 90% being at most 10 minutes-walk away and 69% five minutes or less away. Those living in the KB area reported lower levels of bus stop access, with only 54% reporting being five minutes or less away and 80% 10 minutes at most. Of those living in KB, the majority (68%) who lived more than 10 minutes' walk away from their nearest bus stop lived in the outer reaches of the area, with those having greatest bus stop accessibility living in those suburbs nearest to Hobart or with higher densities (Kingston, Blackmans Bay, Taroona). The L-B corridor had the lowest proportion of respondents living five or less minutes away from a bus stop (52%). In this corridor, 13% of respondents reported not knowing where their nearest bus stop was, compared with 3% for the overall sample. L-B respondents were located throughout the corridor and not clustered in one location.
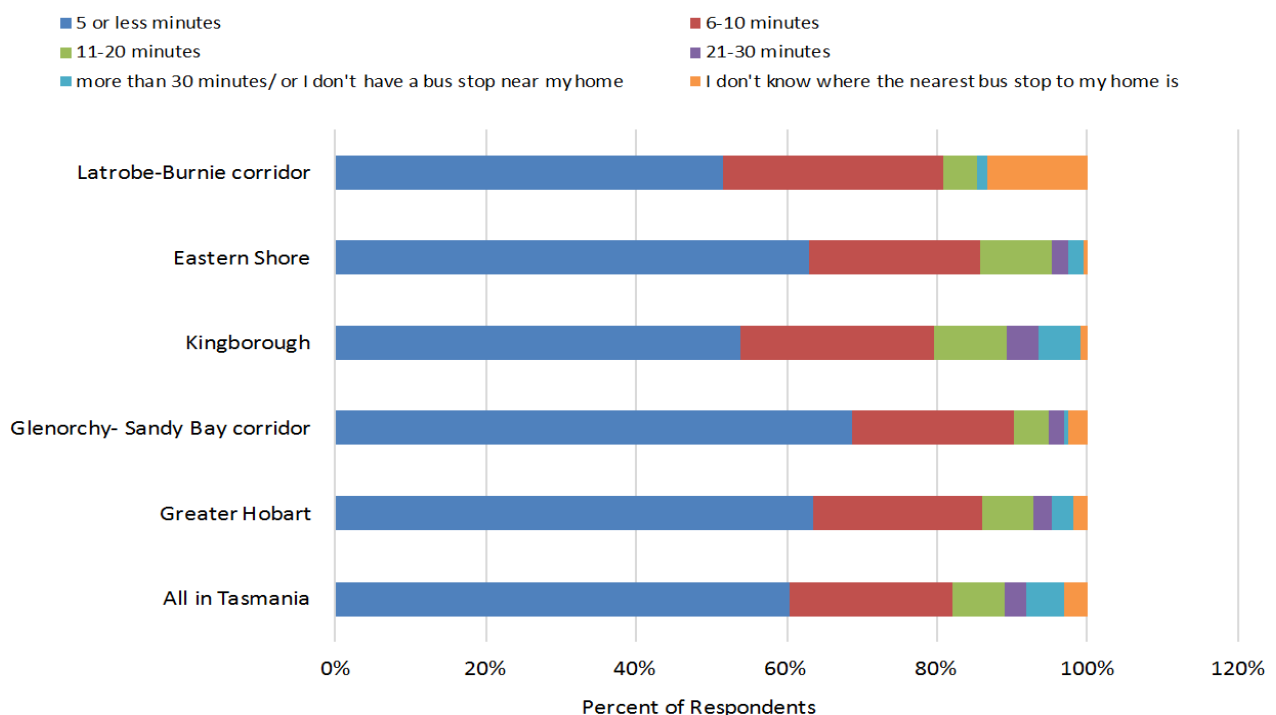
Figure 4: Access to bus stop - distance to bus stop from home by walking

Bus use

Respondents were asked about their frequency of bus use on weekdays (Monday-Friday) and the weekend (Saturday and Sunday) over the past year. Additionally, respondents were asked to report their actual travel for the previous seven days, including a detailed breakdown of modes of transport used for their trips and trip steps. From these diary recordings specific trip characteristics could be determined, with particular interest in bus use and the walking associated with it.

Figures 5 and 6 break down bus use frequency by weekdays and weekends and place. They show some variation within the GHR, with the area of least frequent (rarely/never) bus use being reported by KB respondents (almost 60%) and the area of highest frequency (every/most weekdays) bus use reported by ES respondents (32%). This compares with 23% for the GHR and 22% for the overall sample. In the L-B corridor, the vast majority (78%) of respondents claimed to rarely or never use the bus on weekdays, while 13% claimed to have used the bus frequently.

	All in Tasmania	GHR	Glenorchy-Sandy Bay	Kingborough	Eastern Shore	Latrobe-Burnie
Rarely/never use	58%	55%	55%	60%	51%	78%
Sometimes use	20%	22%	25%	19%	17%	9%
Frequently use (every/most weekdays)	22%	23%	20%	21%	32%	13%
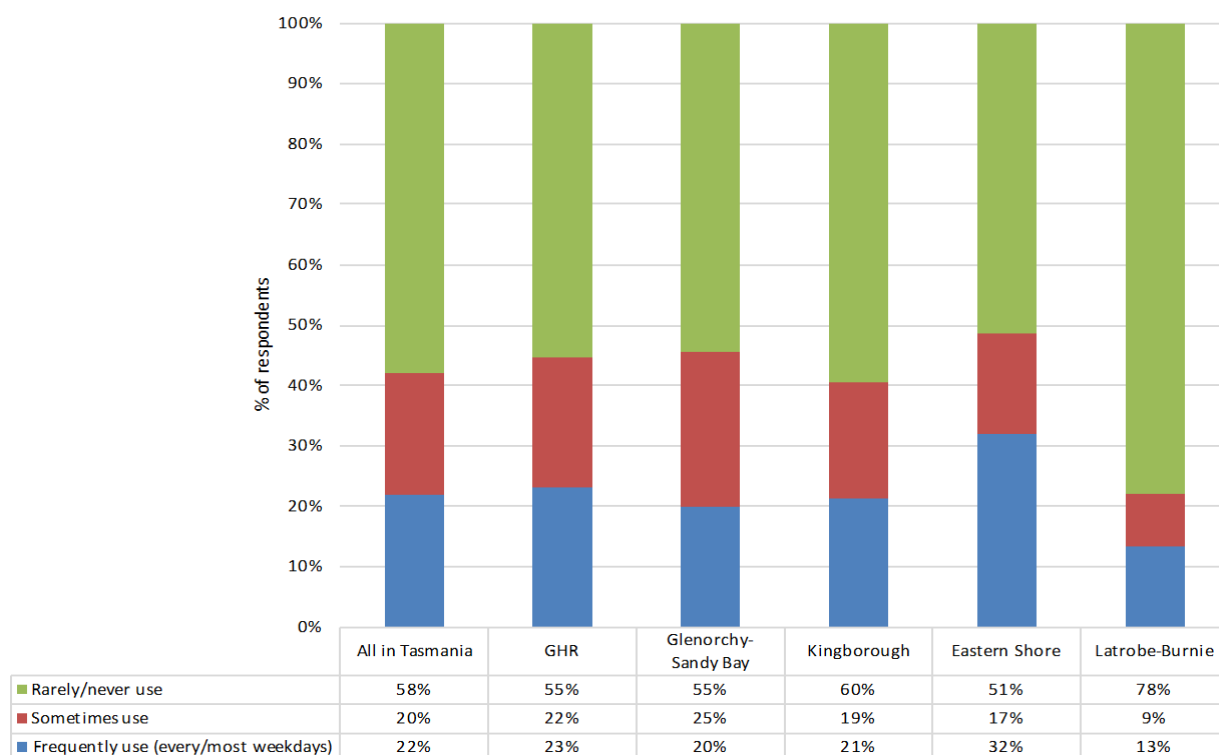
Figure 5: Frequency of bus use – weekdays (past year)

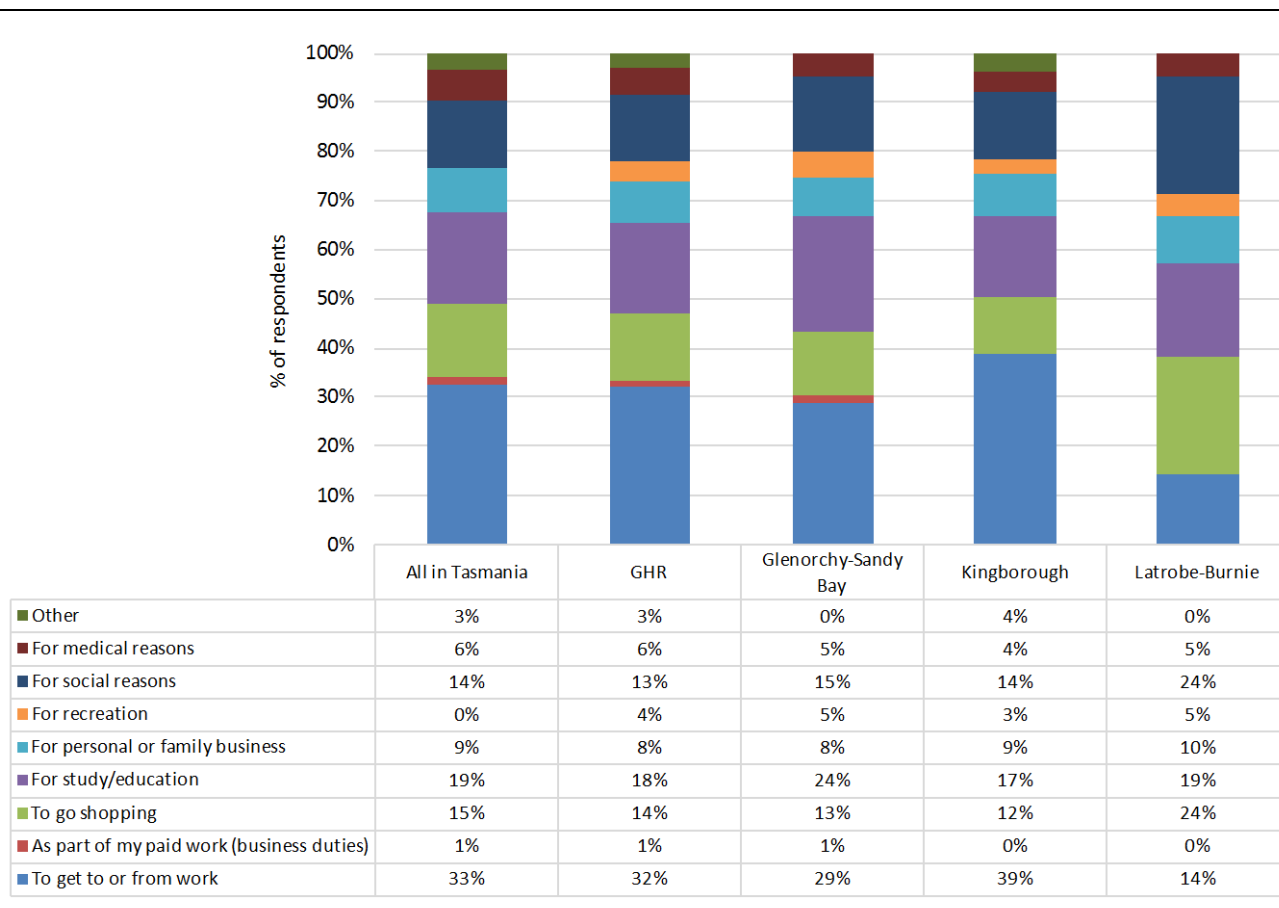|	All in Tasmania	GHR	Glenorchy-Sandy Bay	Kingborough	Eastern Shore	Latrobe-Burnie
Rarely/never use	82.8%	82.1%	81.3%	85.6%	85%	82%
Sometimes use	10.9%	11.7%	13.5%	8.8%	10%	12%
Frequently use (every/most weekends)	6.3%	6.2%	5.3%	5.6%	5%	6%
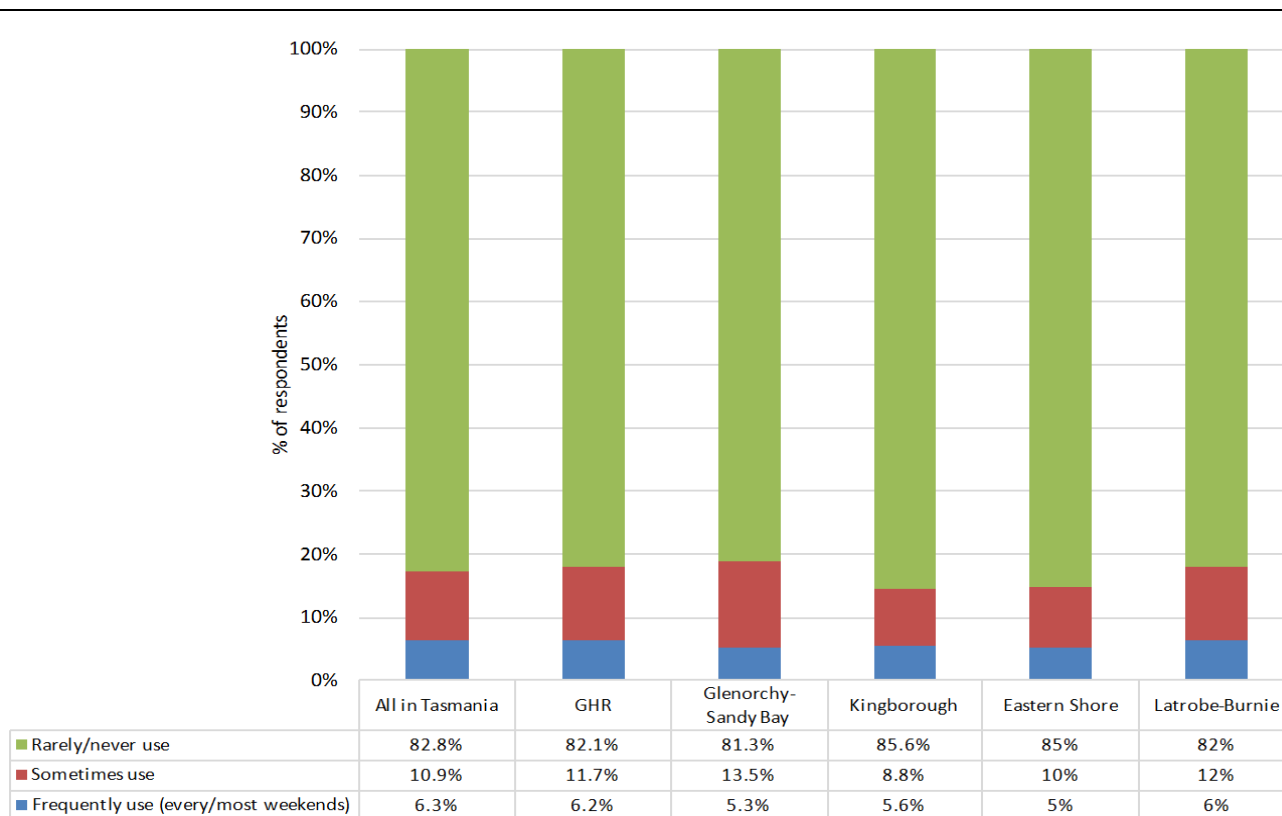
Figure 6: Frequency of bus use – weekends (past year)

The vast majority of respondents claimed to have rarely or never used a bus on the weekend in the past year…

For weekends, the vast majority of respondents claimed to have rarely or never used the bus in the past year. The pattern was consistent across the overall sample and according to the places of interest within the study. In the L-B corridor, weekday and weekend frequency of bus use was similar. Analysis of bus trip purpose (Figure 7) (based on respondent's travel patterns for the previous seven days) showed that respondents in the L-B corridor reported less commuting by bus compared with the overall sample and the GHR (33% for the overall sample, 32% for the GHR and just 14% for L-B). This much lower use of the bus for commuting thereby accounts for a good part of the low weekday bus use in L-B.

The reasons for using the bus were similar spatially within the GHR sample, but not within the L-B corridor. The bus was used to get to or from work for 32% of reported trips in the GHR. It was marginally higher in KB and lower in the G-SB corridor. The latter has a high proportion of student residents and key higher education campuses located within it (e.g. the University of Tasmania and TAFE), likely explaining the second highest bus use purpose being 'for study/education'[14].

	All in Tasmania	GHR	Glenorchy-Sandy Bay	Kingborough	Latrobe-Burnie
■ Other	3%	3%	0%	4%	0%
■ For medical reasons	6%	6%	5%	4%	5%
■ For social reasons	14%	13%	15%	14%	24%
■ For recreation	0%	4%	5%	3%	5%
■ For personal or family business	9%	8%	8%	9%	10%
■ For study/education	19%	18%	24%	17%	19%
■ To go shopping	15%	14%	13%	12%	24%
■ As part of my paid work (business duties)	1%	1%	1%	0%	0%
■ To get to or from work	33%	32%	29%	39%	14%

Figure 7: Bus use by trip purpose (based on trip diary entries for the previous seven days)

A higher proportion of bus users were: women, younger and older adults, the unemployed and students…

Table 2 presents the proportion of bus users by selected socio-demographic variables. A higher proportion of bus users were: women, younger and older adults, the unemployed and students. Of these groups, those aged 18-24 and the unemployed displayed the highest proportions of public transport use. Those groups who used the bus the least were most commonly employed and/or living in households with children under 18, consistent with evidence that suggests that households with children tend to create more complicated household travel demands that promote car use[15].
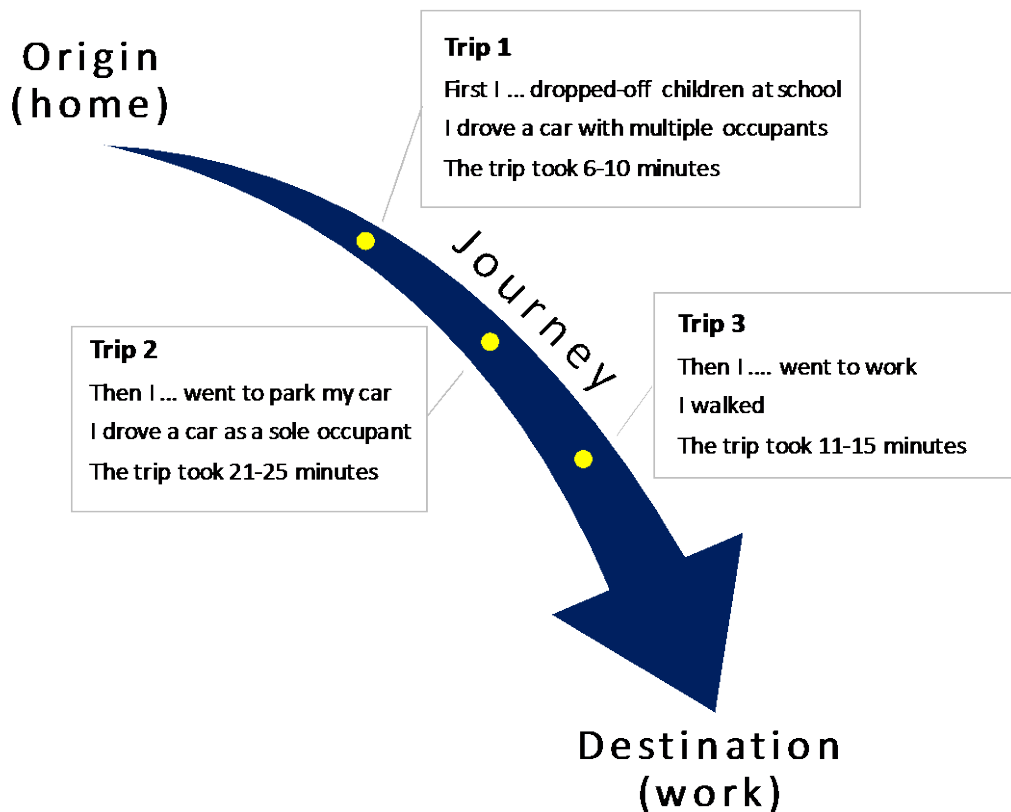
Table 2: Bus user and non-bus user by socio-demographic variables

Socio-demographic variables	Bus users	Non-bus users
All	41%	59%
Gender, %)		
Woman	42%	58%
Man	38%	62%
Age, %		
18-24	57%	43%
25-54	36%	64%
Age 65+	45%	55%
Employment status,%		
Employed full-time	32%	68%
Not employed (looking for work)	68%	32%
Student (Full-time)	53%	47%
Household type, %		
Couple or lone parent with children	36%	64%

Note: Non-bus users were identified as those who specified 'rarely or never' used bus on weekdays in the past year, while 'bus users' were identified as those who stated they used a bus either every day, most days or sometimes on weekdays.

Trip mode and length

The survey asked respondents to record the trips they made each day for the seven days prior. This included recording the purpose of the trip, the mode of transport used for each trip and the length of the trip in time. Based on one weekday in the week (Monday)[16], the mean number of trips made by individuals in the GHR sample was 3.8 trips per day. This included all trips within a longer journey, including walking to and from bus stops or car parks and dropping off or picking up household members or others as part of a chain of trips. A journey and the trip components are defined in the glossary and depicted in Figure 8.

Origin (home)

Trip 1

First I ... dropped-off children at school

I drove a car with multiple occupants

The trip took 6-10 minutes

Journey

Trip 2

Then I ... went to park my car

I drove a car as a sole occupant

The trip took 21-25 minutes

Trip 3

Then I .... went to work

I walked

The trip took 11-15 minutes

Destination (work)

Figure 8: Example of trip components (trip chain) made within a longer journey between two main origins and destinations

As an indicator of difference between bus users and non-bus users in the GHR, the mean number of trips per day for non-bus users was 3.7 and for bus users was 4.0. The higher number of trips per day for bus users reflected the higher proportion of multi-modal and multi-route journeys from main origin to final destination made by bus users. Examples of multi-modal journeys include:

- walking either side of a bus trip;
- being dropped off or picked up at a bus stop;
- driving then parking and riding the bus; or
- transferring from one bus route service to another bus route service.

Figure 9 displays the transport mode reported for all trips including very short trips (5 minutes or less). The overall and GHR samples are compared with select case study corridors and areas.
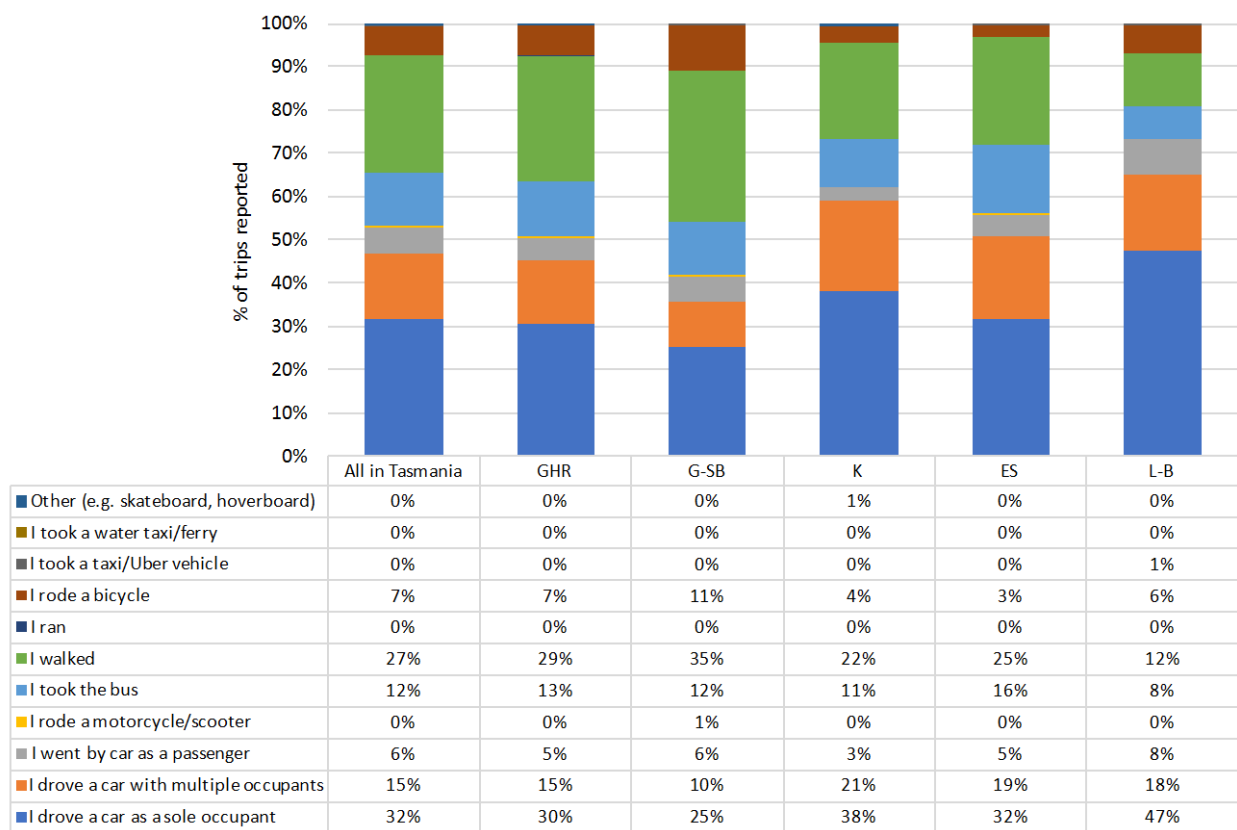
	All in Tasmania	GHR	G-SB	K	ES	L-B
Other (e.g. skateboard, hoverboard)	0%	0%	0%	1%	0%	0%
I took a water taxi/ferry	0%	0%	0%	0%	0%	0%
I took a taxi/Uber vehicle	0%	0%	0%	0%	0%	1%
I rode a bicycle	7%	7%	11%	4%	3%	6%
I ran	0%	0%	0%	0%	0%	0%
I walked	27%	29%	35%	22%	25%	12%
I took the bus	12%	13%	12%	11%	16%	8%
I rode a motorcycle/scooter	0%	0%	1%	0%	0%	0%
I went by car as a passenger	6%	5%	6%	3%	5%	8%
I drove a car with multiple occupants	15%	15%	10%	21%	19%	18%
I drove a car as a sole occupant	32%	30%	25%	38%	32%	47%

Figure 9: Transport mode of all trips reported (all trip lengths including walk trips of 5 minutes or less)
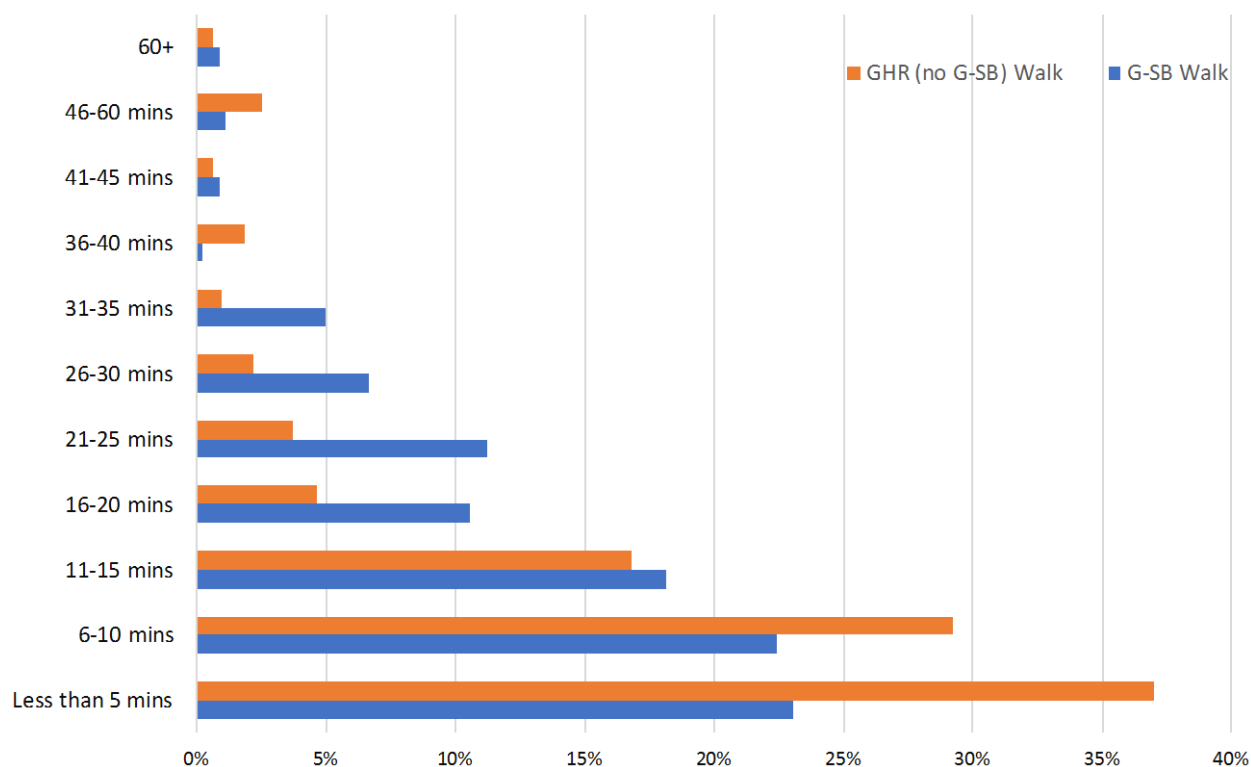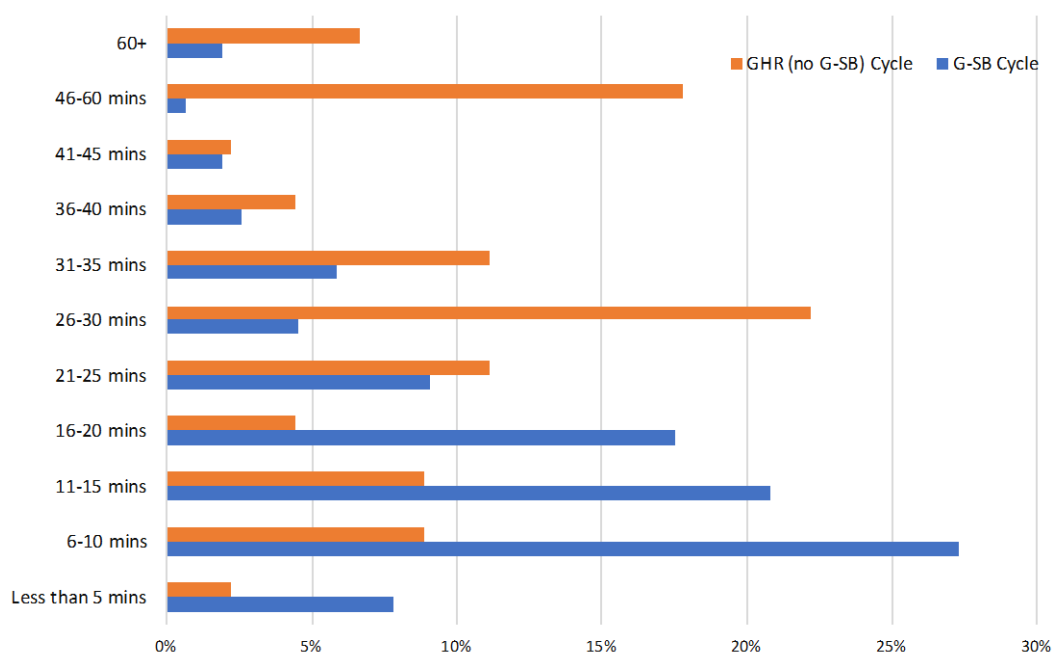

Figure 10: Walk trip length

Respondents in the G-SB corridor reported the highest share of active transport modes - being trips made as 'walk' or 'cycle'…

Respondents in the G-SB corridor reported the highest share of active modes, being trips made as 'walk' or 'cycle' (35% and 11% respectively). The walk trips included those to and from other modes of transport, such as the bus, as well as walking as the single mode. The proportion of the latter (walking as the single mode) was highest for the G-SB corridor than for other GHR areas. The median walk trip length category for G-SB walk trips was 11-15 minutes compared with 6-10 minutes for all other GHR walk trips. Some 55% of G-SB walk trips were more than 10 minutes and 26% were more than 20 minutes. This compared with 34% and 12% respectively for all other GHR participants (Figure 10).

Some 90% of all walk and cycle trips across the GHR sample were 30 minutes or less. Within developed countries, a 30 minute time budget tends to be the upper limit for those walking to urban services, particularly jobs, while 10 minutes is the accepted time people will take to get to public transport or to a local amenity[17]. The G-SB corridor forms the highest density transport corridor in Tasmania and contains major activity and employment centres, such as the Hobart CBD, the University of Tasmania and other inner-middle urban commercial hubs. These urban activities and urban form heighten the opportunity of G-SB residents to undertake shorter trips conducive to active modes such as walking and cycling compared with the rest of the GHR.


Figure 11: Cycle trip length

In the KB and ES areas the proportion walking was at least ten percentage points down on the G-SB corridor (22% for KB and 25% for ES), while in L-B, walking trips were almost three times lower than the G-SB corridor (12%). Cycling as a mode of transport was highest in the G-SB corridor at 11% of all trips. This compares with lower rates of cycling in other GHR areas such as the ES and KB where cycling trips made up 3% and 4% of all trips respectively. The cycling share for these two areas was even lower than L-B. Of the cycle trips recorded, the median cycle trip length category for G-SB was 11-15 minutes compared with 26-30 minutes for all other GHR cycle trips (Figure 11). This indicates that G-SB residents in this study cycled more regularly for shorter trips than respondents residing in other parts of the GHR.

Regarding all car modes (passenger, multi-occupant driver, sole driver), car use was highest in L-B (73%). Within the GHR, KB had the highest share of car modes (62%) and G-SB the lowest (41%). This difference suggests a much lower rate of physical activity associated with day-to-day travel among respondents in the KB area. Similar patterns in other outer urban areas of the GHR (specifically the northern and eastern fringes of the GHR) were also identified.

Health and physical activity indicators

Survey participants reported on their general health using a five point Likert scale of 'excellent' through to 'poor' health (Figure 12). Overall, there was limited difference across the GHR spatially, but in the L-B corridor notably fewer respondents reported having 'excellent' or 'very good' health compared with the overall and GHR samples (42% in L-B compared with 59% and 60% for the overall sample and GHR respectively). At the other end of the spectrum, a higher proportion of L-B respondents reported 'fair' or 'poor' health.
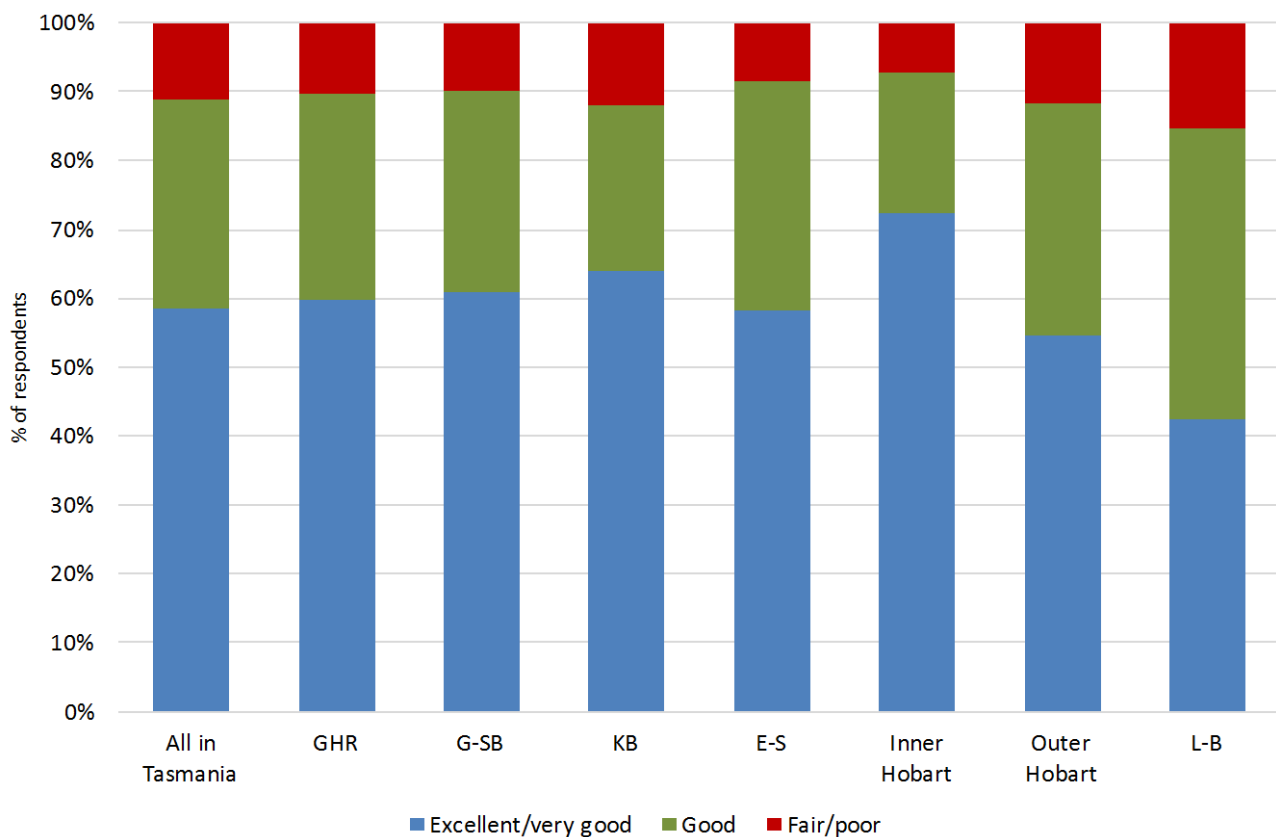
Figure 12: Self-reported general health

Within the GHR there was little difference in self-reported health across the case study areas, however a higher proportion of KB participants reported excellent/very good health and fair/poor health than the GHR overall. For inner Hobart and outer Hobart suburbs, there was a noticeably higher proportion of respondents in inner Hobart suburbs reporting the highest health ratings, while the opposite was true for outer Hobart suburbs. These observations are consistent with international studies of commute distance and health and likely reflect sociodemographic patterning of health and physical activity behaviour[18].

Similar spatial patterns were apparent for weekly physical activity (walking, moderate and vigorous). Self-reported frequency and duration of physical activity were multiplied to generate an estimate of weekly minutes of physical activity. L-B respondents reported the least amount of physical activity per day compared with the overall sample and the other case study areas. This group also reported half the median minutes of physical activity per week than inner Hobart locations (160 minutes/week compared with 318 minutes/week). For

the GHR, respondents in the ES and inner Hobart suburbs reported the highest levels of physical activity while respondents in the KB and other north and east outer Hobart suburbs reported the least amount of physical activity.

Bus use and walking

The survey asked respondents who took the bus in the previous seven days whether they had chosen to walk further to a bus stop at any time. This question was asked to ascertain the proportion of people consciously choosing to incorporate physical activity into their journeys involving public transport.

As presented in Table 3, compared with those who did not choose to walk further than needed to a bus stop, the group who chose to walk further:

- were more commonly men;
- were more commonly living in a lone person household;
- recorded higher mean and median minutes walked per week; and
- were more likely to report the highest health rating (excellent) and less likely to report good, fair, or poor general health.

Table 3:   Respondents taking the bus who chose to walk further than needed to a bus stop by selected sociodemographic variables and median minutes walked per week

Variable	Walk further to a bus stop?		
	Yes frequently (every time or most times)	Yes sometimes	No (not at all)
All	16%	25%	59%
Gender, %			
Women	12%	21%	67%
Men	20%	21%	59%
Household type, %			
Couple with children	13%	18%	69%
Couple without children	11.5%	18.5%	70%
Lone person household	21%	19%	60%
Self-reported health, %			
Excellent	18%	21%	61%
Very good	15%	21%	64%
Good/Fair/Poor	11.5%	22%	66.5%
Weekly PA, Median (minutes)			
Weekly walking reported (median minutes for sample)	210	175-	150

Barriers to the use of public transport

The survey asked participants 'what stops them from using public transport more often' as an indicator of barriers to public transport use. Public transport frequency or timetabling was the most freqruntly identified reason (18% of all responses), followed by the claim that public transport did not suit the complicated nature of personal travel (12%). These same barriers also commonly emerged in the focus groups and interviews. Preference for other modes (either driving or catching a lift with a family member/friend or using active modes) followed as third and fourth most common reasons (Figure 13).
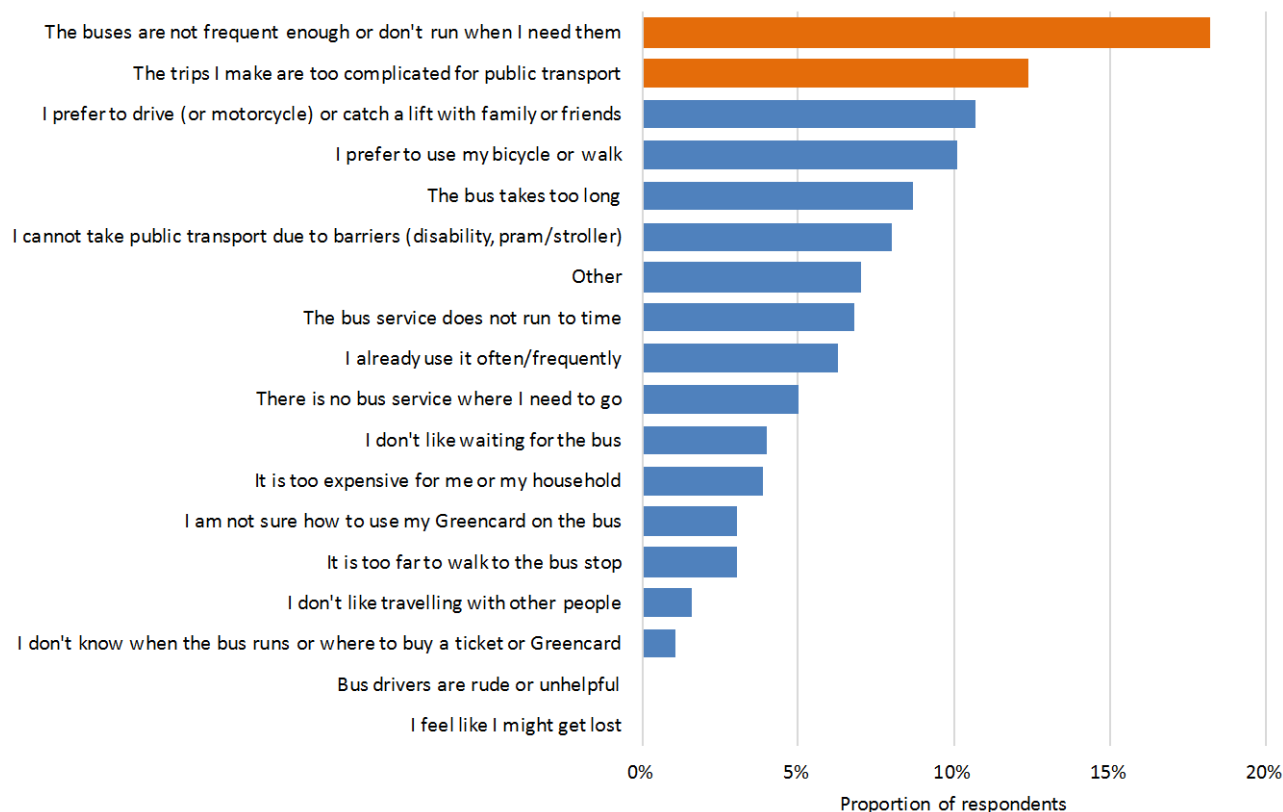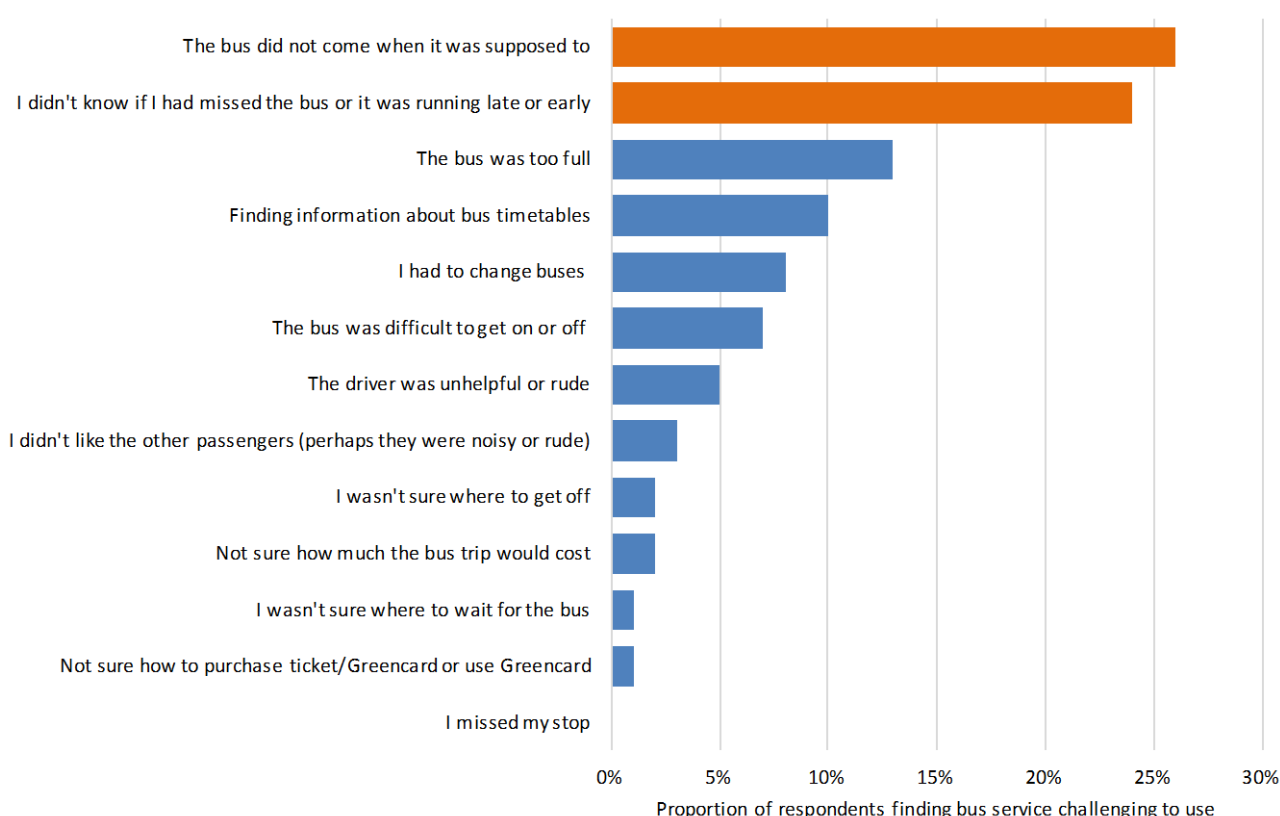

Figure 13: What stops you from using public transport more often?

Note: Respondents were asked to choose up to three reasons from a list. The response options were provided in randomised order.

For participants who had used the bus in the previous seven days they were asked how challenging they found the bus service to be and to qualify their response if they had found it challenging. Of all the bus user respondents (n=510), 10% stated that they found the bus service either 'somewhat' or 'very' challenging to use. The reasons for this response type are outlined in Figure 14. The top two most common reasons revolved around bus arrival or departure uncertainty, specifically claims that buses had not arrived when they were scheduled or frustrations about not knowing whether the bus was running early or late. Addressing this uncertainty was a strong theme in the focus groups and interviews as one way of improving the attractiveness of bus services, "…that's my major reason for not using the buses anymore, is the unreliability".

Figure 14: For what reasons did you find the bus service challenging to use?

Note: Sample is for those who found the bus service at least somewhat challenging, n=57. Respondents were asked to choose up to three reasons from a list. The response options were provided in randomised order.

Facilitating the use of public transport

In order to establish the Tasmanian community's perceived acceptability and potential impact of strategies to increase public transport use, the survey asked participants to rate the liklihood or not of using the bus more often given 10 hypothetical initiatives. The initiatives identified were those commonly implemented to improve public transport systems, or those that are salient to public transport and public health in Tasmania. They are outlined here within themed groups:

- Fare pricing intitatives

- Free travel outside peak times (before 7am, between 9am and 3pm and after 6.30pm);

- Free travel before 7am; and

- Half price travel outside of peak times (before 7am, between 9am and 3pm and after 6.30pm).

- Information initiatives

- Written or electronic information on how to make the most of bus services (brochures, better website information);

- Speaking to someone by telephone to help you plan your journey and answer any questions; and

- Provision by bus service providers of real-time information (electronic signs or smart phone apps that tell you when the next bus is due to arrive).

- Loyalty and incentive scheme initiatives

- A public transport loyalty scheme where reward points can be converted to Greencard credit; and

- An employer incentive scheme that rewards employees for bus travel to and from work (e.g. Greencard credit).

- Infrastructure and transport engineering initiatives

- 'Park and ride' or 'bike and ride' facilities (where a network of formal car parking and bicycle storage facilities connect to high frequency bus services in outer urban areas); and

- Bus only lanes along high frequency bus service corridors during morning and afternoon peak periods so buses can travel quicker than the traffic.

Respondents rated their likelihood of use on a Likert five point scale from 'extremely likely' through to 'not at all likely'. There was notable interest in real-time information, the top rating initiative (Figure 15). The second most highly rated initiative were bus lanes (or high occupancy vehicle lanes) along high frequency bus service corridors during peak periods.
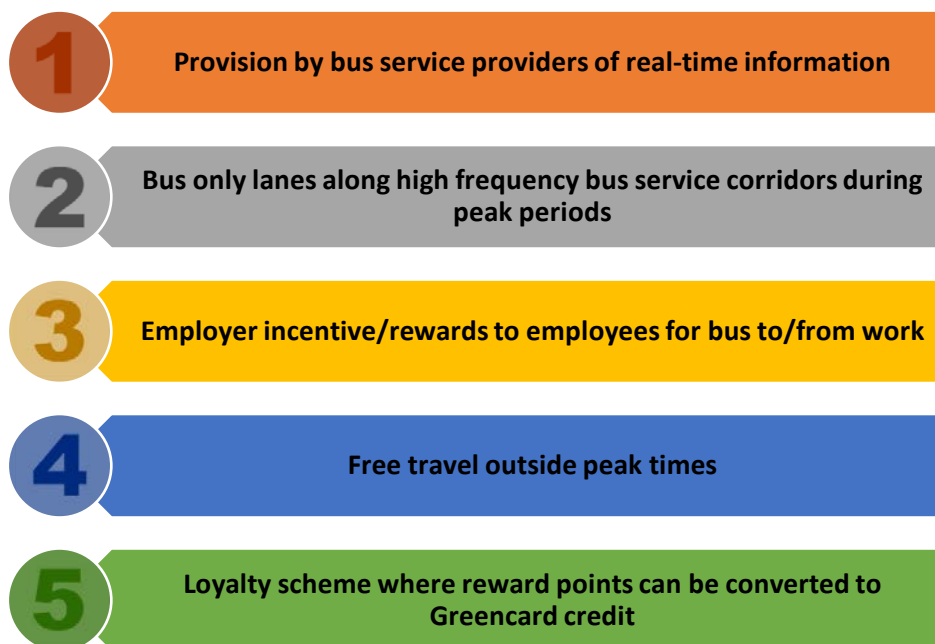
Figure 15: Top five appealing public transport use initiatives, commencing with the most preferred

However, there were different levels of interest in the initiatives depending on location and socio-demographic characteristics. Figure 16 provides traffic light indicators to show the relative appeal or likelihood that an initiative might encourage greater bus use according to spatial and sociodemographic categories. A dark green box delineates a very high level of likelihood/appeal, a lighter green box a high level of likelihood/appeal, a yellow box a neutral response, an orange box a low level of likelihood/appeal and a red box a very low likelihood/appeal.

There was much interest in real-time bus information across the GHR case study areas, reflecting earlier identified frustrations about uncertainty around bus arrival and departure times (Figures 12 and 13). The keenness for real-time information, particularly via smart phone applications, was a strong theme in the focus groups and interviews, *"there's no doubt it [real-time information] makes it … more attractive to use a bus"* and *"…you might think well, I'll just walk to the next stop because it's [the bus] not that far away and I won't miss it"*. This initiative is about providing capacity for reliable on demand trip planning and monitoring, increasing public transport user certainty and confidence in the services they are using. While real-time information was largely popular across the board, it was particularly appealing to students and

those living in inner Hobart and the G-SB corridor and ES. Likewise, the provision of dedicated bus lanes was of interest among respondents across the GHR, in inner and outer urban areas alike. One participant in the ES focus group said that if she saw the bus lane working as intended she would think *"…I wish I could be in that bus, why am I driving?"*. This initiative also had the most appeal to households with children at home, who were otherwise disinterested in other initiatives. Potentially, it is reducing journey time that is the reason for the interest in bus lanes.

There was a broad level of appeal for loyalty or reward schemes, including employer-led incentive programs, as well as free travel outside of peak periods, the former being most appealing across the GHR. Free or half price travel outside of peak periods was of most appeal to those living in G-SB and inner Hobart where frequency of bus services outside of peak periods is likely highest, although there was interest by ES and some outer Hobart respondents. Students showed particular keenness for free travel and reward schemes, reflecting both their tendency for highest public transport usage than other population groups in this survey.

In the L-B corridor none of the options aforementioned appealed strongly. Interview participants residing in north-west Tasmania said that lack of congestion, good motor vehicle related infrastructure and readily accessible parking were reasons for the lack of attractiveness of the hypothetical strategies to increase public transport use. This is not surprising given the regional/rural nature of this area.

Although it does not appear in the top five Tasmanian initiatives overall, 'park and ride' (the bus) or facilities that enable 'cycle and ride' did have some appeal among those living in middle and outer areas of the GHR, especially those living in KB, the ES and outer eastern and northern fringes of the GHR. Packaged with dedicated bus lanes in high frequency bus corridors, rather than a stand-alone initiative, this strategy may have even more potential for those parts of the region. Participants in the focus groups highlighted that parking restrictions in suburban streets (e.g. 2 hours) can prevent opportunities for combining public or active transport options with car use.

Sample category	Fare Pricing			Information			Loyalty & Incentive Schemes		Infrastructure & Traffic Engineering	
	A	B	C	D	E	F	G	H	I	J
All respondents	1.93	1.19	1.69	1.35	0.79	2.24	1.88	1.95	1.78	2.09
North and North West Tasmania										
Latrobe-Burnie corridor	1.39	1.14	1.37	1.29	0.95	1.51	1.49	1.46	1.31	1.41
Launceston	2.02	1.34	2.07	1.68	0.95	1.93	1.91	1.66	1.66	1.73
Greater Hobart Region										
Glenorchy - Sandy Bay corridor	2.21	1.29	1.89	1.38	0.74	2.46	1.94	2.02	1.70	2.20
Kingborough	1.67	1.01	1.47	1.27	0.76	2.33	1.87	2.10	1.97	2.24
Eastern shore	1.95	1.12	1.58	1.42	0.86	2.46	2.16	2.20	2.00	2.26
Hobart inner	2.19	1.41	1.93	1.57	0.78	2.43	2.02	2.11	1.62	2.17
Hobart outer	1.85	1.38	1.77	1.55	1.02	2.08	2.09	2.18	2.13	2.18
Selected Socio-demographics										
Students full-time	2.80	1.78	2.57	1.64	0.98	2.78	2.59	2.44	1.99	2.57
Households with children	1.63	1.00	1.32	1.23	0.71	2.07	1.72	1.83	1.79	2.04

Code	Public Transport Incentive Options
A	Free travel outside peak times (before 7am, between 9am and 3pm, and after 6.30pm)
B	Free travel before 7am
C	Half price travel outside of peak times (before 7am, between 9am and 3pm, and after 6.30pm)
D	Written or electronic information on how to make the most of bus services (brochures, better website information)
E	Speaking to someone by telephone to help you plan your journey and answer any questions
F	Provision by bus service providers of realtime information (electronic signs or smart phone apps that tell you when the next bus is due to arrive)
G	A loyalty scheme where reward points can be converted to Greencard credit (10 points for every trip so 100 points = $5 Greencard credit)
H	Employer's provide incentives/rewards to employees for bus travel to and from work (e.g. Greencard credit)
I	Park and ride' or 'bike and ride' facilities (where formal car parking and bicycle storage facilities connect to high frequency bus services in outer areas)
J	Bus only lanes along high frequency bus service corridors during peak periods so buses can travel quicker than the traffic (e.g. 7am to 9am and 3pm to 6.30pm)

Points allocated to overall share of respondent likert rankings	
4	Extremely Likely
3	Likely
2	Not sure/maybe
1	Unlikely
0	Not at all likely

Matrix Rating	
0.60 or less	Very low likelihood/appeal
0.61-1.20	Low likelihood/appeal
1.21-1.80	Neutral
1.81-2.4	High likelihood/appeal
2.41 or more	Very high likelihood/appeal

Figure 16: Matrix showing relative appeal of options to encourage public transport use

CONCLUSIONS AND FUTURE INQUIRY

This study has achieved its aims of: documenting travel patterns, transport modes and journey types within Tasmania; exploring the relationship between travel behaviours, physical activity and health; enhancing understanding of attitudes towards, preferences for and perceptions of public transport use; developing our understanding of the spatiality of travel patterns, behaviour and travel modes; and establishing the perceived acceptability and potential impact of strategies to increase public transport use

Consistent with previous work, the findings of this pilot study demonstrated a relatively low rate of active and public transport use among respondents, highlighting significant opportunities for improvement. Key challenges to public transport use include the complexity of travel behaviours and infrequent or unreliable services. Despite many participants living in close proximity to bus stops, many of those who were public transport users chose not to incorporate more physical activity into their daily life by walking to/from bus stops further away. This finding represents an important public health opportunity to increase physical activity.

Respondents were supportive of many strategies to increase public transport use, particularly the provision of real-time information and bus-only lanes in high frequency corridors in peak periods. By having ready access to real-time information about bus services (for example on smart phones) public transport consumers heighten their confidence in the bus service system which in turn informs personal travel choices and enhances travel efficiency. Reward and incentive-based schemes were also popular. These strategies were consistent with the most common barriers to bus use documented in this study – namely public transport frequency and timetabling issues. Further work is needed to understand the impact of these types of strategies both on public transport use and physical activity behaviour.

Limitations of this study include its non-probability sampling design, meaning the generalisability of findings may be limited, although the large sample included heterogeneity in terms of travel behaviours, sociodemographic characteristics and physical activity behaviour. Self-reported data are subject

The findings demonstrated a relatively low rate of active and public transport use among respondents...

Respondents were supportive of a number of strategies to increase public transport use that have been successful elsewhere, particularly the provision of real-time information and bus-only lanes in high frequency corridors in peak periods...

to reporting and recall biases and further work in this area should use validated, objective measures where possible. Further, only the *likely* impact of hypothetical strategies to increase public transport use was assessed; the *actual* impact of these strategies should be subject to rigorous empirical testing.

Despite these limitations, this is the first study in Tasmania to comprehensively document the complexity of travel behaviours in the broader community across the State and to focus on the public health implications of public and active forms of travel. It provides insights into factors underlying travel choices in Tasmania and points to many opportunities to increase public and active travel behaviours. Doing so is likely to have important health, social, economic and environmental implications for all Tasmanians. There is now substantial opportunity for further analysis of the dataset, including cross tabulation against sociodemographic variables and other research inquiry not reported here.

Endnotes (references and notes)

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[9] The main mode is generally defined as the single transport mode used for the furthest distance in the journey.

[10] UTAS Travel Behaviour Survey 2017

http://www.utas.edu.au/infrastructure-services-development/sustainability/transport/utas-travel-surveys (accessed 20_09_17).

[11] https://www.surveymonkey.com

[12] The Greater Hobart Region (GHR) is taken to mean the Greater Capital City Statistical Area (GCCSA) defined by the Australian Bureau of Statistics. Respondents living within postcodes contained within this area were included in the GHR sample group.

[13] A confidence level of 90 per cent means that there is a probability of at least 90 per cent that the result is reliable. The larger the margin of error around a value, the less accurate the value. The Greater Hobart confidence level was based on the estimated 2016 population over 18 years old (ABS). We used the Survey Monkey Sample Size calculator to calculate confidence and margins of error https://www.surveymonkey.com/mp/sample-size-calculator/.

[14] For more detail on student travel behaviour associated with the University of Tasmania, refer to: Lyth, A., Peterson, C., & Singh, K. 2017. *University of Tasmania 2017 Travel Behaviour Survey: Summary of Findings.* University of Tasmania, Hobart. http://www.utas.edu.au/commercial-services-development/sustainability/transport/utas-travel-surveys (accessed 21_12_17).

[15] Lyth-Gollner, Anna and Dowling, R., 2002, "Implications of Household Form, Gender & Parenting Cultures on Car Use & Urban Transport Policy: a Sydney Study", *25th Australasian Transport Research Forum Incorporating the BTRE Transport Policy Colloquium*, October 2-4, Canberra, ACT.

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Appendix A

Tasmanian Travel Behaviour & Physical Activity Survey – Question topics

The survey was open to Tasmanian adults aged 18 years or over.

Residential location
1. Tasmanian postcode and suburb of residence

Private transport access
2. Current driver's license
3. Access to a car or motorcycle that they can drive or ride
4. Access to a bicycle that they can ride

Public transport access/use
5. Length of time to walk from home to the nearest bus stop
6. Frequency of public transport (buses) use in Tasmania on weekdays (Monday to Friday) in the past year
7. Frequency of public transport (buses) use in Tasmania on weekends (Saturday or Sunday) in the past year
8. Barriers to public transport use (up to three randomised reasons)
9. Frequency of bus use in the last 7 days
10. Choosing to walk further than needed to a bus stop to catch a bus anytime in the last 7 days
11. Purpose of bus travel in the last 7 days
12. Ease of the bus service used in the last 7 days
13. Up to three reasons for finding the bus service challenging (for those participants who stated some level of challenge using bus services in the last 7 days, randomised list of reasons provided)
14. Bus company used (if travelled by bus in the past year)

Travel diaries - last 7 days
15. Travel activity over the previous 7 days, including trip purpose, trip mode, trip length?

Public transport information and ticketing
16. Metro Greencard ownership
17. Use of public transport website or app (such as the Metro Tasmania App)
18. Purpose of use of public transport trip or accessibility website or app for
19. Frequency of use of public transport website or app

Rating of bus use incentives
20. Likelihood that the following strategies would encourage more frequent public transport use (options for rating against five point Likert scale 'extremely likely, likely not sure/maybe, not likely, not at all likely')
- *Free travel outside peak times (before 7am, between 9am and 3pm and after 6.30pm)*
- *Free travel before 7am*
- *Half price travel outside of peak times (before 7am, between 9am and 3pm and after 6.30pm)*
- *A loyalty scheme where reward points can be converted to Greencard credit (10 points for every trip so 100 points = $5 Greencard credit)*
- *Employer's provide incentives/rewards to employees for bus travel to and from work (e.g. Greencard credit)*
- *Park and ride' or 'bike and ride' facilities (where formal car parking and bicycle storage facilities connect to high frequency bus services in outer areas)*

- *Written or electronic information on how to make the most of bus services (brochures, better website information)*
- *Speaking to someone by telephone to help you plan your journey and answer any questions*
- *Provision by bus service providers of real-time information (electronic signs or smart phone apps that tell you when the next bus is due to arrive)*
- *Bus only lanes along high frequency bus service corridors during peak periods so buses can travel quicker than the traffic (e.g. 7am to 9am and 3pm to 6.30pm)*

Physical activity
21. Injury, illness or disability restricting physical activity
22. Typicality of past week physical activity
23. Frequency of walking 10 minutes or more in the last 7 days (number of days)
24. Duration of time spent walking (10 minutes or more)
25. Frequency of moderate physical activity 10 minutes or more in the last 7 days (number of days)
26. Duration of time spent doing moderate physical activity (10 minutes or more)
27. Frequency of vigorous physical activity 10 minutes or more in the last 7 days (number of days)
28. Duration of vigorous physical activity (10 minutes or more)

Sociodemographic information
29. Age (18-24, 25-34, 35-44, 45-54, 55-64, 65-74, 75 or over)
30. Gender (woman, man, trans, prefer not to disclose, other)
31. Household composition
32. English language spoken at home
33. Student status (not student, full-time, part-time)
34. Employment status
35. Location (postcode) of workplace (workplace at which spent most time last week)
36. Highest level of education completed
37. General health
39. Participants were provided with the opportunity to provide any other information about their travel or physical behaviour as an open comment

Appendix B

Survey respondent sociodemographic profile by geographical areas

	TAPAS survey sample area						
	TAS	GHR	G-SB	KB	ES	L-B	GL
Gender							
Men	31.9%	33.0%	33.7%	33.3%	29.1%	33.9%	27.3%
Women	66.9%	66.0%	65.7%	66.7%	67.5%	61.0%	72.7%
All other (incl. Trans/prefer not to specify)	1.2%	1.0%	0.6%	0.0%	3.4%	5.1%	0.0%
Age							
18-24	19.0%	19.4%	22.8%	12.6%	13.7%	33.9%	2.3%
25-34	23.3%	24.1%	25.5%	23.5%	24.8%	13.6%	27.3%
35-44	22.6%	22.9%	20.0%	24.6%	30.8%	13.6%	20.4%
45-54	18.9%	19.6%	18.9%	21.9%	16.2%	13.6%	20.4%
55-64	11.5%	9.9%	9.5%	12.0%	7.7%	18.6%	18.2%
65-74	3.7%	3.1%	2.5%	4.9%	3.4%	3.4%	11.4%
75+	1.0%	1.0%	0.8%	0.5%	3.4%	3.4%	0.0%
Employment status (staff)							
Full-time (35hrs+ per week)	43.7%	44.2%	40.1%	48.6%	53.9%	42.4%	31.8%
Part-time (20-34 hrs per week)	16.5%	16.6%	15.2%	17.5%	19.7%	6.8%	20.4%
Part-time (<20hrs per week)	13.4%	14.1%	15.2%	15.3%	8.5%	10.2%	9.1%
Not employed (looking for work)	7.4%	7.1%	8.6%	4.9%	3.4%	11.9%	13.6%
Not employed (not looking for work)	8.1%	8.5%	12.7%	4.4%	2.6%	11.9%	2.3%
Retired	4.1%	3.7%	3.5%	3.3%	6.9%	5.1%	13.6%
Not able to work	1.6%	1.3%	1.0%	0.5%	0.0%	3.4%	4.5%
Other (includes volunteers)	5.2%	4.5%	3.9%	5.5%	5.1%	8.5%	4.5%
Household Type							
Couple with children (u18) living at home	26.3%	27.0%	19.8%	38.2%	33.3%	15.2%	25.0%
Couple without children (u18) living at home	25.1%	23.6%	26.1%	22.9%	20.5%	39.0%	27.3%
One parent family	5.3%	5.6%	4.7%	4.4%	8.5%	5.1%	2.3%
Other family	2.1%	2.2%	2.7%	0.6%	1.7%	1.7%	0.0%
Group (adults living tog.)	19.2%	19.4%	21.6%	16.4%	17.9%	20.3%	20.4%
Lone person	18.0%	18.2%	20.6%	15.9%	14.5%	16.9%	22.7%
Visitor	0.1%	0.1%	0.2%	0.0%	0.0%	0.0%	0.0%
Other	3.8%	3.9%	4.3%	1.6%	3.4%	1.7%	2.3%

Language usually spoken at home							
English	97.6%	97.4%	96.1%	98.4%	99.1%	98.3%	97.7%
Other	2.4%	2.6%	3.9%	1.6%	0.9%	1.7%	2.3%
Student							
Full-time student	23.6 %	25.0 %	32.9%	18.6%	12.0%	28.8%	11.4%
Part-time student	10.9%	10.9%	12.7%	13.1%	5.1%	16.9%	2.3%
Not enrolled as student	65.5%	64.1%	54.5%	68.3%	82.9%	54.2%	86.4%
Education attainment							
Yr 10 or less	5.4%	4.7%	2.7%	2.2%	9.4%	5.1%	9.1%
Yr 12	17.0%	16.7%	19.5%	9.8%	14.5%	33.9%	6.8%
Trade/apprenticeship	1.9%	1.7%	1.4%	2.2%	0.8%	0.0%	9.1%
Certificate/diploma	23.0%	21.0%	14.2%	23.5%	30.8%	25.4%	34.1%
University Bachelor Degree	32.5%	33.9%	35.7%	39.3%	34.2%	25.4%	27.3%
Higher University Degree	20.1%	21.9%	26.5%	22.9%	10.3%	10.8%	13.6%
General health description							
Excellent	20.0%	20.5%	21.4%	22.9%	17.1%	18.6%	15.9%
Very Good	38.3%	39.3%	39.4%	41.0%	41.0%	23.7%	38.6%
Good	30.5%	29.8%	29.4%	24.0%	33.3%	42.4%	29.5%
Fair	9.1%	8.2%	7.2%	10.9%	6.8%	15.3%	11.4%
Poor	2.0%	2.2%	2.5%	1.1%	1.7%	0.0%	4.5%
Current injury, illness, disability restricting physical activity							
Yes	13.2%	12.4%	12.6%	11.3%	7.4%	16.7%	20.4%
No	86.8%	87.6%	87.4%	88.7%	92.6%	83.3%	79.5%