



LOW CARBON LIVING  
CRC

## RP2021e: Greening Inner-urban Travel with Sharing Economy Mobility Services

Demand for Sharing Economy Mobility Services:  
The Market, Brand Growth & Behaviour Change  
Final Report



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This report has been peer reviewed by members of the Project Leaders Group. These reviewers evaluated its:

- originality
- methodology
- rigour
- compliance with ethical guidelines
- conclusions against results
- conformity with the principles of the Australian Code for the Responsible Conduct of Research (NHMRC 2007),

and provided constructive feedback which was considered and addressed by the author(s).

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## Project Overview

### **RP2021e Greening Inner-urban Travel with Sharing Economy Mobility Services**

The sharing economy is undergoing massive expansion, with exemplars like the car sharing market expected to involve millions of consumers globally by 2020. Increasingly, consumers consider public sharing systems a viable alternative to product ownership, a paradigm that competes with the dominant logic of private ownership and control. Sharing systems have evolved as a disruptive technology driven business concept on the premise of providing end-users with access to the benefits of product ownership, but without the commitment to capital expenditure.

This research project is designed to investigate the potential social, economic and carbon benefits of the sharing economy mobility services by answering the question: To what extent can sharing economy services deliver the low-carbon mobility needs of those who live, work or play within inner-urban precincts?

The project has four main parts:

- Work Package 1: Barriers to the provision of sharing economy mobility services
- Work Package 2: Servicing the needs of major inner-urban trip generators
- Work Package 3: Mapping demand for sharing economy mobility services
- Work Package 4: Quantifying the carbon abatement impact

This report represents the Final Report of Work Package 3, and draws on data from Australia and the United States of America to explore, in-depth, consumer behaviour that surrounds the adoption of sharing economy mobility services.

## Introduction

### Background

There has been a rapid global rise in both bike and car share offerings. Yet many of these have only current low adoption levels, highlighting a pressing need to understand the consumer behaviour that surrounds their adoption

This research explores how shared mobility options are transforming choices in the inner-city precinct where commutes are shorter and speeds slower, relative to a suburban setting.

There were 19.2 million registered motor vehicles in Australia at the start of 2018. On a per capita basis, car ownership continues to rise with the 1955 levels of 153 vehicles per 1,000 people in Australia now at 740 per 1000 people (ABS, 2018). These high levels of ownership and exclusive car usage occur against the backdrop of a growing share economy with new transport operators such as BlaBlaCar, GoGet, Lyft, Uber and a myriad of share bike schemes all entering the market.

To achieve low carbon emission targets, such as Adelaide's goal of becoming a carbon neutral city, commuters will need to modify or change their current behaviours. Transport contributes the second largest amount of greenhouse gas emissions in the Adelaide CBD, with as much as 91% coming from private vehicles (Pitt & Sherry, 2015). Therefore, transport behaviour is one obvious area to target for change, especially less use of private vehicles and more use of alternatives such as the shared mobility options of hire bikes or hire cars.

Some reduction in transport related emissions in the Adelaide city have occurred since 2007. Reductions are believed to be mainly due to a change from private vehicles to public transport, with bus use increasing by almost 30% between 2001 and 2015, and to an increase in walking and cycling (Pitt & Sherry, 2015). However, private car use still remains the highest form of transport used in the Adelaide Central Business District (CDB) and the mode of transport that contributes the most greenhouse gases. In fact, Adelaide's CBD features the highest percentage of daily car commuters of Australian mainland capital cities at 54% (Charting Transport, 2013). This makes Adelaide a robust test market for understanding how commuters choose and behave in this inner-city environment.

The use of shared mobility options in the CBD offers a sustainable alternative to driving private cars and can make public transport more attractive by providing first/last mile services, yet the data relating to the use of shared transport is limited. More knowledge about the characteristics of those who use, or do not use, share bikes and share cars could help plan future behaviour change interventions and identify what triggers behaviour change. It is also important to understand how these new transport offerings diffuse into the market so that marketing support can be designed to appropriately support and encourage their wider adoption.

This report presents findings from an on-line survey and in-depth interviews with commuters who travel in the Adelaide and Brisbane inner-city areas. Two cities were chosen to be examined to bring increased robustness from adopting a "many sets of data" approach (Bound, 1989). Firstly, current

travel behaviours are identified. The patterns of usage across transport options are examined against known empirical generalisations in buyer and consumer behaviour, built over the last 30 years. From this, it can be established if the new shared mobility transport options are acting as "normal" brands in a market, or if they are disrupting the known patterns. This helps to identify the best path to raising awareness of them and growing their adoption.

Secondly, drawing from key concepts from the psychology behaviour change model of the Trans-theoretical Model, commuters' behaviour, intentions, and underlying psycho-social influences, relating these brands in people's shared transport options are identified. This helps to identify how ready the commuter population is to adopt these new transport options and the triggers for behaviour change.

Understanding the mechanisms of human behaviour is most important prior to attempting to make changes to any behaviour (Foxall et al., 2006). However, all human behaviours, including travel behaviours, are complex and can be influenced by many psycho-social processes. Internal processes can include thoughts, feelings, beliefs, self-confidence, personal needs and wants, perceived discomfort or inconvenience, low motivation, intentions, old established attitudes (Zimbardo & Leippe, 1991; Bamberg & Moser, 2007; Watson & Tharp, 2007)). External processes can include the built environment, influence of others, policies, technologies and financial costs. Knowledge of these internal and external processes can help with the development, and enhance the effectiveness, of large scale community behaviour change programs (Davison et al., 2012).

Established or habitual travel behaviours can be particularly difficult to change (Garling & Axhausen, 2003), as any behaviour that a person performs consistently is serving a purpose and has positive outcomes for the person. For example it is usually easy, convenient, may save time, and requires little or no thought to step into one's own car and drive to a destination – although the same person may have a strong belief in the importance of increasing sustainable behaviours. Behaviour change theories, in particular the Trans-theoretical Model of behaviour change, can identify the types of positive outcomes and other factors that can influence travel behaviour, as well as help explain the processes that are involved in changing a behaviour.

### Introduction to Marketing Empirical Generalisations

The first section of this report looks at the adoption and usage of shared mobility transport options. Specifically, it uses the Dirichlet Model of buyer behaviour to identify patterns of sharing users across transport options. From this work, we can establish if the sharing economy mobility options are acting as "normal" small/new brands in the transport market or if they are a separate partition or category.

The analysis looks at if the new options are drawing on customers across the range of other category competitors or if they are drawing more heavily upon certain types of users, such as those who use other shared mobility options.

It is easy when you are a new "disruptor" to a category to think that you may have limited appeal and reach. However, this can restrict growth options and so it is important to establish just who your market is in order to then be able to market to maximise reach and build knowledge and adoption.



## Introduction to the Trans-theoretical Model of Behaviour Change (TTM)

Drawing upon social marketing and psychology, the TTM is an integrative model of behaviour change that was developed from an extensive analysis of different theories of psychotherapy (Prochaska & Di Clemente, 1983; Prochaska, 2013). The TTM has been shown to be a robust model, now used in the context of many health and other lifestyle behaviours, helping to explain behaviour and guide strategies to encourage change in people who are not motivated, as well those who are already motivated to alter a current behaviour. Some of the TTM concepts have been utilised in a small amount of previous transport research - for example, to guide the program Easy Steps which targeted increased walking in Queensland (Department of Transport and Main Roads, 2017); to examine the promotion of cycling and a Ride to Work day in Victoria (Rose & Marfurt, 2007); and to identify UK people who had never contemplated cycling and people who would like to cycle (Gatersleben and Appleton, 2007).

The TTM posits that people move through a series of stages on their way to making a behaviour change (Stages of Change) – commencing with a pre-contemplation stage where there is no thought about changing; then moving through contemplation, preparation, and action stages; finally arriving at a maintenance stage where a new behaviour has been acquired and is maintained over time. As they progress through the stages, people come to perceive more ‘pros’ or personal benefits, and less ‘cons’ or personal costs related to making a change (Decisional Balance). People will also have, or they acquire, more confidence in their ability to change (Self-Efficacy); and they also use several specific psychosocial processes as they move towards changing a behaviour (Processes of Change).

Overall, the TTM relates to thoughts; emotions; needs; self-efficacy; awareness; personal norms; social support; stimulus control and reinforcement; motivation or readiness to change, and behaviour. In turn, these internal processes influence how a person acts, thus identifying all or even some of these underlying influences should help to understand why commuters travel the way they do. Importantly, this knowledge can then be used to guide and develop campaigns or interventions that promote desirable changes in travel behaviour – understanding that people in different stages of change, will be experiencing different internal influences, and will respond to different types of cues or messages.

Few interventions to promote shared transport options have been guided by the concepts of the TTM, and little is known about the effectiveness of TTM interventions that may have incorporated all four TTM concepts. In addition, most studies that have used the TTM have not been guided by in-depth data relating to the targeted population. For example, Diniz et al. (2015) developed an educational intervention to increase Brazilian workers’ cycling behaviour. The intervention was based on the workers’ stages of change (one TTM concept), but no other TTM concepts were measured prior to the intervention. Strategies were based on processes of change that were presumed to be operating for this population, but not based on any prior in-depth research to identify the personal needs of the workers. This may have been one reason no significant differences were found between the intervention and control groups. The present research collects a large amount of data related to all the TTM concepts. This data will

increase understanding of commuters’ internal and external behaviours, and can be used to guide future research, and the future development of appropriate interventions. This research therefore provides a robust evidence base from which to grow adoption of these new transport options.

## Shaping the Provision of Information

There are both challenges and opportunities related to information targeted at encouraging more sustainable transport behaviours (Waygood et al., 2012). At present, it is unknown as to how much information related to encouraging sustainable travel is available to the general public, or how much information is noticed or acted upon. However, results of a survey of Australian bike share members (Fishman et al., 2014) indicated that marketing and advertising was rated ninth out of eleven motivators to joining a bike share program. This result illustrates how little attention may be paid to shared transport information, due to an internal screening process frequently used by all consumers. Information is prevalent in today’s world of technology – it is impossible to pay attention to it all – so this screening process allows people to ignore information that does not seem relevant to them. Thus, for people to notice information intended for them the message contents of that information must hit all the ‘right buttons’ so that messages are seen as relevant and are in fact attended to. In this sense, people can be thought of as “cognitive misers”.

If behaviour change messages can present a good argument for adopting a new behaviour (e.g. moving towards sharing a car) then hopefully the messages will be considered, and then acted upon. Therefore the present research will also explore commuters’ knowledge related to the shared mobility options currently available to them in the Adelaide and Brisbane inner-city areas where information initiatives have been undertaken. Data from the present research should also be able to help guide the type of information that may be more likely to attract the attention of transport users and what message prioritisation should be.

Past research suggests that information is most likely to be effective if it is developed with knowledge of people’s level of readiness for change and if the messages are guided by theory (Noar, Benac & Harris, 2007; Prochaska & DiClemente 1994a). Concepts of the TTM will also be drawn upon to suggest how information may be developed to encourage behaviour change. The TTM posits that different types of information are likely to be needed for people in different stages of change. For example, a private car user who is not even thinking about using shared transport (the TTM pre-contemplation stage), would be unlikely to notice or act upon information explaining how to hire a bike for city travel – they would not be ready to make such a behaviour change. That person would be more likely to notice information that may nudge them into giving some thought to reducing their car use, and begin to consider a change (the TTM contemplation stage): For example, information that could increase their knowledge about the personal benefits that could be gained by not using their car in the city, and information that could provide some comparisons between car use and other available options.

As well as the content of messages, the context in which they are presented is important. The manner in which travel information is presented to people can affect how they react and if they use the information (Waygood, et al., 2012). For

information to change attitudes and/or beliefs and to be acted upon, it must firstly be received and attended to, so messages have to be attractive enough and relevant enough for a person to pay attention, read, and comprehend the message (Zimbardo & Leippe, 1991). The target audience must also accept and retain a message's conclusion. Again, drawing on the TTM, identifying commuters' current travel behaviours, and their stage of change, could assist with when, where and how effective messages promoting the use of more sustainable travel modes could be presented.

## Research Aims

This research maps how future mobility and demand will be shaped as share car and bike schemes continue to grow in penetration in the mainstream market, producing a new generation of sharing literate consumers.

- (a) What is the penetration and usage frequency of shared mobility transport options, compared to other more traditional transport options? Do these "disruptor" brands follow known brand usage patterns? What are the implications of this if they do and if they do not?
- (b) What is the best path for growth for these future mobility options? What behavioural targets need to be prioritised and what communication messages will aid cut-through and adoption?
- (c) Do the sharing economy mobility services share customers in the expected way between them? What spill-over effects are there between options? Do they form a transport market partition or are they just "normal" small brands?
- (d) Where does Adelaide sit on the TTM of adoption of sharing economy mobility services? What are the barriers and triggers to adoption? What messages are needed to encourage trial and reduce perceived risk? How can shared mobility options transform choices in the inner city precinct where commutes are shorter and speeds slower relative to a suburban setting?

## Expected Outcomes

Expected outcomes include –

- A better understanding of commuters' behaviour and their internal processes that operate around the use, or not, of sharing economy mobility transport options.
- Clear identification of the marketing strategies needed to grow the sharing economy mobility services.
- The segregation of commuters by identifying their stage of change in relation to the use of share bikes or share cars in the Adelaide
- Identification of commuters' perceived triggers and barriers related to shared transport options and making changes to their current travel behaviours
- Based on behaviour change theory (the TTM), guidance for the future development of marketing messages and interventions to promote more use of sustainable transport options in Adelaide.

## Research Method

The research was undertaken by Associate Professor Anne Sharp and Dr Sandra Davison. Both are researchers with the Ehrenberg-Bass Institute for Marketing Science at the University of South Australia. The research was undertaken with University Ethics approval and conducted in line with the Australian Social and Market Research Society Code of Professional Behaviour (Associate Professor Sharp is a full member of AMSRS).

The research consisted of an online survey in both Brisbane and Adelaide. These two cities were chosen as they offer differing levels of adoption of sharing economy mobility services as well as other transport options. Having more than one city in the sample also allows us to see if the patterns hold across cities and hence follow a "many sets of data" approach to knowledge development.

The surveys were identical except for the transport brands being researched. The survey took just under 23 minutes to complete, on average.

## Participants and Procedure

In March 2018 South Australian residents who had recently travelled into the Adelaide city area ( $n = 302$ ) completed an online questionnaire relating to their travel behaviour, thoughts and feelings. Residents were drawn from an online data base, pureprofile.com. In order to make comparisons with other Australian state research (Fishman et al., 2014; Marinelli and Roth, 2002) and international trends in travel behaviours (Ciari & Becker (2017; Forward, 2014), Queensland residents who recently travelled into the Brisbane city area ( $n = 309$ ) were also surveyed with the same questionnaire.

In addition, in-depth interviews were conducted with five people who regularly travelled into and around the Adelaide city area.

Data was analysed using SPSS 25.

## Results & Discussion – Laws of Growth and Marketing

### A Marketing Science View

The last few decades have seen increasing understanding of patterns in buyer and consumer behaviour. Coupled with this has been the establishment of empirical generalisations about how buyers choose, how brands compete and how small brands become big. From aviation fuel contracts through to toothpaste purchasing, these patterns have been found to robustly hold across countries, markets and time and can be used to both understand and predict future likely behavioural patterns in a market (Sharp, 2010).

This section of the report applies these established empirical generalisations to the private transport market in Australia, focusing on how the entrance of sharing economy mobility brands, such as Uber, have affected the market. Specifically, it uses the Dirichlet Model of buyer behaviour to examine patterns of brand usage and customer sharing across both traditional and sharing economy mobility private transport brands. From this, we can establish if the sharing economy mobility options are acting as small brands in the transport market or if they are actually a separate partition or transport category. The analysis determines whether these new market entrants are drawing on customers across the range of private transport category brands or if they are drawing more heavily upon users who already use other sharing economy mobility options. This way we can then establish if these new entrants are performing as we would expect a small new entrant brand to or if they are changing the fundamental structure of the market.

In order to undertake this, we first we outline the marketing empirical generalisations or laws that we know describe and predict choice behaviour in markets. Then we examine where boundary conditions or deviations from these patterns have been noted in the past and if we might expect to see them here.

### The Known Laws

There are four key laws that this report draws upon and tests. These are:

- The size of brands (market share) and the relationship between number of customers (penetration or number of people buying at least once in a time period) and loyalty (average usage frequency of the brand in a time period). This is known as the Double Jeopardy Law.
- How the brands share customers (duplicated buying within a time period) and, when they gain new customers, which brands these are drawn from. This is known as the Duplication of Purchase Law.
- The make-up of brands' customer bases in terms of the number of light, medium and heavy buyers each brand has (average brand and category buying rates in a time period). This is known as the Law of Buying Frequency.
- The profile of each brand's customers (demographic and attitudinal) and how this differs from the profile

of the average category user. This is known as the Brand User Profile Law.

### Law of Double Jeopardy

Some brands in a category are much higher in market share than others. Yet, this law states that brands within the same category vary little from each other in how frequently they are purchased. The big variation between brands in a category comes from the number of buyers that they have. This means the size of the customer base, rather than the rate at which brands are bought, is the big difference between big and small market share brands. The Double Jeopardy effect sees small brands being penalised twice. They have fewer buyers and, those that do buy them, do so slightly less often. This means loyalty is predictable, based on a brand's market share size.

### Duplication of Purchase Law

It is the norm for buyers in a category to buy across a range of brands rather than just being sole brand loyal. This is known as polygamous loyalty. Each individual will have a different repertoire of brands they use and their likelihood of choose each brand is probabilistic and relatively stable over time. The way in which brands share customers is also predictable, based on the relative size of brands rather than other elements such as their positioning. This allows us to predict how different sized brands will share customers and to compare this to actual sharing that is observed, thus identifying sub-markets in a category where we see greater or lesser sharing between brands than would normally be expected.

### Law of Buying Frequency – NBD (light and heavy buyers)

This law states that all brands have the same distribution of buyers. All brands have many light buyers and only a few medium buyers and few heavy buyers of that brand. This distribution shape is the same across all brands. This law has many implications for communication and also the path to brand growth. It makes marketing essential in order to reach light buyers of the brand who are less engaged and less likely to think about the brand and yet are such a critical component of the brand's overall customer base. While acknowledging the importance of heavy buyers of the brand, it puts their relative rarity into perspective and highlights the diminished returns from focusing too much on "preaching to the converted" in marketing efforts.

### Law of Brand User Profiles

The customer bases of competing brands in a category do not differ much. That is, each brand's customer base looks the same in terms of demographics, attitudes and media habits. This is not surprising when you consider the repertoire nature of brand buying. This is a very positive finding in that it means anyone who uses the category could potentially be a customer of your brand. It means each brand has a broad target for who can potentially be a customer. There are no restrictions to one type of buyer or segment in a market. The only requirement is that the person is a category buyer. This also has implications for messaging and not restricting

yourself to just one part of the category, but instead appealing broadly.

### Known Deviations

While deviations are few, it is important to highlight them here as it is possible that the share economy mobility brands are brands that may also prove to be deviations. Over the last thirty years, two deviations have been noted from the laws outlined above.

1. Change of pace or niche brands – these are brands that, for the number of customers they have, are bought more frequently than we would predict (niche brand) or have lower than expected buying rates for their size (change of pace brands). It could be that sharing economy mobility brands are niche brands in that they appeal to only a sub segment of the wider transport market.
2. Groupings and partitions – this is where we see brands sharing customers more than expected with each other and less with other brands. It may be that sharing economy mobility brands are forming a sub-segment of the private transport market, especially given the requirements of downloading and installing apps that are required for their usage.

### Prior Findings on Shared Mobility Brands

In 2017, the Ehrenberg-Bass conducted development research (i.e. no affiliation to any particular corporate sponsor of the Institute) in the US to examine “disruptor” brands across the categories of accommodation, music and transport. This was conducted across 2004 respondents, covering five cities of New York, Chicago, Houston, Los Angeles and Philadelphia. This is useful research to compare to as the US markets have sharing economy mobility brands that are more established (larger market share) than Australia. This makes it possible to see how Australian conditions may develop as these brands become more entrenched in the market. Discussion of the results from this work are made in the findings below as a comparison, to strengthen the findings further and to demonstrate their generalisability to this context of sharing economy mobility. In effect, the US work helps to increase the “many sets of data” approach to knowledge development in this area. Please note that the analysis for the Law of Buying Frequency was not conducted for the US market and so comparisons are not possible for this law.

### Access to All Options

For some transport modes there is the requirement of ownership or access (e.g. private car or scooter) before you can use it. As a starting point then, access levels were measured. These are reported by market.

#### Adelaide

In Adelaide car ownership was 85% with a further 9% saying they had access to a car. This leaves less than 6% of respondents without easily access and hence not able to choose a private car as a transport option. This is, as expected, extremely high access to this transport option’s infrastructure.

For moped/scooter/motorbike ownership, 9% owned, 5% had access while 86% did not. This is a significant barrier to being able to choose this transport mode.

Bike ownership was 40% with a further 8% claiming access. This leaves 52% of respondents without access to their own bike as a transport mode, although share bikes are still obviously an option.

In Adelaide, 96% of respondents had a phone or tablet that they could use apps on. However, as shown in the following table, few have installed apps on their devices that would allow them access (eg Uber, OfO) or easier access (eg Moovit) to these share economy and lower carbon transport options. This is a significant first-step barrier to accessing sharing economy mobility options and a clear research finding indicator as to where additional communication efforts should be placed.

Only 3% of respondents were a member of a shared bike or car scheme. Again, this is a significant barrier for the adoption of this transport option.

Table 1: Apps on phones Adelaide

App	Yes %
Uber	41
Taxi	26
MetroMate	23
MyTransLink	12
TripMate	6
Tripit	6
GoGet cars	3
Moovit	2
Addinsight	2
OfO	1
AllBikesNow	1
OBike	1

#### Brisbane

Car ownership was 91% with a further 4% saying they had access to a car. This leaves less than 5% of respondents without easily access and hence not able to choose a private car as a transport option. This is, as expected, extremely high access to this transport option.

For moped/scooter/motorbike ownership, 10% owned, 9% had access while 81% did not. This is a significant barrier to being able to choose this transport mode.

Bike ownership was 48% with a further 11% claiming access. This leaves 40% of respondents without access to their own bike as a transport mode. This is a lower barrier than the level seen in Adelaide, where 52% did not have access.

The lack of ownership for moped/scooter/motorbike and push bikes mean there are significant barriers for large parts of the market in accessing these modes of transport.

In Brisbane, 98% of respondents had a phone or tablet that they could use apps on. Again, as seen in Adelaide, the installation of apps on phones to allow access or easier access to the sharing economy options was low. Only 6% of respondents were a member of a car/bike hire scheme.

Table 2: Apps on phones Brisbane

App	Yes %
Uber	49
MyTransLink	41
Brisbane Bus and Train	26
Taxi	15
TripMate	2
GoGet cars	1
Moovit	1
OfO	1
AllBikesNow	1
OBike	1
MetroMate	1
Tripit	1

Both Adelaide and Brisbane could make significant efforts to increase the installation of apps on mobile devices that allow access to these sharing economy services. This is the very important first barrier to address. When people come into a situation where they could choose a sharing economy transport option, a small barrier such as no app on a phone could be enough of a barrier to make another transport choice.

### Findings: Law of Double Jeopardy

The following two tables show the penetration of the transport options across respondents in a month of usage. They also show the average usage (number of trips taken by mode) rate. The tables are ordered by penetration and we would expect to see the larger penetration brands showing a Double Jeopardy pattern in that they are both used by more people and the people that do use them, use them slightly more often. This Double Jeopardy pattern has been noted in any multiple brand usage situation where brands are competing against each other and are largely substitutable. It is an effect that is due to differential mental and physical availability. The bigger share brands are known by more people and hence get chosen often. The smaller share brands are known by people who also tend to know about the bigger brands and so their usage tends to get split with these larger brands. Hence, these smaller brands get penalised twice: they have fewer customers and the customers they do have are slightly less loyal

Table 6 shows the Law of Double Jeopardy in Adelaide. Sharing economy mobility brands are identified by “\*” in the tables. The first column identifies the transport option, the second shows the percentage of respondents who claim to have used that transport option at least once in the last month. The final column shows their average claimed frequency of usage in the last month. A month is used because the weekly usage measures were so low as to make the patterns in the data impossible to see.

A clear Double Jeopardy pattern can be seen. The larger penetration brands are also to be used slightly more often. For example, 78% of respondents used their own private car at least once in the last month, on average using it 5.8 times a week. In comparison, the Tram was used by 24% of respondents and average 3.2 uses a month. It is also clear from the tables that the biggest difference between the brands comes from the number of people using them at least once in a

period (a 3.3 fold difference for private car versus Tram), rather than from the usage rate (a 1.8 fold difference).

Table 3: Adelaide penetration (month) and usage (weekly), n=302

Transport Options	Penetration (last month)	Rate of usage (weekly)
Own car	78	5.8
Friend/family member car	30	2.6
Other Bus	28	3.9
Tram	24	3.2
Train	20	3.1
Uber*	14	2.0
Taxi	13	2.2
O-bahn	9	3.2
Bicycle	8	3.3
Motorbike/scooter/moped	3	4.0
Chauffeured service	2	1.0
Smart phone based dockless bike eg ofo*	1	2.0
Share bike docking*	0	0
GoGet car*	1	0
Other car share*	1	0
Ecocaddy*	0	0

The Brisbane market shows a similar Double Jeopardy pattern. The higher share brands have slightly higher usage levels than the smaller share brands. The sharing economy mobility brands are all small share brands currently, as was seen in Adelaide.

Table 4: Brisbane penetration (month) and usage (weekly), n=309

Transport Options	Penetration (last month)	Rate of usage (weekly)
Own car	75	6.1
Train	38	3.1
Bus	32	3.0
Friend/family member car	24	3.6
Uber*	23	1.9
Taxi	16	1.8
Bicycle	6	7.5
Motorbike/scooter/moped	3	6.3
Tram	2	2.5
Bike share eg City Cycle*	2	2.0
Chauffeured service	1	0
Other car share*	1	1.5
GoGet car*	0	0

Given the small samples in the markets and the low shares of the sharing economy mobility brands, we do see some ‘wobble’ in the results, but the Double Jeopardy pattern is still clear in both markets.

## US Markets Comparison

In all the cities, ‘own car’ was the most common option, with the highest penetration and frequency of use, although in New York, the subway was very close in penetration. In line with Double Jeopardy, smaller transport options suffer from many fewer customers, and less frequency of use, though only slightly. Motorbikes, Bicycles and Moped/Scooters did appear to be slightly niched options, with higher frequency than we would expect for their penetration, as lack of ownership locks some people out of these transport options. We see these same patterns here as in the Australian data. The results for New York are shown below, as indicative results from a larger market where the sharing economy mobility brands are more entrenched and hence higher in penetration. Because these markets are more established, the penetration figures are weekly.

Table 5: New York market penetration & usage 2017, n=402

Transport Options	Penetration (weekly)	Rate of usage (weekly)
Own car	46	6.4
Subway	45	5.3
Bus	29	4.6
Uber*	28	4.0
Taxi	28	3.4
Friend/family member’s car	13	3.4
Bicycle	12	4.8
Lyft*	10	4.4
Motorbike	7	5.1
Chauffeured service	6	4.6
Juno*	5	4.8
Via*	5	4.3
Gett*	4	5.3
Bandwagon*	4	5.0
Moped/scooter	4	5.4
Average	16	4.7
Ratio	12.9	1.9

## Findings: Law of Duplication of Purchase

### Sharing at an Aggregated Brand Level

The findings in this section are done in two stages. Firstly, we examine the level of sharing of each brand from other brands in the market, at an overall level. That is, we look at a measure of how much each brand attracts other brand’s customers. The bigger brands, being known by more people who may or may not know about the smaller brands, should show higher levels of “draw”. The following Table 6 and Table 7 examine this through showing the average sharing levels for each transport option. The “Penetration” column illustrates the proportion of respondents that used each option at least once in the last month. The “Average % who also used” column shows the average proportion of all respondents, who used other transport options in that same time period, who also used this given transport option. This is a measure of duplicated purchase/use. By ordering each transport option by penetration, we see Duplication of Purchase patterns within each brand.

We would expect both columns to decline from top to bottom as we know from the Law of Duplication that big brands share less with smaller share brands. So, we would expect sharing to go down as the brands get smaller in size and that the bigger brands have the most users of other brand, also using them.

For both Adelaide and Brisbane, the average percentage of respondents making a duplicated use does indeed broadly decline in line with the penetration of the transport option. That is, users were far more likely to also use a higher penetration transport option than a lower penetration one.

There are however, some deviations (indicated in bold), which is occurring for transport options with a higher duplicated use than what would be expected, based on their penetration. These deviations are further explored subsequently.

Table 6: Adelaide penetration (month) & % used usage (month)

Transport Options	Penetration (last month)	Average other brand users who also used %
Own car	78	61
Friend/family member car	30	31
Other Bus	28	35
Tram	24	35
Train	20	28
Uber*	14	26
Taxi	13	20
O-bahn	9	12
Bicycle	8	<b>24</b>
Motorbike/scooter/moped	3	3
Chauffeured service	2	3
Smart phone based dockless bike eg ofo*	1	3
GoGet car*	1	1
Other car share*	1	0
Share bike docking	0	0
Ecocaddy*	0	0
Average (all options)	—	17
n=302		

For Table 6 we can see that we do have the expected pattern of Duplication of Purchase sharing. For example, 61%. Of people that used a transport option other than “own car” in a month, also used “own car”. In comparison, for the smaller share brand of Uber (14% penetration), we see that only 26% of other brand users used Uber. This lesser sharing is because the brand is smaller and so has less mental (and physical availability to be chosen). The exception to the pattern is with the “Bicycle” transport option.

Looking now at the Brisbane market, we see the exact same pattern. In this market, we see that the Bus and Uber options have slightly higher draw from other brands in the market than is expected, given their size.

Table 7: Brisbane transport penetration & % used usage

Transport Options	Penetration (last month)	Average other brand users who also used (%)
Own car	75	54
Train	38	38
Bus	32	<b>47</b>
Friend/family member car	24	29
Uber	23	<b>34</b>
Taxi	16	26
Bicycle	6	12
Motorbike/scooter/moped	3	3
Tram	2	1
Bike share eg City Cycle	2	2
Other car share	1	5
Chauffeured service	1	3
GoGet car	0	0
Average (all options)	—	20
n=309		

These results do confirm that the brands show patterns of brand sharing that are broadly in line with the Duplication of Purchase law. Next, we look at the sharing patterns across the brands in detail. This is also where the noted exceptions can be explored in more depth.

### Sharing at an Aggregated Brand Level

This next section examines the full sharing levels for each transport option, by brand rather than in aggregate. With the options ordered by penetration, it can be seen that the proportion of users for each service, who also used another service, declines from left to right.

So, for example, Table 8 shows how the different transport brands share customers in Adelaide. If we take trains as an example, we can see that of all the people who used trains in the last month, 74% also used their own car and 28% also used a family/friend’s car and 43% a train. The columns also give us valuable information about average sharing levels and help us to identify groupings or partitions in a market.

Looking at the average figure at the bottom of each column, we can see that, on average 61% of those who took their own

car also took another mode of transport that month. There is 31% sharing, on average, for those that took a friend/family member’s car. These averages can be used to spot especially high or low sharing. For example, a high 47% of those who took a train in Adelaide also took a tram, far more than the 28% average sharing we see for this mode across all the brands. In effect, trains and trams are forming. A sub group of the market as they share customers between them more than expected. We also see this in the 56% of tram users who also used a train when we would have expected more in the vicinity of 35% from the tram sharing average.

A high 56% used a Tram, which is much higher than we would expect. The average for each transport mode, which are shown as an average at in the bottom row, would lead us to expect about 35% sharing with this and the other

For Adelaide, while the overall pattern holds well, the following deviations are evident:

- (1) O-bahn shares users more than expected with Bus and Tram
- (2) Tram shares users more than expected with Own Car, Bus and Train
- (3) Train overshares with Own Car and Tram
- (4) Uber overshares with Friend/Family member car
- (5) Bicycle overshares with Own Car, Other Bus, Tram, Train, Uber and O-bahn

These deviations are likely caused by functionality, which is commonly seen in Duplication of Purchase data. For example, O-bahn, Bus and Tram (1) are all forms of public transport; and Bicycle could possibly serve as a form of exercise or leisure rather than a direct form of transport.

As oversharing between Tram and Train is bidirectional, the two transport options form a grouping. Therefore, users of the Tram are more likely to use the Train and vice versa. The same occurs for Bus and O-bahn.

Finally, low penetration transport options share a much higher proportion of their users with other forms of transport and therefore appear to deviate considerably from other options. However, this is a result of their small sample size, which was fewer than 10 users.

Table 9 shows the sharing by brands in Brisbane.

The following deviations are evident in the Brisbane data:

- Own Car under shares with Bus, Uber and Taxi
- Bus overshares with Train
- Friend/family members car overshares with Own Car and Uber
- Uber overshares with Own Car, Train, Bus and Friend/family members car
- Taxi overshares Train
- Bicycle overshares with Own Car, Train, Friend/family members car and Taxi

Table 8: Full Sharing by Brand in Adelaide

Transport	Penetration (last month)	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
(A) Own car	78		25	22	24	19	13	11	7	9	3	2	0	0	0	0	0
(B) Friend/family member car	30	65		30	25	19	26	19	10	10	1	6	0	0	1	0	0
(C) Bus	28	63	32		44	31	15	17	21	18	4	4	1	0	0	0	0
(D) Tram	24	78	31	51		47	25	19	21	18	3	6	1	0	0	0	0
(E) Train	20	74	28	43	56		26	21	13	18	5	2	2	0	0	0	0
(F) Uber	14	71	55	31	43	38		29	19	24	7	7	0	2	0	0	0
(G) Taxi	13	68	45	37	37	34	32		13	18	3	5	0	3	0	0	0
(H) O-bahn	9	59	33	67	56	30	30	19		26	4	7	0	0	0	0	0
(I) Bicycle	8	88	38	63	54	46	42	29	29		4	0	4	0	4	0	0
(J) *Motorbike/scooter/	3	75	13	38	25	38	38	13	13	13		13	0	0	0	0	0
(K) *Chauffeured service	2	71	71	43	57	14	43	29	29	0	14		0	0	0	0	0
(L) *Smart phone based dockless bike eg ofo	1	100	0	100	100	100	0	0	0	100	0	0		0	0	0	0
(M) *GoGet car	1	0	0	0	0	0	100	100	0	0	0	0	0		0	0	0
(N) *Other car share	1	100	100	0	0	0	0	0	0	100	0	0	0	0		0	0
(O) *Share bike docking	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		0
(P) *Ecocaddy	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Average Sharing	N=302	61	31	35	35	28	26	20	12	24	3	3	3	1	0	0	0

Transport options with n = <10 indicated by \*



“Own car” is lower than expected sharing may be a result of availability - it is constantly available for use. Since Buses share at higher than expected level with Trains unidirectionally, the Bus could be complementary to the Train, i.e. users catch the Bus and then the Train. Deviations 3, 4 and 5 may be as a result of availability and functional similarity or difference. Bicycle’s oversharing with a number of brands might also be caused by the fact that it serves purposes other than transport and is functionally different in that it requires physical activity.

Low penetration brands again appear to deviate, but this is a result of their small user base and resultant small sample noise. Their users are still predominantly more likely to also use a high penetration transport option.

### **US Markets Comparison**

In the US, the Duplication of Purchase Law again held for the transport category. However, there was a slightly complex market structure, reflecting the mix of privately owned options (cars, motorbikes, bicycles), cheaper public transport of buses or trains, and the more expensive taxi/rideshare options. For example, those who used their own car were less likely to also use any other transport option. At the other end, users of Motorbikes were more likely to use most other transport options, a common characteristic of a small brand that attracts heavy category users.

There was a partition between the two public transport options of bus and subway/metro, with users of one more likely to also be users of the other.

It was concluded that the Duplication of Purchase Law generally holds. While there were some deviations (partitions), these were typically not the share economy mobility brands, but rather the smaller brands and/or with functional similarities. Therefore the law of Duplication of Purchase holds, despite the substantial functional differences across options within these categories. The exceptions we do observe reflect some of these functional differences, rather than being prevalent in the share economy mobility services brands.

Table 9: Full Sharing by Brand in Brisbane

Transport	Penetration (last month)	A	B	C	D	E	F	G	H	I	J	K	L	M
(A) Own car	75		30	24	22	24	13	7	2	1	2	0	0	0
(B) Train	38	59		53	21	32	21	9	3	3	2	1	0	0
(C) Bus	32	57	63		31	35	28	9	3	5	2	3	1	0
(D) Friend/family members car	24	68	34	41		42	25	11	1	3	1	1	1	0
(E) Uber	23	77	54	48	44		25	11	3	3	4	1	1	0
(F) Taxi	16	63	51	55	37	37		18	4	2	4	2	2	0
(G) Bicycle	6	84	53	47	42	42	47		16	0	11	0	0	0
(H) *Motorbike/scooter/moped	3	44	44	33	11	22	22	33		0	0	0	0	0
(I) *Tram	2	40	60	10 0	40	40	20	0	0		0	0	0	0
(J) *Bike Share eg City Cycle	2	80	40	40	20	60	40	40	0	0		0	0	0
(K) *Other car share	1	25	25	75	25	25	25	0	0	0	0		25	0
(L) *Chauffeured Service	1	50	0	50	50	50	50	0	0	0	0	50		0
(M) *GoGet car	0	0	0	0	0	0	0	0	0	0	0	0	0	
Average Sharing	N=309	54	38	47	29	34	26	12	3	1	2	5	3	0

Transport options with n = <10 indicated by \*

## Findings Law of Buying Frequency: NBD (light and heavy buyers)

The following two tables - Table 10 and Table 11, show the percentage of respondents using each transport option from zero to ten plus times in a week. In line with a Negative Binomial Distribution (NBD), we would expect to see the largest group of people not using each transport option at all, some using it infrequently, and (very) few using it very frequently.

This pattern can be seen for both Adelaide and Brisbane, with the most common usage rate being zero (not using that transport option at all), closely followed by once or twice. Own Car has a higher proportion of respondents who use it more frequently, most notably 10 or more times. This occurs systematically across both Adelaide and Brisbane. A probable explanation for this long tail is that users have constant access to their own car and it is therefore far more convenient for many different types of trips, varying in duration and purpose. It should also be noted that although the respondents used their own car more frequently, the overall NBD pattern holds in that there is still a higher proportion of users not using it at all and some using it infrequently.

Table 10: Buying frequencies for transport options in Adelaide (weekly)

Number of Times Used (weekly)	Own car	Friend/family member car	Other Bus	Train	Tram	Uber*	O-bahn	Bicycle	Taxi	Motorbike/scooter/moped	Chauffeur red service	Smart phone based dockless bike eg ofo*
0	27	82	83	90	91	93	94	96	97	99	99	99
1	10	6	4	3	3	2	1	1	2	0	<1	0
2	13	6	4	3	3	3	2	1	<1	<1	0	<1
3	6	2	1	1	1	1	1	1	<1	<1	0	0
4	6	2	2	1	1	1	0	1	0	0	0	0
5	10	1	1	1	0	0	1	0	0	0	0	0
6	5	0	2	0	0	0	0	0	0	0	0	0
7	9	0	0	0	0	0	0	0	0	<1	0	0
8	2	0	1	0	1	0	0	0	0	0	0	0
9	1	0	0	0	0	0	0	0	0	0	0	0
10+	12	1	1	1	1	0	0	0	<1	0	0	0
n=302												

*Bike share, GoGet car, Other car share and Ecocaddy not used in the time period and therefore omitted from table*

Table 11: Buying frequencies for transport options in Brisbane

Number of Times Used (weekly)	Own car	Train	Bus	Friend/family member car	Uber*	Taxi	Motorbike/scooter/moped	Bicycle	Tram	Bike Share*	Other Share*
0	30	80	82	87	88	94	98	99	99	99	99
1	14	4	5	5	6	4	<1	0	0	0	<1
2	7	7	5	3	3	1	<1	0	0	<1	<1
3	4	1	3	2	1	<1	<1	0	<1	0	0
4	6	4	4	1	1	0	0	0	0	0	0
5	9	1	2	1	<1	<1	<1	0	0	0	0
6	3	2	0	0	0	<1	0	0	0	0	0
7	11	0	0	<1	0	0	<1	0	0	0	0
8	2	1	0	0	<1	0	0	0	0	0	0
9	0	0	0	0	0	0	0	0	0	0	0
10+	13	0	1	<1	0	0	<1	1	0	0	0
n=309											

*GoGet car not used in the time period and has therefore been omitted \*

## Findings: Law of Brand User Profiles

The final law tested draws on the finding that the customer profiles of competing brands hardly differ. For this test, selected demographic variables of gender, income, work status and age, as well as a battery of personal attitudes to innovation were examined.

### Demographics

There were no statistically significant differences between share economy mobility service user and non-users in terms of gender. In both groups, the split was approximately 50:50.

For age, there was a skew to younger users as we might expect as they have access to the technology and so can use it more easily. There were 10% of non-users under 30 years compared to 43% of users ( $p < 0.01$ ). The non-users were far more likely to be over 70 years (16% cf 2%,  $p < 0.01$ ) and to have a household income over 100K (37% cf 17%,  $p < 0.01$ ).

Users of share economy mobility services were more likely to be in paid work (either part time or full time) compared to non-users (47% cf 77%,  $p < 0.01$ ), again reflecting the younger profile of the user group, hence fewer retirees.

However, the overall finding is still that these brands also appeal and are adopted by people of all ages, incomes, work status and genders. The younger people may have been the early adopters, but we are seeing usage right across the transport user spectrum.

### Attitudes

Respondents were asked their level of agreement with a battery of statements. They were asked to indicate their level of agreement using a 1 to 5 scale where “1” meant “strongly agree” and “5” meant “strongly disagree”. They could also choose any whole number in between. Table 12 shows the three statements where there was a statistically significant difference ( $p < 0.05$ ) between the mean rating given by share economy mobility services users and non-users.

In all instances, the share economy mobility services users gave lower means, indicating a higher level of agreement. However, the mean differences are all less than a scale point in difference and there were 11 other attitude statements where no differences were seen. So, overall, there are far more attitudinal similarities than differences and, where there are differences, they are slight from a managerial perspective.

Table 12: Agreement levels

Statement	Used share economy services	Didn't use
Technology gives me more control over my daily life	2.1	2.6
I can figure out new high-tech products and services without help from others	2.3	2.7
Other people come to me for advice on new technologies	2.4	3.0

Statements where there were no statistically significant differences in the mean ratings given between share economy mobility transport option users and non-users were:

- Technology helps me make necessary changes in my life
- Technology allows me to more easily do the things I want to do at times when I want to do them
- New technologies make my life easier
- I seem to have fewer problems than other people in making technology work
- I enjoy figuring out how to use new technologies
- Technology controls my life more than I control technology
- I feel like I am overly dependent on technology
- The more I use a new technology, the more I become a slave to it.
- I must be careful when using technologies because criminals may use the technology to target me
- New technology makes it too easy for companies and other people to invade my privacy
- I think high-tech companies convince us that we need things that we don't really need

### US Markets Comparison

The same skew to younger people was seen in the US data, but to a lesser degree. This suggests that as these new brands diffuse into the market and gain increased adoption, they draw from all age cohorts.

Attitudes to innovation in the transport category were also measured on the same 5-point scale in the US. The results show some variation across transport options, but this tended to be for the users of functionally different Motorbike/Moped/scooter options, rather than the share economy mobility brands. As for Australia, the main finding is that there are more attitudinal similarities than differences between groups.

Therefore, even though these categories contained quite functionally different offerings, we still see that brand/option user profiles differ only slightly.

## Overall Summary

Our results show that the Laws of Growth hold for the share economy mobility brands and the last-mile transport market in general. Marketers can draw on these laws to underpin their brand growth strategy. This is a positive finding.

The way to grow any brand is via expansion of the customer base. And to do this the aim must be to gain many buyers in any given time period (Sharp, 2010). This means a focus should be on mental and physical availability — making the brand easy to be thought of and easy to buy.

Finally, our results challenge the stereotypes that the users of share economy mobility brands will be very different from typical transport users. While there is evidence these brands do tend to appeal slightly more to younger people, the key finding is that they appeal to all transport users. Therefore, efforts should be made to make these brands even easier to use for older demographics (removing barriers to purchase), who did not grow up in the digital era.

## Recommendations from Laws of Growth

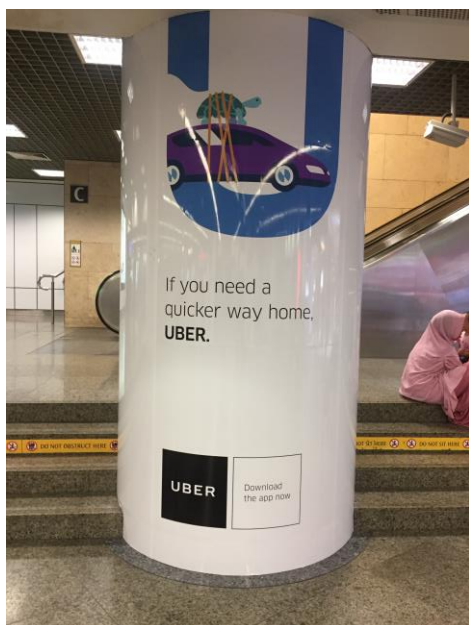
The analysis has shown that the emerging share economy mobility brands, while disrupting the traditional transport market, are doing so in line with the known patterns of buyer and consumer behaviour. These brands tend to be small share brands that are small because they do not yet have many users. They are used by their customers at about the rate that would be expected for their respective market share. They draw customers not just from other shared mobility brands but from across the other competitor offerings, in line with those brands size.

The users they attract are not majorly different from users of the category, although the first adopters have tended to be younger. This is a very positive finding as it means any category user could potentially be a customer. Their appeal is not just restricted to a small part of the market.

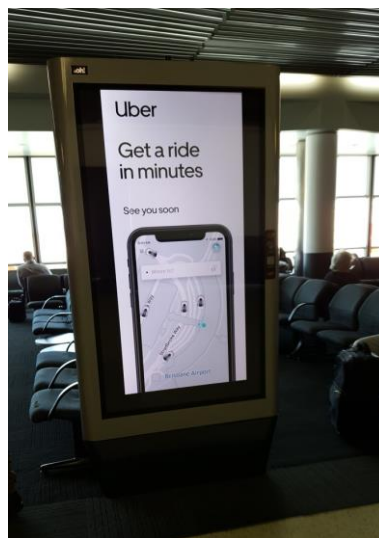
The implications for growing these brands in terms of market share are clear:

The path to growth for share economy mobility brands is through gaining more customers (increasing penetration) rather than focusing on getting increased usage amongst existing users. Focus should not be on things like loyalty programs but instead on removing barriers to usage and encouraging trial. Making it as easy for as many category buyers to use your brand in the format they want in the broad range of situations where they would consider a category purchase. This can be described as Mental and Physical Availability.

The shared mobility brands will grow through drawing most of their new customers from existing larger share transport brands, rather than from other shared mobility brands. This means the targeting of communications must be at a category level and focus on reach. For example, in Singapore, Uber advertises in the SMRT train stations which is a great example of having broad appeal and reaching potential users when they are in a transport choice context.



A similar example is also seen in at the Brisbane Airport in 2018.



In conclusion, the share economy mobility brands are used by all types of transport category customers and so they must be broad and consistent in their messaging and appeal to the main triggers for being in the category, should be well branded, consistent, and capture viewers' attention. They need to have creative that appeals to all transport users and to have simple messages that build knowledge of their services and how to access them. They should make targeted efforts to make people aware of the app and to download it as that is the first significant barrier to adoption.

## TTM - Results and Discussion

### TTM: Stage of Change

A TTM Stage of Change measure was able to segment South Australian and Queensland people who travelled into the Adelaide and Brisbane city areas respectively, providing a picture of who was and who was not using shared transport, as well as who was thinking about doing so – or not. This information was then related to other variables drawn from the present research, in order to identify barriers and motivators associated with the use of sustainable transport modes.

### Car Sharing

Stage of change for car sharing was assessed by stating “Available share cars in the (Adelaide/Brisbane) city area include the use of GoGet hourly car hire and Uber cars”, and then asking survey participants to indicate which of the following statements best described them –

1. I have never thought about travelling in or around the (Adelaide or Brisbane) city in a share or hire car (pre-contemplation stage = PC)
2. I have never actually travelled in the city around a share or hire car, but sometimes I have considered doing so (contemplation = C)
3. I am making plans and expect to soon try out a share or hire car (preparation = P)
4. I sometimes use a share or hire car for travel around the city (action = A)
5. I regularly use a share or hire car for travel around the city (maintenance = M)

Results, illustrated in Figure 1 and Figure 2, the majority of people who had visited the Adelaide city area (79%) or Brisbane city area (64%) had never thought about travelling in a share or hire car, as indicated by the number of travellers in a pre-contemplation stage of change. Only six percent of Adelaide commuters and eighteen percent of Brisbane commuters were sometimes, or regularly, using car sharing in their respective city areas (those in action or maintenance stages of change). In 2010, car sharing in Australia was reported to be used mostly by business, rather than the general public (Shaheen & Cohen, 2013), and this may still be so.

Although car sharing was almost non-existent among the surveyed commuters, results did indicate that fifteen percent of Adelaide travellers and eighteen percent of Brisbane travellers were at least somewhat receptive to using some form of car sharing sometime in the future. This is one segment of the general population that could be targeted in campaigns aimed at increasing the use of sustainable transport options, as they may only need some gentle nudging to move them into an action stage whereby they make some changes to their transport behaviour and at least trial car sharing.

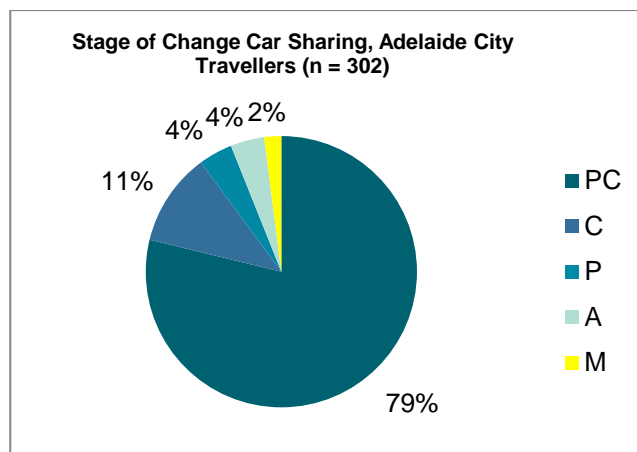


Figure 1: Stage of Change for Car Sharing: Adelaide

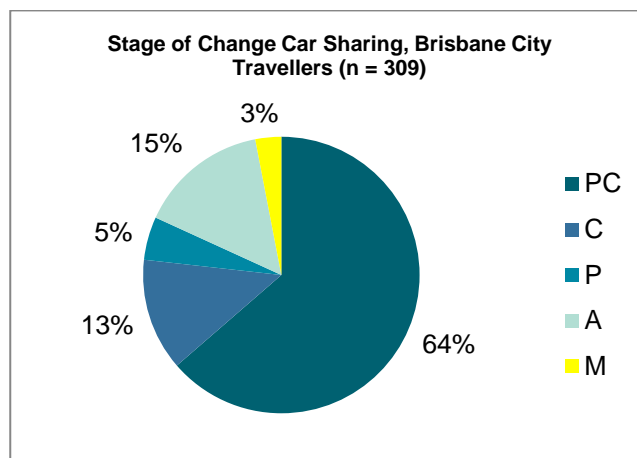


Figure 2::Stage of Change for Car Sharing: Adelaide

Younger travellers, especially those in the 18 to 30 years age group were more likely to have considered sharing or hiring a car, or were already using these types of transport sometimes, as Table 1 indicates. Younger Brisbane travellers were more likely to already be car sharing (33%) compared to younger Adelaide residents (13%). Results support targeting some messages relating alternative types of transport towards younger people, as they may be more likely to go on to develop and maintain desirable travel behaviours, as early adopters.

Results here also supported the use of the TTM stage of change measure to provide useful data for campaign developers. Research often shows those who are, and are not, car sharing at present, but the TTM also identifies a further segment of the population who are interested but not yet quite ready to move to car sharing in the future.

Table 13: Stage of change: Car share in Adelaide city area, by age

Adelaide Residents <i>n</i> = 302	Stage of Change by Age: Car share				
Age range	PC	C	P	A	M
18 – 30 ( <i>n</i> = 45)	24 (53%)	9 (20%)	5 (11%)	6 (13%)	1 (.3%)
31 – 50 ( <i>n</i> = 100)	72 (72%)	11(11%)	8 ( 8%)	4 (4%)	5 (5%)
51 – 70 ( <i>n</i> = 114)	100 (88%)	12 (10%)	Nil	2 (2%)	Nil
Over 70 ( <i>n</i> = 43)	40 (93%)	2 (5%)	Nil	1 (2%)	Nil

Table 14: Stage of change: Car share in Brisbane city area, by age

QLD Residents <i>n</i> = 309	Stage of Change by Age: Car share				
Age range	PC	C	P	A	M
18 – 30 ( <i>n</i> = 99)	44 (44%)	15(15%)	7 (7%)	26 (26%)	7 (7%)
31 – 50 ( <i>n</i> = 117)	77 (69%)	14(12%)	8 (7%)	17 (14%)	1 (1%)
51 – 70 ( <i>n</i> = 70)	54 (77%)	9 (13%)	Nil	4 (6%)	3 (4%)
Over 70 ( <i>n</i> = 23)	21 (91%)	2 ( 8%)	Nil	Nil	Nil

### Bike Sharing

A stage of change algorithm, using the same format as the car sharing algorithm, measured bike sharing behaviour. Trends were similar to car sharing, with the majority of travellers in both states not thinking about hiring a bike for city travel as illustrated in Figure 3. None of the South Australian survey population regularly used bike sharing in Adelaide, while eleven (4%) did so on an irregular basis. In Brisbane two people (1%) used a share bike regularly, and eleven (4%) had done so sometimes.

These share bike rates are not unlike general cycling rates noted in previous Australian research. A 2017 profile of visitors to the city area of Adelaide (*n*= 2005) noted that two percent of people had cycled to the city area (City of Adelaide, 2017). Only three percent of people had cycled in their Melbourne residential area on the day they were surveyed (Boulang e al., 2017), showing that normal cycling rates can be low in suburbia as well as in city areas.

Those who did cycle in their Melbourne residential neighbourhood were mostly younger employed males. In contrast, in the present research nine of the thirteen Brisbane share bike users were female. Eight of the eleven Adelaide share bike users were also female.

Younger residents (37% of those under 31 years), and Brisbane residents (39% of those under 31 years) were more likely to have given some thought to bike sharing.

Past research results and the results of the present research suggest that promoting bike sharing in cities would be promoting a completely new behaviour for the majority of

people, and one that many may not wish to embark upon. As noted in the previous section of this report, car sharing is also not favoured by the majority of travellers. Further analyses in the present research help to understand why this is so, and how at least some of these people may be encouraged to progress through the change stages and begin to use available shared transport options.

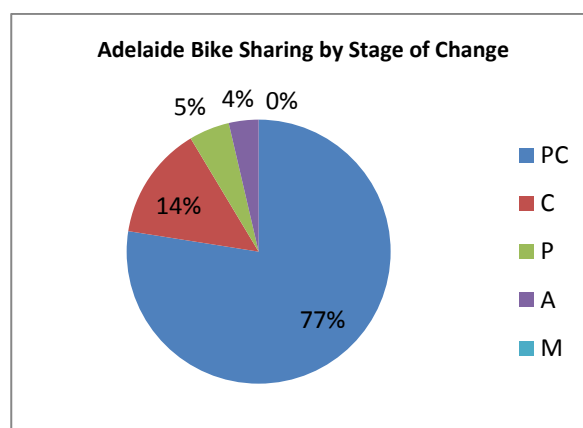


Figure 3: Bike Sharing in Adelaide



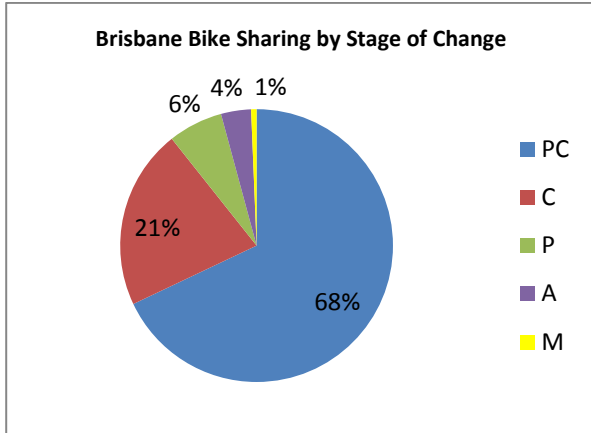


Figure 4: Bike Sharing in Brisbane

### Perceived Pros and Cons of Bike Sharing

Decisional balance – the weighing up of the benefits and barriers related to bike sharing - was measured with ten items. Five items about the benefits of bike sharing formed a Pro Scale with a reliability analysis producing a Cronbach’s alpha of .76 and five items about possible barriers to bike sharing formed a Con Scale with a Cronbach’s alpha .66, indicating satisfactory internal consistency for the two scales. Statements were measured on a sliding scale from 5 being “strongly agree” to 1 being “strongly disagree” and they were randomised for each survey participant. All items were intentionally worded in the first person (using personal pronouns of “I” or “me”) to encourage people to relate the content of the items to themselves.

Table 15 displays the amount of agreement or disagreement with the pro and con items, with little difference between those who travel in the Adelaide city area and those who travel in the Brisbane city area.

### TTM Decisional Balance

Table 15: Decisional Balance: Pros and Cons of Bike Sharing (SA n = 302 : Qld n = 309)

Decisional Balance Item – Bike Sharing		Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
There is not enough public information about how to hire a bike in the city*	SA	50 (17%)	103(34%)	122 (40%)	21 (7%)	6 (2%)
	Qld	35 (11%)	108 (35%)	113 (37%)	43 (14%)	10 (3%)
Hiring a bike for my city travel is not a safe option for me*	SA	67 (22%)	102 (34%)	81 (27%)	43 (14)	9 (3%)
	Qld	54 (17%)	109 (35%)	102 (33%)	39 (13%)	5 (2%)
I am not fit enough to consider hiring a bike for city travel*	SA	69 (23%)	78 (26%)	56 (18%)	65 (21%)	34 (11%)
	Qld	52 (17%)	75 (24%)	80 (26%)	78 (25%)	24 (8%)
It would be difficult for me to carry goods and personal property on a bike*	SA	103 (34%)	130 (43%)	52 (17%)	13 (4%)	4 (1%)
	Qld	98 (32%)	142 (46%)	52 (17%)	14 (5%)	3 (1%)
Cycling around city streets would be very stressful for me*	SA	95 (31%)	102 (34%)	69 (23%)	30 (10%)	6 (2%)
	Qld	88 (28%)	100 (32%)	75 (24%)	38 (12%)	8 (3%)
Cycling saves fuel and parking costs, and money saved can be used for enjoyment +	SA	60 (20%)	137 (45%)	83 (27%)	15 (5%)	7 (2%)
	Qld	48 (15%)	152 (49%)	90 (29%)	10 (3%)	9 (3%)
An electric bike could be a quick and easy way for me to travel in the city +	SA	34 (11%)	105 (35%)	114 (38%)	38 (13%)	11 (4%)
	Qld	30 (10%)	123 (40%)	106 (34%)	38 (12%)	12 (4%)
Hiring a bike to ride around the city can improve my physical health +	SA	50 (17%)	140(46%)	76 (25%)	21 (7%)	15 (5%)
	Qld	49 (16%)	149 (48%)	78 (25%)	24 (7%)	9 (3%)
Hiring a bike for use around the city is the most convenient transport option for me +	SA	6 (2%)	28 (9%)	90 (30%)	99 (33%)	79 (26%)
	Qld	12 (4%)	31 (10%)	92 (30%)	88 (28%)	86 (28%)
I am helping the environment if I use a hire bike for travelling around the city +	SA	50 (17%)	109 (36%)	109 (36%)	23 (8%)	11 (4%)
	Qld	43 (14%)	112 (36%)	119 (38%)	23 (7%)	12 (4%)

+ = Pro items: \* = Con items

+

Results indicate that for most people, bike hiring or sharing is not seen as a convenient way to travel in the city; they are unable to carry goods; and for many cycling in a city would be very stressful, presumably to a large extent due to safety issues which were also noted as barriers by more than half the survey population. However, the antecedents of this stress could be further explored in future research.

In keeping with the recommendations of Prochaska et al. (1994b), scores for decisional balance items were converted to *t* scores for further analysis. SPSS was used for calculating *Z* scores from the raw scores for pro items and con items, and for conversion of *Z* scores to *t*-scores (with a mean of 50, and a standard deviation of 10). The benefits of using *t* scores are that scores with a mean of 50 can become more meaningful in analysis. For example, if scores for the con items were subtracted from the pro items then scores close to zero, or even minus scores, may result. These scores would be less easy to interpret than the higher corresponding *t* scores. Conversion also allowed comparison of decisional balance scores to the scores reported in some past TTM research (e.g. Dijkstra et al., 1996; Hildebrand & Betts, 2009).

According to the TTM, as people move towards a behaviour change, the pros they perceived related to that behaviour should increase and the perceived cons should decrease (Prochaska & Norcross, 2010). A one-way analysis of variance (ANOVA) confirmed that Adelaide travellers in different stages of travel behaviour change perceived a significantly different amount of pros, or benefits, related to bike sharing when they travelled around the city area ( $F(3,298) = 10.78, p < .001$ ), with Bonferroni tests showing the those who have never considered travelling around the city by use of a free or hire share bike perceiving the least amount of benefits. This pre-contemplation group of people also perceived significantly more costs related to bike sharing ( $F(3,298) = 10.25, p < .001$ ), as indicated by the mean pro and con scores presented in Table 16. More information about the availability of bike sharing, and information that could reduce some of the stressful aspects of bike sharing could possibly help move some of these people forward to a stage where they could begin to reduce the negatives around bike sharing, and begin to consider making a change, rather than never thinking about using this form of shared transport in the city.

Table 16: Use of Decisional Balance Pros and Cons of Bike Sharing in Adelaide, by Stage of change

Stage of Change	Decisional Balance t Scores			
	Pros Sub-Scale		Cons Sub-Scale	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
Pre-Contemplation	48.29	(10.15)	52.42	(10.08)
Contemplation	54.78	(8.50)	44.46	(10.77)
Preparation	56.80	(7.70)	44.56	(9.65)
Action	58.31	(8.53)	43.50	(11.80)

Maintenance	N/A	N/A
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Similar results related to the pros and cons of bike sharing around their city area were found for Brisbane commuters.

As Table 17 illustrates, people who had never thought about using share bikes perceiving significantly less pros/benefits than those in all other stages with the exception of maintenance stage where bike sharing was a regular behaviour ( $F(4,304) = 12.66, p < .001$ ), and significantly more cons/costs than those in all other stages of change ( $F(4,304) = 12.18, p < .001$ ).

Table 17: Use of Decisional Balance Pros and Cons of Bike Sharing in Brisbane, by Stage of change

Stage of Change	Decisional Balance t Scores			
	Pros Sub-Scale		Cons Sub-Scale	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
Pre-Contemplation	47.53	(9.51)	51.66	(8.40)
Contemplation	55.63	(7.36)	45.12	(8.81)
Preparation	55.97	(8.78)	43.24	(8.89)
Action	53.04	(10.93)	42.91	(11.50)
Maintenance	49.75	(6.14)	41.05	(8.27)

Interestingly, the two people who were regularly using bike sharing in the Brisbane city area did not perceive as many benefits as people in most of the lower stages of change. However, they could certainly see less cons or barriers to bike sharing compared to people in all other stages of change. So at least for these two people, reducing the barriers surrounding bike sharing was more important than increasing the benefits.

Consistent with past transport research (Xia et al., 2017), decisional balance results in the present research show that a large percentage of people are well aware of personal health benefits, and that they can personally contribute to a better environment by bike sharing. Yet, for most this knowledge is not sufficient to affect their behaviour, as stage of change results in the present research have indicated that only a very small percentage of people are actually making use of available bike sharing options, or any form of shared transport.

Bike sharing in the city was perceived as unsafe (56% of SA residents and 52% of Qld residents), too stressful (65% of SA residents and 60% of Qld residents) and was seen as the most convenient form of city transport by very few (11% of SA residents and 14% of Qld residents). Previous Australian research has also shown the convenience of motorized travel to be a strong barrier to becoming a bike share member (Fishman et al., 2014).

Cycling safety concerns are a common barrier frequently noted in past research, e.g. by Adelaide residents (Xia et al, 2017); Norwegians car travellers (Fyhri et al. (2017) who were asked about using e-bikes. Also, bicycle safety concerns have been previously related to lower stages of change for US university students and employees (Thigpen, Driller & Handy, 2015).

Other main barriers to cycling noted in past research include poor infrastructure and weather conditions (Fyhri et al. 2017), with weather conditions also noted as a reason for disliking bike travel elsewhere in the present research.

### Perceived Pros and Cons of Car Sharing

Pros were measured with ten items - a 5-item Pro Scale (Cronbach's alpha .76), and a five item Con Scale (Cronbach's alpha .7) showing satisfactory internal consistency for the two scales. Table 18 presents responses for the ten items from people who owned or had access to a car.

The convenience of having a private car for use anytime and anywhere, was by far the most agreed upon con/barrier to car sharing. A dislike of sharing a car with other people unfamiliar to them was also noted by a majority of people.

Table 18:: Decisional Balance: Pros and Cons of Car Sharing

Decisional Balance Item – Car Sharing	Responses, SA (n = 285) and Qld (n = 295) commuters who owned or had access to a car				
	Strongly Agree	Agree	Not Sure	Disagree	Strongly Disagree
Sharing or hiring a car in the city means less private cars in the city, so less traffic congestion+ SA	24 (9%)	120 (43%)	95 (33%)	31 (11%)	15 (5%)
	Qld 24 (8%)	123 (42%)	99 (34%)	39 (13%)	10 (3%)
Car sharing means less cars on the road, so less carbon emissions and that is good for the city+ SA	36 (13%)	137 (48%)	79 (28%)	20 (7%)	13 (5%)
	Qld 48 (16%)	127 (43%)	91 (31%)	22 (7%)	7 (2%)
I enjoy driving and I would not want to stop using my own car around the city* SA	60 (21%)	103 (35%)	80 (28%)	19 (7%)	7 (2%)
	Qld 51 (17%)	104 (35%)	98 (33%)	36 (12%)	6 (2%)
When in the city, I feel safest when I drive myself in my own car* SA	69 (24%)	104 (36%)	69 (24%)	16 (6%)	11 (4%)
	Qld 82 (28%)	105 (36%)	72 (24%)	29 (10%)	7 (2%)
Sharing a car with others is cheaper than using my own car+ SA	26 (9%)	104 (37%)	108 (38%)	23 (8%)	8 (3%)
	Qld 25 (8%)	112 (38%)	118 (40%)	29 (10%)	11 (4%)
Hiring a car means that I can choose a prestige car that I could not afford to own myself+ SA	12 (4%)	74 (26%)	106 (37%)	53 (19%)	24 (8%)
	Qld 23 (8%)	81 (27%)	113 (38%)	62 (21%)	16 (5%)
I would find it difficult to share a car with strangers+* SA	66 (23%)	121 (42%)	56 (20%)	21 (7%)	5 (2%)
	Qld 74 (25%)	112 (38%)	66 (22%)	38 (13%)	5 (2%)
Using alternative forms of transport would mean I may not need to buy or maintain a car of my own+ SA	14 (5%)	83 (29%)	92 (32%)	57 (20%)	23 (8%)
	Qld 16 (5%)	82 (28%)	107 (36%)	64 (22%)	26 (9%)
I don't know how to arrange to share or hire a car in the city* SA	51 (18%)	94 (33%)	81 (28%)	28 (10%)	15 (5%)
	Qld 32 (11%)	98 (33%)	90 (30%)	51 (17%)	24 (8%)
I can rely on my own car being ready for use anywhere, anytime* SA	117 (41%)	105 (37%)	38 (13%)	6 (2%)	3 (1%)
	Qld 114 (39%)	122 (41%)	46 (16%)	8 (3%)	5 (2%)

+ = Pro: \* = Con

South Australian survey participants' perception of the pros/benefits of car sharing in the city was higher for those

intending to start using car sharing, or those already using car sharing on a regular basis, as can be seen in the Pro sub-scale score shown in Table 19 which presents mean total scores for each stage of change. However, perceptions of pros were not

significantly different statistically for those who had never thought about car sharing. In contrast, there was a significant difference between the stages of change for participants' perception of the cons of car sharing, with cons much higher for those who had never thought about car sharing around the city ( $F(4,280) = 4.28, p = .002$ ), compared to those who were receptive to change, or had already made some changes towards shared transport.

This result strongly suggests that it is the cons/ barriers to car sharing that hold the most power and hinder change – most people are aware of the benefits of changing but these benefits are not strong enough to outweigh barriers, such as the convenience and perceived safety of using a private car. Similarly, Lucan and Jones (2009) found that British travellers perceived the car as very difficult to live without. All these results highlight the challenges faced by campaigns that endeavour to reduce private car use.

Table 19: Use of Decisional Balance Pros and Cons of Car Sharing in Adelaide, by Stage of change

Stage of Change	Decisional Balance t Scores			
	Pros Sub-Scale		Cons Sub-Scale	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
Pre-Contemplation	49.18	(10.27)	52.04	(9.74)
Contemplation	51.48	(8.77)	46.38	(7.85)
Preparation	54.77	(10.93)	48.60	(5.40)
Action	51.79	(11.79)	49.84	(11.21)
Maintenance	55.45	(5.42)	41.55	(10.89)

Similar to Adelaide, perceptions of the pros/benefits of car sharing for Brisbane participants were reasonably similar, but not statistically different, for people in different stages of change. However, once again people who were not thinking about using a share car were those who perceived significantly more cons, or barriers to change ( $F(4,290) = 10.64, p = <.001$ ). Table 13 presents the mean pro and mean con scores for decisional balance relating to car sharing for the Brisbane survey participants.

Table 20: Use of Decisional Balance Pros and Cons of Car Sharing in Brisbane, by Stage of change

Stage of Change	Decisional Balance t Scores			
	Pros Sub-Scale		Cons Sub-Scale	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
Pre-Contemplation	49.18	(10.27)	52.04	(9.74)
Contemplation	51.48	(8.77)	46.38	(7.85)
Preparation	54.77	(10.93)	48.60	(5.40)
Action	51.79	(11.79)	49.84	(11.21)

Maintenance	55.45 (5.42)	41.55 (10.89)
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Responses to open questions in the survey and those used in the in-depth interviews did not reveal any additional useful pros or cons for using, or not using, a car in the city. In open questions in the survey a very small number of residents (15) provided a variety of reasons for not liking or refusing to own a car. Main reasons were a preference for more environmentally friendly mode of transport around Adelaide (3 responses), and traffic congestion around Brisbane (3 responses). One Adelaide interviewee also noted traffic congestion as a reason for not using her car in the city area.

From interviews conducted with five Adelaide city travellers ( $n = 5$ ), reasons stated for using one's own car were freedom to go anywhere compared to fixed public transport routes, and a car considered a cheap form of travel by one person (although this person was now using public transport or walking around the city, demonstrating that positive beliefs about private car use can sometimes be overridden by an alternative transport behaviour).

One young interviewee who usually used public transport for daily travel in and around the city, stated he was considering driving his car instead as he wanted to gain more experience in traffic by driving his car in the city. This person also thought driving his car in the city at night was quicker, more convenient and safer (although he also stated 'as a teen I am conscious of environmental issues. Not using a car is better for the environment'). This is another example of how environmental beliefs do not necessarily influence travel behaviour – personal needs are considered more important when selecting a travel mode.

### TTM: Processes of Change

According to the TTM, frequently using several specific psycho-social processes (five cognitive or thinking type of processes, and five action type of processes) can help people move through the stages of change and develop a new behaviour. The TTM originally posited that cognitive processes are used most frequently in the early stages of change (Prochaska et al., 1988) – as people gather information and start considering making some change to their behaviour. However, later research has shown that use of cognitive type processes can peak in an action stage of change (Marcus, Rossi & Selby, 1992), and may also be used frequently throughout all the stages (Rosen, 2000; Hirvonen et al, 2012), along with the five behavioural processes.

Cognitive processes are *consciousness-raising* (efforts to seek new information and to gain understanding about a problem behaviour); *dramatic relief* (experiencing and expressing feelings about a problem); *environmental re-evaluation* (personal assessment of how a problem affects the physical and social environments); *self re-evaluation* (assessing how one thinks and feels about oneself in relation to a problem); and *self-liberation* (making a choice, commitment to change the problem behaviour, including the belief that one can change).

The five behavioural processes, usually used more in the later stages of change, are *social liberation* (increasing the alternatives for non-problem behaviour, awareness and

acceptance of alternatives); *counter conditioning* (substituting the alternatives for the problem behaviour); *helping relationships* (utilising the support of others during attempts to change, being open and trusting with a person, friend or family); *stimulus control* (avoiding stimuli that elicit the problem behaviour, removing triggers, controlling the situation, developing new triggers); and *reinforcement management* (rewarding oneself or being rewarded by others for making changes, being aware of positives. With reinforcement, noting the natural rewards is also very

important, as these can be powerful motivators (Watson & Tharp, 2007). Natural rewards are positive consequences which occur naturally and follow on from a new behaviour – e.g. increased feelings of satisfaction, pride, more leisure time. As the name suggests natural rewards do not rely others or on any external incentives such as money, gifts etc.

Ten processes considered to be related to car use, some of which were drawn from previous research, were included in survey items. Frequency of use is displayed in Table 21.

Table 21: Use of Individual Processes: Reducing Car Use (SA n = 285 : Qld n = 295)

Processes	Never	Very occasionally	Sometimes	Often	All the time
<i>Consciousness-raising</i> . Information about using alternative transport options, rather than private cars, captures my attention SA Qld	69 (24%) 66 (22%)	79 (28%) 74 (25%)	98 (40%) 105 (37%)	30 (10%) 44 (15%)	9 (3%) 6 (2%)
<i>Dramatic relief</i> . I worry about the problems caused by the number of motor vehicles being driven on city streets SA Qld	46 (16%) 57 (19%)	75 (26%) 67 (23%)	111 (39%) 103 (35%)	32 (11%) 49 (17%)	21 (7%) 19 (6%)
<i>Environmental re-evaluation</i> . I think of the link between the reduced use of private cars and the well-being of the environment SA Qld	52 (18%) 54 (18%)	63 (22%) 70 (24%)	121 (42%) 110 (27%)	33 (11%) 50 (17%)	16 (6%) 11 (4%)
<i>Self re-evaluation</i> . I think about the personal satisfaction and pride that comes from contributing to a better environment if I reduce my car use SA Qld	58 (20%) 78 (26%)	78 (27%) 61 (21%)	104 (36%) 114 (39%)	31 (11%) 36 (12%)	14 (5%) 6 (2%)
<i>Self-liberation</i> . I tell myself that if I trialled a different form of transport, I could break the habit of always using my car SA Qld	92 (32%) 95 (32%)	70 (25%) 71 (24%)	85 (30%) 92 (31%)	30 (10%) 34 (11%)	8 (3%) 3 (1%)
<i>Social liberation</i> . I notice that changes are occurring and it is becoming easier to travel around the city without using my car SA Qld	69 (24%) 64 (22%)	73 (26%) 66(22%)	83 (29%) 114 (39%)	46 (16%) 46 (16%)	14 (5%) 5 (2%)
<i>Counter conditioning</i> . When I want to travel around the city I consider which form of transport, other than a private car, could best suit my needs SA Qld	61 (21%) 66 (22%)	66 (23%) 47 (16%)	83(29%) 110 (37%)	47 (16%) 37 (19%)	28 (10%) 15 (5%)
<i>Helping relationships</i> . I have sought help from other people or organisations to find out how to travel in the city without a car SA Qld	151 (53%) 139(47%)	68(24%) 53 (18%)	47 (16%) 78 (27%)	13 (5%) 20 (7%)	6 (2%) 5 (2%)
<i>Stimulus Control</i> . If I have to travel around the city area, I usually leave my car at home SA Qld	61(21%) 63 (21%)	67 (23%) 58 (20%)	78 (27%) 89 (30%)	45 (16%) 61 (20%)	34 (12%) 24 (8%)
<i>Reinforcement Management</i> . I have already saved money by using other forms of transport in the city, rather than using my car SA Qld	67 (23%) 75 (25%)	69 (24%) 57 (19%)	76 (27%) 86 (29%)	52 (18%) 57 (19%)	21 (7%) 20 (7%)

Consistent with the principles of the TTM, SA car users (n=285) who travelled in the Adelaide city area, and who were not thinking about using a share car (pre-contemplation stage of change), were those using significantly less psycho-social processes than those in other stages ( $F(4,280) = 4.73, p = .001$ ). The use of processes was measured on a sliding scale from 1 = never, to 5 = all the time, with mean total scores for process use displayed in Table 22.

Table 22: Frequency of Use of Psycho-Social Processes; Adelaide

Stage of Change (n = 285)	Process Score	
	M	SD
Pre-Contemplation	23.85	(8.23)
Contemplation	27.42	(7.87)
Preparation	28.80	(5.22)
Action	31.38	(7.63)
Maintenance	28.33	(4.36)

The frequency of use for psycho-social processes by Brisbane car users who travelled in the Brisbane city area was similar to those of Adelaide car users. Compared to all other stages, significantly less processes were used by those in a pre-contemplation stage, those who had never thought about travelling around the city in a share car. ( $F(4,290) = 6.76, p < .001$ ). Mean total scores for the ten processes displayed in Table 23.

Table 23: Frequency of Use of Psycho-Social Processes, By Stage of Change for Car Sharing in Adelaide

Stage of Change (n = 285)	Process Score	
	M	SD
Pre-Contemplation	23.27	(8.07)
Contemplation	27.92	(7.17)
Preparation	27.21	(6.48)
Action	28.23	(6.36)
Maintenance	28.63	(8.45)

Table 22 showed that Adelaide travellers in maintenance stage used cognitive and behavioural processes slightly less frequently than those in preparation and action stages. This result is not uncommon in the TTM research. Peaks in action stage for physical activity were noted by Marcus, et al. (1992) and Davison (2015). Once a new behaviour has been well established then people may use some or all of the processes of change less frequently. However, this may not be a good thing, as with some newly developed behaviours people can easily revert to old habits. For example, Danish car users who were provided with free public transport for one month significantly decreased their car use, but four months later car use reverted to baseline (Thøgersen & Møller, 2008).

Overall, the present results suggest that finding methods of encouraging those not thinking about reducing their car use to use more of psycho-social type processes (which are detailed at the end of this section) may assist them starting to at least think about making a change towards using more sustainable

modes of transport. For example, the cognitive process of consciousness-raising can be promoted for use in the very early stages of change. Consciousness-raising relates to people's efforts to notice or seek information that helps them gain more understanding about a problem. As noted in Table 24, in the present research SA car users not thinking about using shared transport were very much less likely to be seeking any information about alternative transport options. Presenting these 'pre-contemplators' with relevant car sharing information may help them begin to contemplate making some changes to their usual transport behaviours. The challenge is to know exactly what type of information will be relevant.

Table 24: Consciousness-Raising ('Information about using alternative transport options, rather than private cars, captures my attention')

Stage of Change	Use of Consciousness Raising 'Never' or 'Very Occasionally'
Pre-Contemplation	130 (59%)
Contemplation	12 (36%)
Preparation	2 (20%)
Action	1 (8%)
Maintenance	1 (17%)

As the maximum score for the overall frequency of use of the ten TTM processes was 50, there would appear to be room for behaviour change campaigns to encourage more use of all processes for people in all the stages of change. This may help encourage more thought about any changes being considered for those in the lower stages – as well as help others to maintain changes they have already made and keep people on track, rather than risk them slipping back to old travel habits.

### Self-efficacy, Positive Self Beliefs

An open question asking interviewees (n = 5) if they had any positive feelings about their current forms of travel produced interesting responses.

- 'I feel like I do my bit and I recommend public transport to people' (user of public transport)
- 'I am pretty proud of it' (riding a bike to work and round the city if needed)
- 'Yes – I feel good about myself. I like doing a bit towards clean air (Uber and bike share user)
- 'Yes I couldn't exactly say why but it does feel nice to take the bus. Shows my independence, and that I can use it, and I feel better not using some petrol-guzzling vehicle.' (public transport user)
- 'I feel a bit smug – using public transport or walking compared to other people in the office who take cab charge even for short trips' (train to city and walks).

These responses endorsed the TTM concepts of self-efficacy and the process of change 'self-liberation'. Responses also demonstrated the process of 'reinforcement management' as all the interviewees were receiving some *natural*

reinforcement (a very powerful type of reinforcement that helps to maintain desirable behaviour). That is, they were receiving positive consequences from a desirable behaviour that did not rely on tangible rewards – their own positive feelings and beliefs were sufficient.

## Attitudes and Beliefs

All survey participants who owned or had access to a car (n = 580) rated ten statements related to their attitudes and beliefs about car use and other transport options. Seven items were grouped into a Receptive to Alternative Sustainable Transport sub-scale (items 1,2,3,7,8,9,10 - see items in Table 25, with a Cronbach's alpha of .82 indicating good internal consistency.

Two items (items 4,6) formed a Personal Needs sub-scale with an alpha of .66. The one remaining item (item 5) represented Environmental Responsibility. Responses were measured on a sliding scale with 1 being "strongly disagree" to 5 being "strongly agree". Table 25 lists the ten items, providing separate responses from SA and Qld travel.

Table 25: Individual Attitude and Belief Items: SA and Qld Car Users

Statement	Strongly Agree	Agree	Not Sure	Disagree	Strongly Disagree
1. Financial incentives would encourage me to use, or make more use of, public transport residents SA	36 (13%)	108 (38%)	83 (29%)	40 (14%)	18 (6%)
.....Qld	49 (17%)	124 (42%)	67 (23%)	44 (15%)	11 (4%)
2. Walking and/or cycling helps me see myself as a healthy, fit person SA	45 (16%)	136 (48%)	60 (21%)	31 (11%)	13 (5%)
.....Qld	43 (15%)	138 (47%)	66 (22%)	34 (11%)	14 (5%)
3. I would like more information about the various types of transport I could use for city travel SA	19 (7%)	89 (31%)	101 (35%)	52 (18%)	24 (8%)
.....Qld	20 (7%)	107 (36%)	100 (34%)	51 (17%)	17 (6%)
4. Owning and driving a car is important to me – it is part of who I am SA	72 (25%)	118 (41%)	55 (19%)	26 (9%)	14 (5%)
.....Qld	66 (22%)	133 (43%)	62 (21%)	23 (8%)	11 (4%)
5. Reducing car use in the city or suburbs is not my responsibility SA	23 (8%)	84 (29%)	100 (35%)	60 (21%)	18 (6%)
.....Qld	14 (5%)	92 (31%)	107 (36%)	67 (23%)	15 (5%)
6. For me, driving a car is affordable and good value SA	37 (13%)	133 (47%)	73 (26%)	31 (11%)	11 (4%)
.....Qld	32 (11%)	159 (54%)	69 (23%)	29 (10%)	6 (2%)
7. I can personally help reduce the amount of carbon emissions in the city when I walk and/or cycle rather than drive my car SA	44 (15%)	136 (48%)	71 (25%)	23 (8%)	11 (4%)
.....Qld	30 (10%)	148 (50%)	77 (26%)	25 (8%)	15 (5%)
8. Increasing parking charges would discourage me from using my own car SA	52 (18%)	78 (27%)	64 (22%)	55 (19%)	36 (13%)
.....Qld	37 (12%)	103 (35%)	72 (24%)	55 (19%)	28 (9%)
9. Increasing fuel prices would discourage me from using my car SA	44 (15%)	67 (23%)	71 (25%)	70 (25%)	33 (12%)
.....Qld	26 (9%)	90 (30%)	73 (25%)	73 (25%)	33 (11%)
10. Developing more, and better, cycle lanes would help me reduce my car use and increase my bike use SA	28 (10%)	56 (20%)	76 (27%)	71 (25%)	54 (19%)
.....Qld	26 (9%)	62 (21%)	79 (27%)	88 (30%)	40 (14%)

The value of owning a private car was evident with 66% of Adelaide traveller and 65% of Brisbane travellers agreeing their car was important to them and formed part of their identity – the highest single positive response for attitudes. However, 63% of Adelaide commuters and 60% of Brisbane commuters also agreed that walking or cycling rather than driving their car would help reduce carbon emissions in the city – although at least 70% of them stated they had used their

car in the city during the past week as well as sometime in the previous month.

Similar to bike sharing, these results for car sharing illustrate that people are well aware of the environmental consequences of private car use and what they could personally do to reduce these, yet they remain very attached to their own car.



Additional evidence showed that, for many, the private car has value above money. Responses from an additional survey item asked residents to rate how likely they would be to sell their car if they could save \$5,000 annually by using other forms of transport. Responses were measured on a Likert type scale, with 0 being “not at all likely”, to 10 being “almost certainly”. Results showed that the majority of travellers were not likely to sell their car, with a mean score of 3.66 (*SD*2.87). Similarly, German research (Giesel & Nobis, 2016) found that even some users of car sharing indicated very strongly that they would not give up their car, with a private car still seen to be an absolutely necessity. However, those same users of car sharing, who placed such a high valued their private cars, stated that the strongest reason, hypothetically, for giving up their car would be that car sharing was readily available to them as an alternative - better public transport, rising costs, fewer parking spaces and better cycling infrastructure were much lower considerations for most car owners (Giesel & Nobis, 2016).

Hence, messages that have more focus on car sharing, rather than bike sharing, may find a wider audience. Over time, those who can be encouraged to begin to use car sharing may eventually consider giving up their private car. In addition, making car sharing as convenient as using a private car would be a useful strategy. For example, ensuring there are plenty of available car sharing opportunities that are conveniently located and easy to use may be more useful than harder measures such as endeavouring to increase private car costs etc. It may be that it is not so much giving up one’s private car as it is giving up *any* car - and sharing cars could in time overcome this.

While some travellers stated would like more information about the various types of travel they could use in the city, more were unsure, or stated they did not want more information. This is despite that elsewhere in the survey the majority of survey participants stated they did not know about Go Get, hire bikes etc. So, although most knew nothing, quite a lot of people were not really interested in receiving more information – 33% were unsure about wanting more, and 28% clearly did not want more information about types of transport. This means just advertising more about transport options is not the answer alone – in order to promote higher use of shared mobility options it will be necessary to advertise in a manner that can gain cut-through with those who are currently not interested. Using the present results of TTM measures can provide guidance for the type of message content that may help cut through current lack of attention. Considering commuters’ readiness – or lack of readiness – to change, taking note of the perceived pros and cons related to car use and alternative transport, and making use of some of the psycho-social processes that operate around car use as well as car and bike sharing could strengthen future messages.

Overall, results show that people can hold conflicting attitudes, and that positive environmental attitudes do not necessarily predict positive travel behaviour. Rather, personal needs appear to be the strongest driver of travel behaviours.

### Attitudes and Stage of Change

Attitudes were not strongly related to a person’s stage of change, but were in the expected direction, indicating that attitudes were slightly more positive for those in higher stage of change who were considering, or already, using some form of car sharing.

There was a very small, significant, relationship between positive attitudes and beliefs and stage of change for share cars and share bikes, similar for SA residents ( $r$  302, = .4) and Qld residents ( $r$ , 309 = .3). This suggested that people who were receptive to the idea of car sharing, were also be more likely to be receptive to bike sharing, but this relationship was weak.

### First Mile Last Mile Transport

As the present results have shown, most city travellers are using their private cars in the city, and decisions for travelling around the city areas by non-city residents are likely to be made from home, at the beginning of a trip. Interviewees in the present research demonstrated this. Those who travelled into the city by public transport then travelled around the city by a variety of means – Uber, ofo share bikes, tram, and walking. The person who cycled into the city for work also cycled around the city.

### Habitual Behaviour

Habit strength for current transport use was measured by two survey items, with wording very similar to two items used by Fyhri et al.(2017) which were adapted from the Self-Report Habit Index (Verplanken & Orbell, 2003). Fyhri found that people with strong transport habits contributed negatively to having an interest in e-bikes.

As illustrated in Table 26, the majority of people agreed that their current transport use was somewhat automatic, with little difference between the age groups. Although many people (43% to 54%) also agreed that little thought was given to any alternative modes of transport they could use in the city, there were some differences between the age groups ( $F$  (3,607 = 2.52,  $p$  = .05). Those in the 31 – 50 years age group disagreed significantly less with this statement than other age groups (Table 27 ).

Table 26: Habitual behaviour: Choice

**(At present, my choice of transport for moving around the city is more or less automatic)**

Age Groups (N = 611)	Percentage of each age group				
	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
18 – 30 years (n = 144)	24 (17%)	74 (51%)	40 (28%)	6 (4%)	Nil
31 – 50 years (n = 217)	49 (23%)	106 (49%)	48 (22%)	11 (5%)	3 (1%)
51 – 70 years (n = 184)	43 (23%)	86 (47%)	40 (22%)	15 (8%)	Nil
Over 70 years (n = 66)	10 (15%)	41 (62%)	13 (20%)	2 (3%)	Nil

Table 27: Habitual behaviour : Consideration

**(I never stop and think about the various types of transport I could use in the city)**

Age Groups (N = 611)	Response (N = 611)				
	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
18 – 30 years (n = 144)	11 (8%)	50 (35%)	41 (28%)	39 (27%)	3 (2%)
31 – 50 years (n = 217)	27 (12%)	91 (42%)	62 (29%)	33 (15%)	4 (2%)
51 – 70 years (n = 184)	28 (15%)	65 (35%)	39 (21%)	47 (25%)	5 (3%)
Over 70 years (n = 66)	6 (9%)	28 (42%)	14 (21%)	13 (20%)	5 (8%)

As expected, habitual travel behaviour was related to lower stages of change, although Pearson correlations indicated that this relationship was very small and unlikely to be a key barrier to behaviour change. For example, the relationship between a lack of considering transport alternatives and stage of change for Adelaide bike sharing ( $r, 302 = .12, p = .03$ ); stage of change for Brisbane bike sharing ( $R, 309 = .12, p = .04$ ); and stage of change for Brisbane car sharing ( $r, 309 = .17, p = .002$ ).

### Information All Residents

Lack of information stood out as one possible reason the shared transport, bikes and GoGet cars are not used, Table 28 illustrates that very few people had noticed any information, and only few stated they knew about shared transport options available to them in Adelaide or Brisbane. Fifteen GoGet cars operate within two kilometres of the Adelaide CBD, and fifty-six GoGet cars operate within two kilometres of the Brisbane CBD, yet very few knew about this type of shared transport.

Table 28: Knowledge of Shared Transport Options - SA (n = 302) and Qld Residents (n = 309)

Travel Option	'No, I have not noticed or received any information' or 'I don't think so'		'Yes, I know a little about this'		'Yes, I know all about this'	
	SA	Qld	SA	Qld	SA	Qld
City hire bikes free or paid	204 (68%)	186 (63%)	84 (28%)	90 (30%)	14 (5%)	20 (7%)
ofobikes	271 (90%)	279 (94%)	25 (8%)	13 (4%)	6 (2%)	4 (1%)
OBikes	278 (92%)	277 (94%)	20 (7%)	12 (4%)	4 (1%)	7(2%)
Uber	129 (43%)	93 (31%)	123 (41%)	120 (40%)	50 (17%)	83 (28%)
Eco Caddies	276 (91%)	275 (93%)	21 (7%)	16 (5%)	5 (2%)	5 (2%)
GoGet cars	266 (88%)	253 (88%)	31 (10%)	29 (10%)	5 (2%)	6 (2%)
Car Next Door	273 (90%)	267 (90%)	20 (7%)	23 (8%)	9 (3%)	6 (2%)

Surprisingly, few people in either state had knowledge of ofo bikes despite their recent introduction prior to this present research, and the publicity surrounding these share bikes that appeared in the media in most Australian cities (e.g. a large amount of negative publicity about bikes being damaged or dumped in rivers).

Responses to an earlier survey item 'I would like more information about the various types of transport I could use for city travel' are also interesting to note again here. Well over half of all survey participants in both states, almost all of relating to reducing car use.

### **Information and Stage of Change**

A one way between-groups analysis of variance indicated a significant difference between knowledge about GoGet cars and shared travel behaviour of Adelaide travellers, depending on their stage of change ( $F(4, 297) = 10.3, p < .001$ ). Bonferroni comparisons showed significant difference between people not considering the use of share cars in Adelaide (pre-contemplation stage) where 6% stated they had some knowledge of GoGet cars (with a  $M 3.7 SD .5$  on a scale of 1 = yes, I know all about this, to 4 = no), compared to 23% of those who had sometimes considered using shared transport (contemplation stage,  $M 3.1 SD .9$ ); 46% of those thinking about trying out a share or hire car (planning stage of change,  $M 2.9 SD .9$ ); and 38% of those who already used shared cars sometimes (action stage of change,  $M 3 SD .9$ ).

Only two of the six Adelaide travellers (12%) who regularly used shared transport (those in a maintenance stage of change,  $M 3 SD .9$ ) stated some knowledge of GoGet cars, indicating that the few regular users of shared transport were more likely to be using Uber where knowledge was much higher.

Analyses of variance also showed similar significant differences between the stages of change and the amount of information known about Brisbane's Go Get cars by Brisbane travellers ( $F(4, 304) = 8.6, p < .001$ ), with those not considering car sharing having the lowest knowledge about GoGet cars.

Knowledge about bike share, for example ofo bikes, was also significantly different between the lower and higher the stages of travel behaviour change for Adelaide travellers ( $F(4, 297) = 12.4, p < .001$ ). Similar significant differences in knowledge about ofo bikes were found for travellers in the Brisbane city area ( $F(4, 304) = 17.4, p < .001$ ).

These results strongly support the TTM stages of change, and the premise that people require a raised level of awareness (the TTM process of consciousness raising) to move to higher stages of change and ultimately carry out a behaviour change. Thus, campaigns targeted at changing travel behaviours need to ensure that ample information is available, and that it is sufficiently interesting to attract the attention of those not intending to change their usual travel modes. Both the content and the context of information can affect how that information is received and acted upon.

### **Information and Age**

Younger residents did have slightly more knowledge about share transport options than older residents, but the overall number of residents who knew nothing was large. For all those surveyed in SA and Qld ( $N = 611$ ) 81% of 18-30 years

old did not know about GoGet cars, compared to 85% of those 31-50 years old; 92% of 51-70 year olds and 98% of those over 70 years of age.

As already noted, in SA where ofo bikes had been introduced and were still operating at the time of the present survey, only a minority of travellers had knowledge about ofo bikes. Younger travellers, 18-30 years of age, had at least some knowledge (12%), as did 13% of 31 to 50 year olds and 3% of 51-70 year olds. No one over the age of 70 years had any knowledge of ofo.

Results suggest that those under 51 years of age may be slightly more receptive to information about shared mobility options.

## City Residents - Separate Analyses

Some additional analyses were conducted to ascertain if city residents had different transport behaviours around the city area, compared to people who resided elsewhere. Seventeen participants who resided in the Adelaide City Council area, and seventy-two who resided in the Brisbane City Council area, completed the survey.

### Transport Choices of City Residents

For those who resided in the Adelaide city area, fourteen (82%) owned a car, and two had access to a car. Car ownership was almost identical to residents who resided out of the Adelaide city area (85% car ownership). Car use during the week prior to the survey was also similar (71% of city residents compared to 73% of all people who visited the Adelaide city area). In the past week, none of the seventeen city residents had used dockless bikes although they were available at the time of the survey (ofo), or docked bikes (Adelaide Free bikes); GoGet cars; Motorbike/Scooter; a Chauffeured car service; or an Eco Caddy. However, Adelaide city residents did make more use of some other types of transport – Uber, taxis, public transport, and bicycles, as illustrated in Table 29.

Most of the Brisbane city residents (86%) owned a car, but their car use was less than residents or visitors who lived outside the city area, and considerably less than Adelaide city residents. Brisbane residents appeared to rely more on public transport (trains and buses) for city travel compared to Brisbane non-city residents and all South Australians. Train services in and around Brisbane are much larger and more developed than Adelaide which may help to explain these differences. The Brisbane City Council area also spreads over a larger area than the Adelaide City Council area, and several train stations are located in and around the city area.

Table 29: Travel Modes used in the past week

Travel Options	Number who used this option in the past week			
	Adelaide city residents (n=17)	All SA travellers (n=302)	Brisbane city residents (n = 73)	All Qld travellers (n = 237)
Own car	12 (71%)	219 (73%)	41 (56%)	215 (70%)
Friend/family car	2 (12%)	55 (18%)	10 (14%)	40 (13%)
Taxi	2 (12%)	10 (3%)	4 (5%)	17 (5%)
Uber	2 (12%)	20 (7%)	12 (16%)	36 (12%)
GoGet Car	Nil	Nil	Nil	Nil
O-bahn bus	1 (6%)	18 (6%)	N/A	N/A
Eco Caddy	Nil	Nil	N/A	N/A
Bus	4 (24%)	52 (17%)	26 (36%)	57 (18%)
Tram	3 (18%)+	27 (9%)+	2 (3%)*	2 (1%)*
Train	2 (12%)	30 (10%)	19 (26%)	62 (20%)
Moped/Scooter	Nil	3 (1%)	3 (4%)	6 (2%)
Bicycle	2 (12%)	11 (4%)	2 (3%)	4 (1%)
Share Bike	Nil	1 (.3%)	Nil	2 (1%)
Car Next Door	N/A	N/A	Nil	2 (1%)

+ In SA, a tram operates from the suburb of Glenelg to the city, and also around part of the Adelaide CBD

\* In Qld, there is only one tram/light rail line which travels between Brisbane and the Gold Coast

Car Next Door operates in East Brisbane, South Brisbane and twenty-six other Brisbane suburbs (Broadstock, 2017). However, only two people had used this mode of shared transport in the past week and this result tends to reflect a lack of knowledge, confirmed with only ten percent of Queensland travellers knowing anything at all about the Car Next Door option.

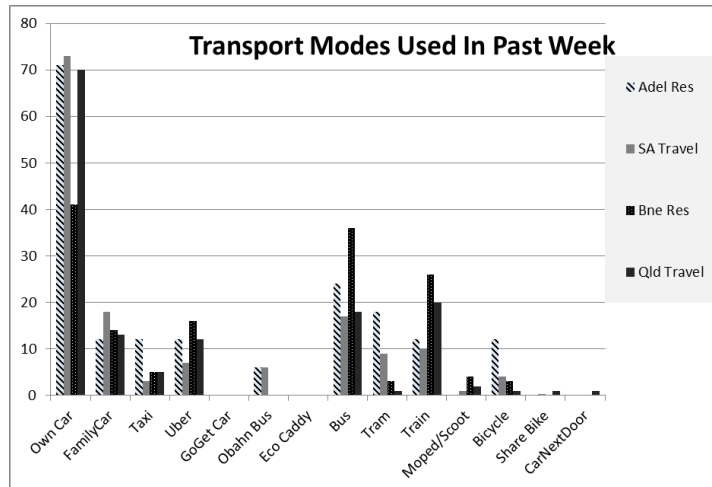


Figure 5: Transport modes last week

### Stage of Change City Residents

Table 30: Stage of change: Car share in Adelaide and Brisbane city residents

Population	Stage of Change: Bike share				
	PC	C	P	A	M
SA Residents <i>n</i> = 17	11 (64%)	3(18%)	3(18%)	Nil	Nil
QLD Residents <i>n</i> = 73	38 (52%)	9 (12%)	4 (5%)	17 (23%)	5 (7%)

Table 31: Stage of change: Bike share in Adelaide and Brisbane city residents

Population	Stage of Change: Bike share				
	PC	C	P	A	M
SA Residents <i>N</i> = 302	9 (53%)	6 (35%)	Nil	2 (12%)	Nil
QLD Residents <i>n</i> = 72*	45 (62%)	22 (30%)	4 (5%)	2(3%)	Nil

### Attitudes - City Residents

Adelaide city residents appeared a little less car-orientated than non-city residents, with some small differences between residents for some transport related attitudes. Less importance was placed on owning a car by Adelaide city residents (46%) compared to all SA residents (64%), tending to reflect that location and being near plenty of alternative transport may help reduce the need for a car. However, most city residents (88%) still owned a car, and others (11%) had access to a car. Ten percent more Adelaide city residents were also likely to believe increased parking charges and increased fuel prices could deter them from using their own car. More and better cycle lanes were also seen as helping to reduce car use by more city residents.

Other attitudes were very similar for Adelaide city and non-city residents, including the value and need for more city travel information. This similarity, and the fact that most city residents were still car owners and users suggests that everyone could benefit from similar campaigns that provided information and promoted the use of shared transport – regardless of where they reside.

## Information, City Residents

Uber was known to some extent by seventy percent of Adelaide city residents, compared to fifty-seven percent of non-city residents. While over sixty percent of city residents had no knowledge about other available shared transport as illustrated in Table 32, all did have considerably more knowledge than non-city residents in Adelaide. For example, thirty-six percent had some knowledge about ofo bikes (compared to nine percent of non-city residents) and thirty-five percent knew about Edo Caddies (compared to seven percent of non-city residents). Results suggest that people who live in the city area have more exposure to shared transport options but that the messages about these options is not being received outside the Adelaide city area.

Table 32: Knowledge of Shared Transport Options - Adelaide City Residents (n = 17)

Travel Option	I have not noticed or received any information	I know a little	I know all about
ofo bikes	11 (65%)	3 (18%)	3 (18%)
OBikes	14 (82%)	3 (18%)	0
Uber	5 (29%)	7 (41%)	5 (29%)
Eco Caddies	11 (65%)	4 (23%)	2 (12%)
GoGet cars	13 (76%)	4 (23%)	0

## Driverless cars

All survey participants (n= 611) - most of whom currently relied on their private cars for travel - were asked the likelihood of them joining other passengers and riding in a driverless vehicle around the city at some time in the future, on a scale from 0 meaning “not at all likely” to 10 meaning “almost certainly:”. Thirty percent were not at all likely to do so, with seventy-five percent rating the likelihood for them at 5 or under. Only five percent were very receptive to this form of travel, with a rating of 8 to 10. However, the five interviewees – all of whom were using transport other than a private car for travel into and around the city – were more receptive. All interviews stated ratings between seven and 10 for the likelihood that they would share a driverless vehicle for city travel, demonstrating that if people move away from using their own cars then they are more likely to be receptive to several other types of transport

Data was based on self-reports with the possibility of response bias, in that people may have provided answers that they believed were the most socially acceptable. However, the large number of negative responses related to shared transport suggests that responses were honest and typical of the general population at this time.

## Limitations

This research did not take into account the type of residence of travellers, or the effect the type of residence may have on travel modes. Would have been useful to know the type of residence for the seventy-three Brisbane city residents, especially those who did not own a car. For example, could have sought answers to questions, such as are city apartment dwellers less likely to own a car? If so, what motivated them? Had they always been carless or was this a more recent decision?

Also some travel options were not included in this research. For example, Drive My Car is a relatively new peer-to-peer car rental firm where people can rent privately owned cars, short or long term, or rent out their own car. Assessing participants’ current knowledge, and use of, Drive My Car would have added some additional information.

## Conclusions

The similarity of the present results, for the residents in two states, for all the TTM measures have provided some evidence for the reliability of the TTM model for use with sustainable travel research. The data derived from the TTM measures have identified several areas that could be targeted in campaigns to encourage the general population to give more thought about, and more use of, shared transport around major cities.

Currently information about travel options may not address the unseen internal psychological processes that operate around people's travel behaviour. The present research has provided a large amount of data relating to both external and internal processes, which can now be used to take the next steps forward.

1. Most past research has looked only at people who are users or non-users of bike sharing and car sharing. The advantage of using the TTM for investigating mobility sharing in the present research is that this change model allows has provided more depth of information by showing additional segments of the population – those who are interested in bike or car sharing although not users, as well as those who are only irregular users. Thus, the model identifies a window of opportunity to move some segments of the population forward by targeting them in campaigns that encourage more thought and more actions related to bike sharing. Although these segments of the population are relatively small in number, any change to more sustainable travel behaviours does mean some reduction in carbon emissions.

2. For the majority of people who travel into and around the city areas of Adelaide or Brisbane there is currently little interest in moving away from private cars. At this time most people who travel into their city areas have never given any thought to using share bikes or share cars (a pre-contemplation stage of change). However, providing information that can show how alternative transport can meet their needs, this segment of the population may begin to consider the use of alternative transport. At present private car travel into cities is very much favoured by most and if people drive their cars into the city then they are unlikely to consider using any other form of transport to move around the city – focusing on last mile options are not really relevant in the city area. People who start with their private car usually remain with their private car. Thus, for the majority of travellers it is the first mile that needs to be targeted to increase the likelihood of more sustainable transport use being used in cities such as Adelaide and Brisbane.

3. Although only a small number of city residents were included in the present research, a large number of those residents appeared to just as attached to their cars as non-city residents. Thus, for this large segment of the population (those identified by the TTM measures as in a pre-contemplation stage of change) appropriate campaigns would be those which focus on providing information on how alternative transport can meet personal needs. Messages which encourage leaving a car in the garage today; testimonials from people who already use shared transport, and how they perceive shared transport as meeting their needs, could also be helpful

4. There is a small segment of people who have considered using shared transport, but to date have not done so. This segment of the population may be receptive to campaigns and messages promoting the use of shared mobility options around city areas which may nudge them forward to an action stage of change. Having already given some thought to shared transport, or are planning to use shared transport at some time in the future (those in contemplation and planning stages of change) may benefit from information as well as the opportunity to use some form of alternate transport. For shared transport this could be given a free trial period of use or free membership to a mobility sharing scheme, along with some motivation to take up this type of offer. Although environmental benefits of not using a car do not seem to play an important part in reducing car use, the current research has shown that people who do use alternative transport have more positive feelings about their actions. They believe they are helping the community, sometimes environmentally and sometimes practically. So, focusing on 'doing the right thing' may be included in messages that call for new behaviours. Showing exactly how to use some form of alternative transport, making use very easy, along with 'You can do it' messages to foster more self-confidence could be considered. Encouragement to make a commitment to trial shared transport, arranging special meetings with like-minded people who may further discuss plans to trial some form of alternate transport etc. may also help. Encouraging public transport use could also be improved by providing appropriate timetables and free travel for a period of time.

5. For the small segment of the population who are already using shared transport sometimes, or on a regular basis (action and maintenance stage of change) it is important to have this segment of the population continue on with their desired behaviour. On-going information about the benefits of not using a car may help them maintain this behaviour. Messages could also include some form of acknowledgement or praise for those who already perform desirable behaviours. Occasional free travel or some type of monetary bonus for doing so may also be considered.

6. Based on decisional balance results related to bike sharing, it would seem that messages promoting health and environmental benefits related to bike sharing are not going to have much effect in helping to move people towards this form of transport. Focusing on how to help city travellers reduce their current perceptions of the barriers related to using share bikes, or indeed any type of bike, around cities is likely to be a more effective method of helping to increase sustainable travel.

7. The availability of more electric bikes may also be seen as somewhat more convenient than manual bikes, and help to reduce the barrier of a lack of fitness which was a barrier noted by some - but only if other key barriers of safety and stress could also be reduced.

8. Decisional balance results for car sharing (similar to bike sharing results) strongly suggest that it is the cons/barriers to car sharing that hold the most power and hinder change – most people are aware of the benefits of changing but these benefits are not strong enough to outweigh barriers, such as the convenience and perceived safety of using a private car. So again, it is the barriers to change that need to be addressed if positive behaviour changes are to occur for an increase in the uptake of car sharing.



9. Clearly, people are still very attached to their own private cars. Hence a move towards car sharing would need to be gradual – e.g. using a share car only for some trips and showing how doing so can meet needs better than using a private car. Encouraging private car sharing or car-pooling in local communities should come first, rather than expecting people to immediately take up a commercial car sharing membership etc. The location of available car sharing pick up and drop off points will of course be important – and again will have to need all the needs of private car owners, or doubtless they will continue to use their own cars

10. Research is also needed on a practical basis – the development of interventions that can show that personal needs can be met by using other forms of transport. This will not be an easy task. For example, with bike sharing as promoting behaviour changes in the general population will firstly mean some changes in urban planning and more bicycle infrastructure to address safety and stress issues.

## Recommendations from the TTM

For behaviour change to occur the general community first needs to be aware of what options are available. Any information that is presently available is not being accessed by most people. Therefore it will be necessary to find some new methods to develop and deliver more information about transport options to the general public. (Based on the process of change ‘consciousness-raising’ and knowledge of shared transport options).

Information needs to be in public places that are frequented by current car users, so they can at first become aware of their options. This is a necessary first step in the stage of behaviour change. The present research has shown that there is a segment of the community, albeit small at present, who are considering making changes towards shared transport. More information in public places may help more people begin to consider the alternatives available. (Based on ‘stages of change’ measures for car sharing and bike sharing).

Information promoting behaviour change will have to show how alternative transport can meet the needs of commuters, especially car users. Encouraging some use of alternative transport may be able to start reducing the need for using a car for every trip. It is unlikely that many people will give up their car completely - this would be a very long process and one that would need to be undertaken in steps (based on responses to items 3,4,7 ‘decisional balance’; process of change ‘stimulus control’; attitude items 4, 6, 8, 9)

The present research confirms that at present the car is a stimulus for transport behaviour. If a private car is visible and available then it is going to be used. New, alternative, stimuli need to be available to compete with this. (Based on ‘decisional balance’ item 10 and habitual behaviour items)

Campaigns seeking to change transport behaviours will need to place more focus on removing perceived barriers related to car and bike sharing. Most people are aware of both the personal and environmental the benefits of changing. However, these benefits are rarely strong enough to outweigh barriers, such as the convenience and perceived safety of using a private car – and the unsafety of bike use. (Based on responses to all ‘decisional balance’ and all attitude and belief items)

Adelaide city residents and other travellers into Adelaide are using their cars around the city areas in a similar manner. Fewer Brisbane city residents use their private car for city travel but at least forty percent do so. Therefore, everyone could use more information about available alternative share options within the city, regardless of their residential location. It cannot be presumed that those near available transport options will use them – or that they are even aware of all of the available options (based on transport modes used in the past week).

Having alternative, convenient transport for people to arrive in the city without using one’s own car is an area yet to be improved. While some people are using public transport and a small number consider shared transport most people still see their car as the most convenient method of travel and the one that can meet all needs. Eliminating the car out of the ‘first mile’ of a trip, may help people rely less on their cars and help them consider alternative more sustainable modes of transport. At present, once people are in their cars then many are likely

to continue on with their complete trip, as evident by the large number of private cars entering city areas.

More research is still needed to investigate car ownership, and the related behaviours and internal influences that at present are driving the use of private cars by the majority of the general public. Talking with more car owners could now help to further expand the data obtained from the present research. More knowledge means more fruitful campaigns can be developed – campaigns that can enlighten the general public to the availability of sustainable transport options and at least make a start at replacing what is at present a strong community need to own a car, and strong habitual behaviours that currently maintain the use of a car for trips for which there are already available sustainable alternatives.

The development, delivery and evaluation of a short campaign that draws on the concepts of the TTM model, and the recommendations presented in this research, could be the next step forward.

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