BARRIERS AND FACILITATORS TO PUBLIC BICYCLE SCHEME USE: A QUALITATIVE APPROACH

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Abstract

The purpose of this study was to explore barriers and facilitators to using *CityCycle, a* public bicycle share scheme in Brisbane, Australia. Focus groups were conducted with participants belonging to one of three categories. Group one consisted of infrequent and non-cyclists (no bicycle riding over the past month), group two were regular bicycle riders (ridden a bicycle at least once in the past month) and group three was composed of *CityCycle* members. A thematic analytic method was used to analyse the data. Three main themes were found: *Accessibility/spontaneity, safety* and *weather/topography*. The lengthy sign-up process was thought to stifle the spontaneity typically thought to attract people to public bike share. Mandatory helmet legislation was thought to reduce spontaneous use. Safety was a major concern for all groups and this included a perceived lack of suitable bicycle infrastructure, as well as regular riders describing a negative attitude of some car drivers. Interestingly, *CityCycle* riders unanimously perceived car driver attitudes to improve when on *CityCycle* bicycles relative to riding on personal bicycles. Conclusions: In order to increase the popularity of the *CityCycle* scheme, the results of this study suggest that a more accessible, spontaneous sign-up process is required, 24/7 opening hours, and greater incentives to sign up new members and casual users, as seeing people using *CityCycle* appears critical to further take up.

Keywords: Public, Bicycle, CityCycle, Bike Share, Transport, Focus group

Introduction

Public bicycle share schemes (PBSS) have existed for almost 50 years, although the last decade has seen a sharp increase in both their prevalence and popularity worldwide (Shaheen, Guzman, & Zhang, 2010). Shaheen et al. (2010) summarize the benefits of PBSS as flexible mobility, emission reductions, physical activity benefits, reduced congestion and fuel use, individual financial savings and support for multimodal transport connections.

In 2010, Brisbane and Melbourne introduced PBSS in their city centers and some surrounding inner suburbs. Bicycle riding for transport (on private bicycles) has increased significantly in Australia over recent years (Bauman et al., 2008), however Australia's PBSS have had disappointing usage rates (Brisbane Times, 2011; Fyfe, 2010). Melbourne and Brisbane schemes have usage rates significantly less than other cities with similar schemes (Meddin, 2011a). Both schemes have approximately 0.3 - 0.4 trips per day per bike according to information supplied by the operators to the authors (Fishman, 2011a, 2011d), although recent months have shown an uptick in usage (Alta Bike Share, 2012; Redhead, 2012). Most other schemes internationally report usage rates of around 3 – 6 trips per bike per day (Fishman, 2011a, 2011c; Meddin, 2011a, 2011b; Rojas-Rueda, de Nazelle, Tainio, & Nieuwenhuijsen, 2011). There has been widespread speculation as to cause of the lower usage rates in Australian cities, yet little empirical research.

Melbourne's PBSS has been in operation since May 2010 and the operators of the system conducted a market research exercise approximately six months after the program launched. The research was motivated in part by lower than expected usage and to assist in determining the impact of recent initiatives such as helmet vending machines (mandatory helmet legislation exists in Australia) (Alta Bike Share, 2011). The survey was completed online by self-selected internet users, and in the field by people walking in close proximity to a docking station. Just under 500 people were surveyed in each method and 31% of respondents had used the Melbourne PBSS. It is important to recognize that these survey methods limit the generalizability of the results, as the sample only includes people who have visited the Melbourne Bike Share website or walked past specific docking stations. Nevertheless, the survey revealed some interesting findings with regard to the barriers and motivators to using the scheme, as illustrated in Figure 1 and 2:
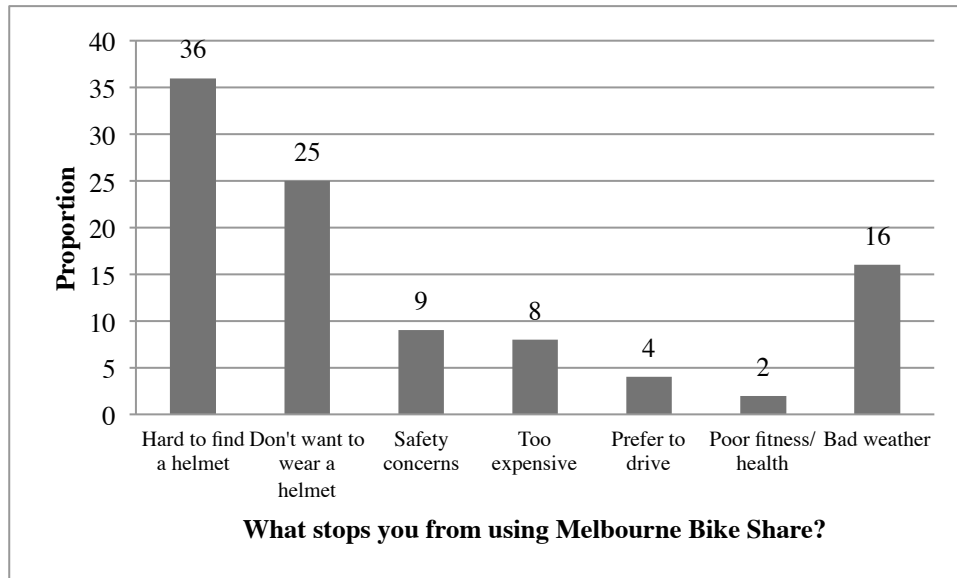
Figure 1: Barriers to using Melbourne Bike Share
Source: (Alta Bike Share, 2011)

Survey respondents were asked to nominate the major barrier preventing widespread use of Melbourne Bike Share (options restricted to those identified in Figure 1). It is noteworthy that 61% of the sample cited helmet issues as their main barrier. Melbourne experienced a particularly wet period around the time of the survey (Bureau of Meteorology, 2011) and this may have contributed to the large proportion (16%) who cited 'bad weather' as a barrier. Respondents had the option of selecting 'other', however this registered less than one percent.

Respondents who had used Melbourne Bike Share (31% of total sample) were asked to identify their main motivations for using the public bikes from a defined set of options (multiple responses allowed), with the results illustrated in Figure 2. The report did not explain why the responses summed to 100. Moreover, it could be argued that *'convenience'*, being *'close to public transport'*, and *'close to work'* could all be grouped as *convenience*, amounting to 48% of all responses.
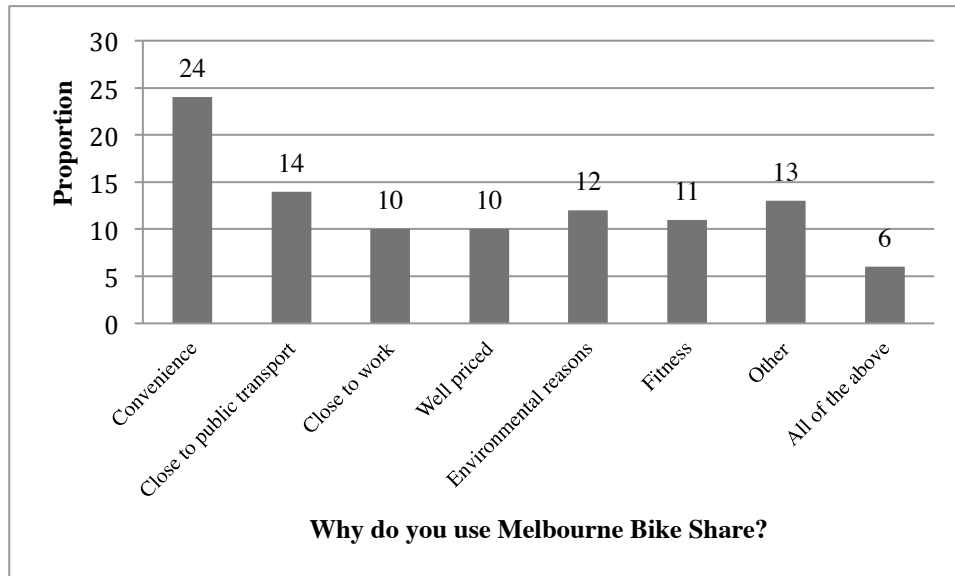
Figure 2: Motivation for using Melbourne Bike Share
Source: (Alta Bike Share, 2011)

As an emerging area within the transportation research field, literature investigating PBSS is limited (Shaheen et al., 2010; Yang, Haixiao, & Qing, 2010). There are knowledge gaps concerning who uses PBSS, what mode of transport would have been used had the scheme not existed, and whether trips were generated that would have not otherwise occurred, and many of these gaps have been recently highlighted by a United Nations publication on public bike share in urban areas (Midgley, 2011). Even in the few studies that have investigated these factors, distance traveled is often omitted, and as a consequence, it is difficult to calculate key measures of success, such as reductions in greenhouse gas emissions and congestion or increases in physical activity (Fishman, 2011b).

A number of indirect impacts of PBSS are yet to be addressed in the literature. For instance, the potential for PBSS to *legitimize* bicycle riding has not been evaluated. Research conducted for the UK Department for Transport has previously found drivers to be frustrated with cyclists, viewing them as an *out-group* (Basford, Reid, Lester, Thomson, & Tolmie, 2002). Public bicycle share schemes, as a prominent action by government to support bicycle riding, may act to increase the level of perceived legitimacy of bicycle riding.

The motivation for this paper is to begin to fill the knowledge gap concerning the opinions and attitudes of the general public (non-riders, riders and members of PBSS) regarding their perceptions of the barriers and facilitators to the use of PBSS. Thematic analysis has been selected to interpret focus group data. Of course a strong linkage is presumed to exist between PBSS demand and user perceptions, and so by delving into user perception issues it is hoped that a greater qualitative understanding of the importance of user issues can be gained. This fundamental research then sets the stage for research into the quantitative aspects of PBSS, and how to best design an evaluation framework.

Methodology

A recruitment notice was published online on the Royal Automobile Club of Queensland (RACQ) website, as well as the Bicycle Queensland website In addition, the notice was included in an E-Newsletter from both these organisations to their contacts. As the recruitment notice was placed on public websites, it is not possible to determine response rates. Finally, the recruitment notice was sent via email to members of the Institute of Health and Biomedical Innovation (n = 900), part of the Queensland University of Technology (QUT).

Respondents were placed into one of three groups:

- Group One: Non and infrequent cyclists, who have not ridden a bicycle over the past month. Two sessions of six people each.
- Group Two: Regular bicycle riders, who have ridden a bicycle at least once in past month. Two sessions of six people each.
- Group Three: Members of the Brisbane PBSS *CityCycle*. One session of six people.

The number of respondents to the recruitment notices differed according to riding behavior, which is the reason for groups one and two having more participants than group three. Each participant was aged over 18 years and lived, worked or studied in the Brisbane Statistical Division. In recognition of their time, participants were rewarded with a $50 department store gift card. The researcher moderated each focus group. The audio recording was later transcribed by the researcher, providing an effective means of beginning to familiarize the authors with the data (Riessman, 1993). In accordance with the requirements of the Queensland University of Technology Research Ethics Committee, each participant was provided with a participant information form and returned a signed consent form prior to each focus group.

Each focus group was held in October 2011 and began with a brief introduction to the aims of this research program, followed by a facilitated group discussion. The discussion used the prompts in Appendix One to guide the discussion, with each prompt introduced only after the previous topic reached saturation, i.e. no new ideas or opinions emerged (Morgan & Krueger, 1997).

Thematic analysis was used to structure our understanding of the data, following Braun & Clarke's (2006) guidelines. This form of analysis was selected for its suitability in identifying and describing the opinions gained through group discussion. This approach provides a rich description of participants' views and attitudes (Braun & Clarke, 2006), which was the principal aim of the research. Thematic analysis was chosen over Grounded Theory, as this was the first of three stages of data collection involved in this program of

research and opinion and attitude description was the primary focus, rather than the formation of theory, which is a goal of Grounded Theory (Braun & Clarke, 2006). Nevertheless, a process similar to the first two stages of Grounded Theory was employed, in terms of the identification of *codes* and *themes* (akin to *concepts* in Grounded Theory). Grounded Theory may be applied to future stages of this research program. Statistical validity is not typical of focus group studies. Rather, an intricate, rich discussion offers valuable information and this may assist future quantitative investigations (Flamm & Agrawal, 2012). Transcriptions were actively read, notes created, and emerging patterns identified, in the following phases, as guided by Braun & Clarke (2006):

1. Data familiarization: Transcribing audio recordings of focus groups, reading transcripts, developing notes and initial ideas.

2. Developing initial codes: Interesting features in the data are grouped into codes, using an inductive analysis, that is, the data was coded without attempting to place it in an established coding frame.

3. Scanning for themes: Multiple codes are grouped into overarching themes, mindful of the research purpose, which was to develop an understanding of the barriers and facilitators to the use of PBSS.

4. Reassessing themes: Initial themes are reassessed for their relevance, significance and distinctness from other themes (shortlisting themes). See Figure 3 for themes and subthemes.

Results

A number of consistent patterns emerged during the discussions with participants. Many opinions were consistent across the groups, i.e. irrespective of whether they had ridden a bicycle in the previous month and whether or not they were members of *CityCycle*. All groups considered safety a major barrier to *CityCycle*, with limited bicycle infrastructure frequently cited. The regular bicycle riders and *CityCycle* members expressed much greater concern regarding a lack of motor vehicle driver awareness and consideration. Regular bicycle riders reported numerous instances of what might be described as both *willful disregard* (seeing a bicycle rider but interacting in an unsafe manner), and the more common *looked but did not see* situation (on the part of motorists). Members of the *CityCycle* group, owing to their experience using *CityCycle*, were able to describe a wider range of motivators and barriers to *CityCycle*. Convenience was the major benefit, although interestingly, a common motivator for initially joining *CityCycle* was a desire to *"see it succeed"*. The basis of this opinion appeared to be a combination of seeing it as a symbol of an international city, as well as wishing to support an initiative aimed at boosting the role bicycles play in

Brisbane's transport system (most participants in this group were regular riders of their own private bicycles).

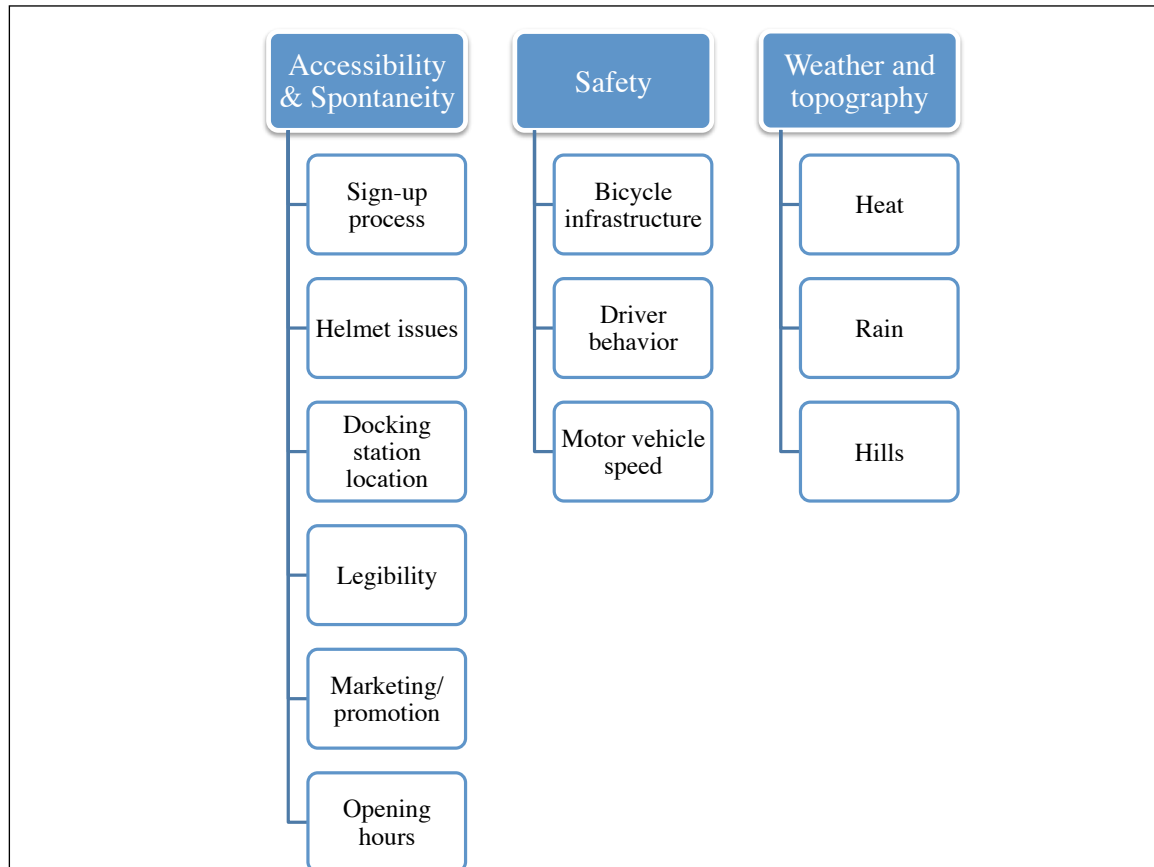Figure 3 illustrates the themes and subthemes emerging from the data:

Figure 3: Focus group themes (shaded) & subthemes

Several themes emerged when discussing barriers to using *CityCycle*. Many were consistent across all groups, whilst the *CityCycle* group members provided their unique insights from using the public bicycles. Barriers and facilitators are generally discussed together, as the later was typically introduced as a response to the former.

Sign up

The inability to use a credit card to instantaneously rent a bicycle (atypical of most post-2005 PBSS) emerged as a major barrier to using *CityCycle*. Participants repeatedly spoke of a high level of interest in the scheme as docking stations began to appear on Brisbane's streets, but the sign up process, which initially took several days, deterred most people. The impact of this, as revealed through focus group discussion with non-members was that the public viewed *CityCycle* as *"not for them"*. Once the *CityCycle* policy regarding

registration had been relaxed[1], some 10 months after the program's launch, initial interest had waned. Many participants were aware of similar PBSS in which *"swiping a credit card"* was sufficient in order to begin using the bicycles (e.g. Paris and Melbourne) and likened it to services in which such an arrangement is commonplace, such as renting DVDs from vending machines.

Upon questioning, *CityCycle* members revealed that a crucial element was *'spontaneity'* – the ability to use the bike on impulse, without the need to register details manually, either over the phone or online. According to the views of participants, it is crucial to build spontaneity into the PBSS, in order to take advantage of the public's curiosity.

As a method of breaking down barriers to the use of the *CityCycle* scheme, *all* participants felt linking it with *Go Card* (Brisbane's public transport smartcard) would provide a significant boost to usership and this specific recommendation was made across the focus groups, irrespective of their bicycling history. Comments in support of this suggestion that largely reflect the general sentiment of participants are included below:

> "*Everyone in Brisbane has a Go Card. If you've got one of them, you should be able to ride CityCycle. You've got a card, swipe, go*".
> (Male, late twenties, *CityCycle* group)

> "*You would double or triple usage rates straight away*".
> (Male, early forties, *CityCycle* group)

One member, who had recently returned from a trip to London, in which he used their PBSS commented: "*...if I had to go through the same process as I had to through CityCycle, I would never have rented the bike*" (Male, late forties, *CityCycle* group).

Helmets

Participants who had not used *CityCycle* frequently described mandatory helmet laws as a reason for not using the scheme. Focus group participants felt the requirement to use a helmet reduced the spontaneity often associated with PBSS use. In addition, there was a reluctance to share a helmet publically for hygiene reasons, specifically citing perspiration and lice. Interestingly, among the *CityCycle* members, they did not share the concerns regarding perspiration, stating that a typical *CityCycle* ride is not of sufficient duration and intensity to perspire.

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1 In August 2011, CityCycle announced changes to the sign up process including Express Card availability at designated distribution points and casual subscription sign-up via telephone, as well as a reduction in daily subscription fees from $11 to $2, in addition to courtesy helmets.

The comments regarding helmets differed somewhat depending on participants' bicycling behavior. Unsurprisingly, regular riders did not find helmets to be a deterrent, whereas non-and infrequent riders did express significant issues with having to wear a helmet, as illustrated in the following extracts:

> *"I don't like wearing helmets. I just hate wearing a helmet. It messes up my hair."*
> (Female, early thirties, non and infrequent rider group)

The quote below illustrates a view expressed by several participants across different focus groups. It attempts to balance the safety advantages of helmets with perceived inconvenience by suggesting that for routes without motorized traffic, mandatory helmet legislation may not be necessary.

> *"I think it's safer to use them [helmets] riding around town. If there was some sort of special bicycle lane that was safer and we did not need to wear helmets, I think that would be okay."*
> (Female, mid thirties, non and infrequent rider group)

Despite the relatively common position, expressed above, approximately half of bicycle injuries that result in hospitalization are from off-road incidents (i.e. without the presence of a motor vehicle) (Haworth, Schramm, King, & Steinhardt, 2010) and this underlines a common misperception that the overwhelming proportion of bicycle related injuries involve motor vehicles.

In terms of direct reference to helmets and *CityCycle*, the comments below from non- and infrequent riders reflect the general view of this group.

> *"If you did not have to wear a helmet there would be a lot bigger uptake of the CityCycle scheme."*
> (Female, early forties, non and infrequent rider group)

> *"It should definitely be a personal choice as to whether you wear a helmet. It puts so many people off."*
> (Female, late forties, non and infrequent rider group)

> *"I don't find helmets are a problem generally but I wouldn't carry mine around just in case I might want to use the CityCycle scheme. I think that would be a bit much."*
> (Male, mid twenties, non and infrequent rider group)

Short of rescinding mandatory helmet legislation, participants were unable to suggest innovative methods of reducing this barrier to *CityCycle* use.

Docking station location

Non-*CityCycle* members frequently commented that in order for them to consider *CityCycle* as an option, docking stations would need to be placed close to their residential and work address. This supports existing literature suggesting commuting/work to be a primary trip purpose among users of PBSS, both in Australia and internationally (Alta Bike Share, 2011; Nice Ride Minnesota, 2010; O'Brien, 2011).

There was general consistency for *CityCycle* docking stations to be better integrated with public transport, as well as suburban locations, beyond the inner areas bordering the CBD. Non and infrequent riders argued that the city center is already well serviced by public transport but linking suburbs with *CityCycle* would be useful. CityCycle members commented that there is a lack of docking stations within major destinations, citing Southbank – a major arts and recreational precinct, as an example.

"Its not good enough to put the docking stations on the periphery of Southbank, because all the food places are in the middle. If I am on a CityCycle, I want to go right there. I don't want to have to walk".
(Male, mid thirties, *CityCycle* group)

"There should be one at the center of Southbank".
(Female, mid thirties, CityCycle group)

Legibility, promotion, marketing and opening hours

There was a widespread perception among all focus group participants that the marketing and promotion of *CityCycle* had not succeeded. Interestingly, the most energetic criticism came from *CityCycle* members. *CityCycle's* advertising, promotion and education was an area in which members had wide ranging but consistent feedback. Members felt improvements could be made by replacing the current campaign focused on humor-based messages, with simple, straightforward, instructional information on how to use the system. The following extracts represent the sentiment of the group:

"I think a set of coherent instructions would have been useful".
(Male, late thirties, *CityCycle* group)

"There are all these advertising billboards with these geeky, stupid ads on them and not one of them really appeals to the person walking by to say 'You can now get a bike for a day. You don't have to subscribe for a year.' Their advertising is awful".
(Female, early fifties, *CityCycle* group)

"It's the whole thing, the idea is fantastic but the implementation of it and the rollout has been deplorable".
(Male, twenties, *CityCycle* group)

 CityCycle members felt the docking stations would be a useful opportunity to provide basic instructions on how to use the system, given that they are predominantly in prominent areas of the city.

 The *CityCycle* website was criticized for lacking user friendliness. Specifically, members said it was often difficult to find information and online subscription renewals had been difficult to complete. Similarly, the smartphone Application (App) was criticized for its lag time (in terms of how often it is updated with real-time information). A number of participants discussed instances where the App gave them incorrect information regarding the location of docking stations or the number of bicycles in a docking station. The extract below is illustrative of the group's experiences:

"I've used the App and it's told me a docking station was there and it was working and there were four bikes and actually, the thing had not been commissioned yet".
(Female, mid thirties, *CityCycle* group)

"If you have gone there when the App said there was a bike and there is no bike, it's a real pain. It destroys the whole convenience factor".
(Male, late thirties, *CityCycle* group)

 In a somewhat separate issue, *CityCycle* members all agreed the design of the information kiosk at each docking station made it very difficult to use in low light

conditions[2]. Additionally, the 5am - 10pm opening time was heavily criticized for reducing the convenience of the *CityCycle* system. Many members commented on other PBSS that were open 24/7. Specific instances were cited in which they had to leave an engagement early in order to get to a docking station before 10pm. The following comment reflects the group's view on opening times:

"*Its absolutely insane. You cannot borrow a bike until 5am and you cannot borrow a bike after 10pm. You can take a bike out at 9:59pm and ride it all night if you want but you cannot take out a bike after 10pm*".
(Female, mid thirties, *CityCycle* group)

"*The silly thing is that they [CityCycle bikes] are all waiting in their racks for the drunks to destroy them*".
(Male, late forties, *CityCycle* group)

Participants who were not members of *CityCycle* had less specific criticism of *CityCycle's* marketing and promotion. They felt, as did *CityCycle* members, that the best promotion of *CityCycle* was to "*see other people using it.*" In fact there was a remarkable level of consistency among participants in all groups on this point. A number of non-*CityCycle* members reported that people have become accustomed to seeing the bicycles parked rather than ridden and this reduces people's propensity to consider signing up to *CityCycle*: "*Nobody uses them, so you don't want to be the first one.*" The extracts below reinforce this view:

It took us ages to actually find someone using a CityCycle – it took me and my wife six months to find someone using CityCycle".
(Male, late thirties, regular rider group)

"*It was a bit like 'Where's Wally?'*"*.*[3]
(Male, mid forties, regular rider group)

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2 In particular, the only lighting came from the display itself. The keypad, which sits under the screen was not lit up and this made it very difficult to see the key pad.

3 Where's Wally is a children's picture game in which they look for 'wally' among a crowded scene. Published as 'Where's Waldo' in North America.

Many participants, across all groups, suggested that in the early phase of the scheme, it would be worth "*paying people*", or at least providing heavy incentives to use the scheme. The rationale was that by observing other people using the *CityCycle* bicycles, members of the public would begin to see it as an option for themselves. Specific initiatives were offered in a number of groups, such as increasing the free period to one hour, at least until ridership increases, *"bring-a-friend days"* (with an associated discount), and competitions for individuals and businesses for greatest distance travelled. One suggested initiative, which received widespread approval, was: "*Letting people put another bike on your card – it would be a really great way of getting more people in*". Another person in the same group added: "*The users would then become the advocates and the sales people*". The idea of "*bringing a mate*" was very popular. The following quotes build on the above concept:

"*If people start seeing people using it – you see someone going down the street, they might think, 'hmm, maybe I'll give that a try'*".
(Female, early fifties, CityCycle group)

"*The advertising is seeing people use it*".
(Male, early thirties, CityCycle group)

"*That's right, you need to get people to see people using the bikes*".
(Female, early fifties, CityCycle group)

"*All we do at the moment is just look at them and they are like these little white elephants that you drive past all the time. You really have to get people to actually use it. That is what is missing in the whole promotion*".
(Male, mid forties, regular rider group)

In part, the marketing needs to remove a perception (at least amongst *CityCycle* members) that the scheme is a "*closed club*". All participants in the *CityCycle* group agreed that when their friends find out they are *CityCycle* members, they are greeted with a very consistent response, represented by the quotes below:

"*You must be the only one!!*".
(Male, early forties, CityCycle group)

"Yep – you're the only one. You're the one".
(Male, late forties, *CityCycle* group)

All members of the *CityCycle* focus group agreed that this response was very common.

Safety

Safety concerns emerged as a consistent pattern across all groups. These concerns related to bicycling generally, rather than specifically related to PBSS. Safety concerns broadly fell into two categories: 1) a lack of bicycle infrastructure and 2) driver behavior.

Lack of bicycle infrastructure

The view that Brisbane's streets do not support bicycling was a consistent theme across and within the various focus groups, regardless of bicycling experience. Non and infrequent riders spoke of road safety issues as a barrier to *CityCycle* use. A number of participants mentioned they considered bicyclists to be exposed to the dangers of the road:

"You know, if you're driving a car and you get in an accident, your car will protect you. But the thing is when it comes to a bike, actually there is nothing protecting you. You are more exposed to getting an injury"
(Female, late twenties, non and infrequent rider group).

A recreational bicycle rider made the following comment which underpins the views of many focus group participants who don't ride, or do so infrequently*:*

"I would never, in peak hour, ride on one of those roads. There is just no way I would do it. I watch the bike riders in the morning doing that, and I think, hats off to you for wanting to ride to work. Its good for your health, its good for the environment, but the infrastructure is just not really here at the moment for us to freely make those choices".
(Male, mid forties, regular rider group)

The above comment illustrates a key barrier/disadvantage about cycling in Brisbane. This individual, a keen recreational cyclist who clearly enjoyed the act of cycling felt the choice to cycle was not open to him due to the road traffic environment. The same person continued by saying:

"I think there are many people who would want to ride their bike to work each day had it not been for the perceived risks. You have this little yellow line or whatever they paint on the road, but on one side of that you have six inches to work with – with pot holes, the broken glass from the stubbies[4] that have been thrown out the window – its just really risky."
(Male, mid forties, regular rider group)

Regular bicycle riders, whether *CityCycle* members or not noted bicycle lanes that failed to provide a continuous route to their destination and frequent instances where they were forced to take a significantly longer route in order to avoid *"problem spots"*. A number of participants commented that bicycle infrastructure is not designed with the same thought as general motorized transport infrastructure. For instance, one participant commented,

"There has been a tendency to put in a bike lane as an afterthought. It has not been designed by people who are cyclists…it is like the guys that are building the infrastructure just do not have a clue about cycling."
(Male, late thirties, regular rider group)

One participant commented, and this was emblematic of the group as a whole *"There are lots of places where they (bike lanes) are non-existent or inconsistent"*. Interestingly, it was revealed that this group of regular riders considered that for those who did not ride frequently, the road traffic environment might be an issue, as illustrated in the following extract: *"For novice riders, the traffic environment is a real turn off"*.

CityCycle members voiced significant concerns regarding the level of bicycle infrastructure within the *CityCycle* catchment. All but one participant felt that insufficient safe bicycle routes are the most significant disadvantage for bicycling in Brisbane, including *CityCycle* use. The one participant who disagreed was also the only person who did not ride for transport. This participant rode exclusively on Brisbane's shared paths along the river, which offer greater separation from motor vehicles than typically experienced on Brisbane's road network. The following extracts help to illustrate the views of *CityCycle* members towards the bicycling environment:

"Its that damn dangerous, you are taking your life in your hands everyday".
(Female, mid thirties, *CityCycle* group)

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4 A glass bottle typical in Australia for holding beer.

> *"...there are so many gaps in the bike network"*.
> (Male, early thirties, *CityCycle* group)

> *"There are so many streets in the CBD that are bike no go zones"*.
> (Male, early fifties, *CityCycle* group)

> *"The lack of bicycle infrastructure is a huge negative impact on cycling"*.
> (Female, mid thirties, *CityCycle* group)

Another criticism, which echoes many of the comments made by participants in other groups, was that Bicycle Awareness Zones were insufficient in terms of providing a reasonable level of safety for bicyclists. The following extracts illustrate this point:

> *"People have to realize that painting a bicycle on a road does not make it a cycle lane"*.
> (Female, mid thirties, *CityCycle* group)

> *"To me the bicycle symbols in Brisbane are just a token. They don't improve safety"*
> (Female, late thirties, non and infrequent rider group)

The quotes above may help explain the slow take up of *CityCycle*, as the success of a PBSS may depend not just on the availability of public bicycles, but also on the network in which these bikes are intended to operate. Recent work examining cycling trends in Sydney and Melbourne have pointed towards the importance of bicycle infrastructure, as illustrated by Pucher, Greaves & Garrard (2010) *"Probably the most visible commitment of a city to cycling is a comprehensive system of separated bicycle paths and lanes, providing a reserved right of way to cyclists and sending a clear signal that bicycles belong"* (p. 339).

Driver behavior and motor vehicle speed

As previously mentioned, driver behavior and awareness towards bicycle riders emerged as a major concern for riders and this supports similar findings in Sydney (City of Sydney, 2007) and Melbourne (Garrard, Crawford, & Hakman, 2006). Non-and infrequent riders held a wide spectrum of opinion on road user behavior, ranging from questioning their right to *"use the road"*, through to views that supported increased allocation of road space for bicyclists. Regular bicycle riders uniformly felt driver behavior was a significant disincentive

to bicycling generally, including *CityCycle* use. The level of awareness and respect shown by drivers towards cyclists was significantly lower than participants desired. The following extracts illustrate the views expressed regarding motorists/cyclists interaction:

"Separate to the issue of infrastructure is the attitude of cars. At least twice a week – just the fact that I am on the road, I will come across a driver who is just rude. Willfully coming too close or cutting me off. Or abusing me".
(Male, late forties, *CityCycle* group)

"On my way here, a driver pulled out, he saw me, but still proceeded to turn in front of me".
(Male, early fifties, *CityCycle* group)

Rather than isolated incidents, the above extracts reflect the experience of most regular bicycle riders involved in the study. During the focus groups, the facilitator often had to encourage participants to wrap up their discussion on the issue of negative driver behavior, which typically extended beyond its allotted time period. Neither the focus group discussion nor the subsequent analysis attempted to examine whether the level of bicycle infrastructure had an influence on driver behavior, as this was outside the scope of our study.

Interestingly, *CityCycle* members who also rode their private bicycles noted that while on *CityCycle* bicycles, a distinct improvement in driver behavior was noticeable: *"It's the CityCycle bikes specifically that get the attention, not the normal bikes"*. It is difficult to determine the precise reason for this apparent positive change in motorists' behavior without interviewing these motorists. The notion that drivers behave differently depending on the appearance of the bicyclist has been made by UK research Ian Walker, who found, amongst other things, that when he dressed to appear as a female cyclists (donning a wig), drivers passed at a greater distance (Walker, 2007). The focus group participants in the current study surmised that these motorists perceived *CityCycle* riders to be less experienced and/or tourists, requiring greater leeway and caution. It emerged during the discussion that the change in driver behavior might also be related to the relative rarity of seeing someone on a *CityCycle* bike. The greater levels of awareness from drivers toward people on *CityCycle* comes in stark contrast to comments made by other, non-*CityCycle* participants who consistently *"felt they were invisible"* to motor vehicle traffic. The following extracts demonstrate this phenomenon:

"On CityCycle bikes, I think cars give you a lot wider berth. They slow down a lot and give you a lot more time. Maybe it's the style of bike. Maybe it's a guy in a suit wearing a helmet, I don't know".

(Male, late forties, *CityCycle* group)

Other members of the group echo this comment:

"I've got the same situation. I ride CityCycle bikes and regular bicycles. There is a huge difference between riding on the CityCycle and riding on my private bike. People don't look or care if you are on a private bike".
(Male, late thirties, *CityCycle* group)

Upon further questioning of the group, participants revealed that they assumed motorists perceived them to be *"less competent"* on a *CityCycle* bike. The participants view was that motorists provide more room and are generally more considerate when they perceive a bicycle rider to be less experienced. Lycra cyclists on the other hand, and this was expressed very clearly by both non and infrequent cyclist focus groups, were perceived by motorists as *"expert cyclists"* that could handle fast traffic and close overtaking distances.

One of the *CityCycle* members described their perception of what motorists might be thinking when they see a bicycle rider in Lycra:

"If you are bent over on a road bike, 'you are one of those cyclists. You are on my road, get off'".
(Male, late forties, *CityCycle* group)

Interestingly, one member of the *CityCycle* group also owns a recumbent tricycle and commented that he has noticed a consistent change in the treatment received by drivers when he rides the recumbent trike compared to a conventional bicycle: *"I find that sometimes I ride the recumbent if I want a break from cars. I find that when I ride the recumbent, cars give me a lot more room"*. This observation is consistent with the group's perception that riding something 'unusual' produces a more generous response from motorists.

Friction between pedestrians and cyclists also emerged as an issue, across all focus groups. Participants who were non and infrequent bicycle riders expressed frustration at bicyclists for using shared paths and footpaths in an inconsiderate manner, whilst regular bicycle riders expressed similar feelings for pedestrians. In a revealing passage, one participant, while discussing her views on the interaction of bicyclists and pedestrians said: *"I really love the idea of having separate areas for bikes and for people"*. This focus group member was an infrequent bicyclist, only riding occasionally on the weekends and did not own a private bicycle. By referring to segregated areas for *"bikes and for people"* illustrates that at some level she views people riding bicycles *as* the vehicle, rather than the person. This may illuminate a societal attitude that dehumanizes people riding bicycles. Lammers &

Diederik (2011) have shown that people in a position of power can dehumanize members of an 'out group'. This, combined with Basford et al. (2002) finding that motorists treat cyclists as an 'out group', one can see how the consistent perception that motorists have a negative attitude to cyclists is created. Walker (2005), in an examination of how different modes of transport are viewed by other road users, found people often refer to the vehicle when describing motorized transport, whilst pedestrians and bicyclists are usually identified as the person. Finally, there was a general perception among bicycle riders that motor vehicle speeds were often excessive and with drivers frequently disobeying the 40km/h limits that are widespread in Brisbane.

Discussion and conclusion

The need for spontaneity emerged as a critical issue governing *CityCycle* use. Focus group participants were clear and consistent in their desire to be able to join on-the-spot, instantaneously, 24/7. The system's closure between 10pm and 5am was widely criticized among focus group participants for reducing accessibility and minimizing a key benefit of PBSS – providing a mobility option when the public transport system is inconvenient or not in operation. Participants uniformly considered the integration of *Go Card* (Brisbane's public transit smartcard) and *CityCycle* was a pivotal issue that would provide a dramatic increase in membership and usability. This is supported by smartcard literature showing a benefit to passengers from integrated ticketing (Pelletier, Trepanier, & Morency, 2011).

Mandatory helmet regulation also acted to reduce the reported spontaneity with which participants could use the PBSS, and these views correspond well with research on the Melbourne PBSS, which revealed 36% of people citing difficulty finding a helmet and 25% not wanting to wear a helmet as the key barriers to using the scheme (Alta Bike Share, 2011). Given that the sample in the Melbourne study consisted of people who had some interaction with the PBSS, including 31% who were members, it is plausible that the actual proportion of the general public for which helmets act as a barrier could be higher. On the 22nd August 2011, Brisbane City Council distributed 400 helmets across the fleet, resulting in approximately one helmet for every three *CityCycle* bikes. These helmets were placed on handlebars, in bike baskets, or secured on the locking mechanism that held the bike to the docking station. In the first two weeks of December, a further 500 helmets were distributed (Redhead, 2011). As shown in Figure 4, short-term usage increased dramatically after August 2011, once helmet distribution came into effect—validating the views regarding helmets expressed in the focus groups.
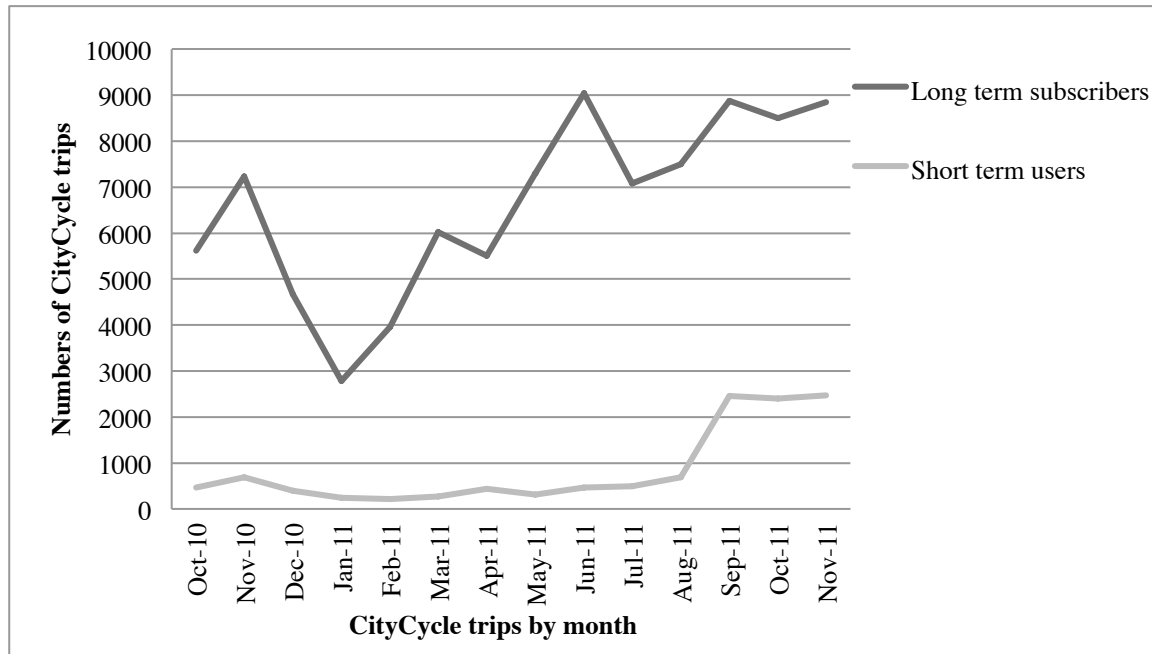
Figure 4: CityCycle trips per month
Source: (Fishman, 2011d)

Supporting the spike in usage coinciding with the first helmet distribution, several *CityCycle* members commented that they had begun using the helmets but had noticed the bikes with helmets were usually the *"first to go"*. Consequently it has become increasingly difficult to rely on finding a bicycle with a helmet. Whilst no silver bullet exists in overcoming the challenges of operating PBSS within a mandatory helmet context, increasing immediate access to helmets appears to be an effective means of boosting ridership.

A lack of contiguous bicycle infrastructure and awareness from motor vehicle drivers were expressed as barriers to bicycling generally, including *CityCycle*. This finding supports similar focus group research with bicycle riders and 'potential' riders in inner Sydney: *"Traffic and safety were once again the main reasons they didn't cycle more frequently"* (City of Sydney, 2007, p. 21). The same study found a lack of driver awareness to be an issue: *"Most felt the majority of car drivers and buses were fairly oblivious to cyclists and therefore posed a danger"* (City of Sydney, 2007, p. 16). These concerns, which largely relate to perceptions of safety, are well established in the literature (Bauman et al., 2008; City of Sydney, 2007; Cycling Promotion Fund, 2011; Garrard et al., 2006). Fear of cycling is not restricted to Australia. In the UK, some 47% of adults strongly agree with the statement 'the idea of cycling on busy roads frightens me', with a further 27% agreeing (Horton, Rosen, & Cox, 2007). Similar results are found in the US (Gardner, 2002). The implication is that more needs to be done to create bicycle routes that increase perceived safety levels for people riding bicycles.

Interestingly, all *CityCycle* members involved in this study felt greater levels of consideration from motor vehicle drivers when riding *CityCycle* bikes, in contrast to their experience on private bicycles. Several possibilities exist to explain this perception. Firstly, motorists may assume *CityCycle* riders are tourists or otherwise unfamiliar with riding a bicycle in Brisbane. Secondly, although it is becoming more common to see people riding *CityCycle* bikes, there is still a sense of novelty and this may help them 'stand out' in the road traffic environment. Thirdly, the upright geometry and bright yellow appearance of *CityCycle* may increase their prominence. Walker (2007) has established that motorists alter their driving behavior depending on the appearance of the rider. Finally, it is possible, as a government sponsored vehicle, motorists assign a greater level of legitimacy to a *CityCycle* rider. Basford et al. (2002) found that UK drivers justified their comparative lack of courtesy to bicycle riders by not viewing them as 'proper' road users. Key reasons drivers said they were frustrated by cyclists included being unpredictable, inherently or deliberately 'different' and for compromising drivers' own convenience. Further research is needed to better understand the mechanisms underlying the apparent change in drivers' behavior towards *CityCycle* riders. Instrumentation measuring passing distances for a variety of bicycles, including PBSS bikes may assist in determining the validity of *CityCycle* members' claim of greater consideration from motorists. Moreover, online and intercept surveys in future data collect phases of this project will seek insight into drivers attitudes to PBSS use.

The promotion and marketing of *CityCycle* was criticized by each group of participants, however the strongest remarks came from *CityCycle* members themselves. This group found the website to be difficult to navigate, the smartphone App to be unreliable, and the advertising campaign to be off target. In particular, the humor-based approach used in the current marketing material was considered to be unhelpful in the goal of increasing ridership. These members were acutely aware of *CityCycle's* failure to achieve widespread adoption among the general public, and felt a simpler approach focused on basic information would better communicate the ease and convenience with which *CityCycle* enhances mobility options. These comments support the views of non members, who were not entirely sure of how to use *CityCycle*. These views imply marketing efforts focused on the mobility benefits and ease of use afforded by *CityCycle* may be effective in growing membership. A particularly strong message during all focus groups was the importance of *seeing* people on *CityCycle* as a powerful promotional tool. Non *CityCycle* participants clearly expressed, at multiple stages of the discussion, that they wanted to see other people using *CityCycle* before they would consider it for themselves. This is consistent with Bandura's Social Learning Theory, which states that observing someone else performing a behavior is an important element in that person performing the behavior themselves (Bandura, 1977). Bicycling in Brisbane is already a somewhat unusual transport option, accounting for only 1.6% of all transport journeys (Brisbane City Council, 2011), and *CityCycle* is a minority within this

1.6%, resulting in the perception that very few people have adopted *CityCycle* as a regular option. Social Learning Theory can perhaps help us understand why the uptake of the system has not been better, as it reinforces the widespread view of non *CityCycle* members that more should have been done in the early stages to maximize the number of people using *CityCycle*. This, they argued, is crucial to seeing *CityCycle* as an option for themselves. All groups strongly expressed the need to incentivize *CityCycle* use such as heavily reduced membership price and/or two for one deals in the initial stages. This would, in their view, assist in avoiding the perception that *CityCycle* bikes largely sit unused, in their docks. The perception of participants that the system is underused may contribute in reducing the legitimacy of the *CityCycle* system and even investment in bicycle infrastructure more generally.

The location of the docking stations, it was suggested, should be expanded, to include a wider coverage of Brisbane suburbs and improved integration with the public transport system. A wider catchment would broaden *CityCycle's* appeal, but would need to be balanced with the additional operational demands inherent in a larger system, which includes maintaining docking station density and redistribution of bikes across the network.

Summary of recommendations & further research

In order to increase levels of *CityCycle* participation, the following recommendations are made, based on the analysis of these focus groups:

- Introduce on the spot, automated sign up
- Open the system 24 hours a day, seven days per week
- Integrate membership with the smart card public transport system, Go Card
- Continue policies to increase immediate access to helmets
- Strategic marketing should focus on reducing barriers to sign up and incentivizing new membership and casual use
- Communication with current and potential users should focus on simple messages based around the mobility benefits afforded by public bikes.
- Increase the catchment area of the system by providing docking stations beyond the downtown area and inner suburbs, and improve links with public transport nodes.

The above recommendations relate directly to Brisbane's *CityCycle* program and caution should be exercised when assessing their relevance with other PBSS. Cities seeking to introduce a PBSS may find the above recommendations helpful in providing initial guidance however.

Further research is required to investigate driver attitudes to PBSS, to improve understanding of the apparent change in driver behavior to public bikes, and to determine whether such a phenomenon is restricted to Brisbane, or found further afield. To begin with, the claim made by *CityCycle* members regarding increased awareness from motorists when on *CityCycle* must be validated. This may be accomplished using instrumented bicycles to measure passing distances of motor vehicles, using both public and private bicycles. In addition, a series of online surveys using probabilistic sampling methods will seek to quantify the barriers and facilitators to PBSS use. The same three categories (non and infrequent riders, regular riders and PBSS members) will be used and the results employed in the development of a demand forecasting tool for PBSS.

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Appendix one: focus group prompts

1. What do you see as the advantages of bicycle riding for transport?
2. What do you see as the disadvantages of bicycle riding for transport?
3. How would/do your family and close friends feel about you riding a bicycle for transport?
4. What factors prevent you from using a bicycle more as a form of transport, including the CityCycle scheme specifically?
5. What factors would encourage to you to use the bicycle as a form of transport, including the CityCycle scheme specifically?