

**Assessment of the type of
cycling infrastructure required
to attract new cyclists**

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Abbreviations and acronyms

CDHB	Canterbury District Health Board
CPH	Community and Public Health
ECan	Environment Canterbury
LTNZ	Land Transport NZ (now the New Zealand Transport Agency)
PMH	Princess Margaret Hospital
UC	University of Canterbury

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Executive summary

This research, which was conducted from July 2008 to January 2010, investigated what type of cycling infrastructure (ie physical street facilities) would encourage 'new cyclists' to use cycling as their mode of transport for daily activities in New Zealand.

The term 'new cyclists' refers to people who either do not currently cycle at all, or people who do not currently cycle for utilitarian (also known as 'utility') trips, but may engage in, say, recreational riding.

The research objectives were to:

- carry out a comprehensive international literature review on the barriers and motivations associated with cycling, as well as the design of cycling infrastructure and its impact on the use of cycles
- identify the biggest barrier for new cyclists when considering cycling as a transport mode
- assess the demand for different types of cycle route provision, such as quiet streets, cycle lanes and off-road pathways
- identify the impact of cycling infrastructure on the likely uptake of utility cycling by current non-utility cyclists
- provide recommendations for local and central government on the type of cycle route design required to encourage a growth in cyclist numbers.

An international literature review was undertaken to identify the characteristics of people who currently cycle, their motivations and barriers regarding utilitarian cycling, and the types of cycling facilities available. Surveys were then carried out to gain a broad understanding of some of the barriers to utilitarian cycling, and 'potential cyclists' were recruited into focus groups to undertake further research. In the focus groups, all motivations and barriers were discussed to gain an understanding of the key issues for potential cyclists, and to identify the most significant issues. The focus groups also evaluated a range of cycling facilities.

Overall, the survey questionnaires and focus groups showed that safety was the most significant issue for potential cyclists, particularly in relation to vehicle driver behaviour and traffic volume. However, other issues were also significant, including:

- having facilities at the destination for showering and changing
- enjoyment (which is linked to safety)
- the perception that car drivers are not courteous (also linked to perceived safety).

The solutions that were most likely to effect a significant change in cyclist numbers related to the nature and consistency of infrastructure, and education for motor vehicle drivers and cyclists on how to best and safely use it. The preferred cycling facility was a comprehensive, consistent network of cycle-only paths with separation from motor vehicles, and with dedicated intersection facilities such as hook turns and cycle signals. However, all of the cycling facility options that were presented rated much higher than the 'no provision' options.

Based on our findings, the following recommendations are suggested for New Zealand:

- Investment in cycling facilities of all kinds should be encouraged throughout the country, with the choice of facility subject, where necessary, to practical considerations and best-practice guidance.
- The uptake of cycling infrastructure that allows cyclists further separation from traffic (including behind parking and kerblines) should be encouraged, whilst providing adequate safe-design details at intersections and driveways.
- A wide variety of cycling infrastructure types should be trialled throughout the country (particularly those that were well supported by the participants in this study) and their actual safety records should be monitored, as well as road-user understanding and acceptance of them.
- Consistent infrastructure for cyclists at junctions, such as hook-turn facilities and dedicated cycle signals, should be implemented.
- On-site signage and markings should be improved, along with education for all road users on how to interact with and use various cycling facilities.
- More low-speed (30/40km/h) zones and cycle-friendly traffic management should be implemented throughout the country, so that people become more familiar with the concepts.
- The continuity and understanding of existing cycling facilities, both in terms of physical road/path features and signage/markings guidance, should be improved.
- Further investigation of the effect of access to company vehicles on the uptake of utilitarian cycling should be carried out, both in terms of vehicles provided for travel to/from home, and vehicles available for private use during the day.
- Those involved in the planning and design of cycling infrastructure should be encouraged to consider the broader health benefits associated with increased cycle use, in addition to the safety implications of infrastructure design.

Abstract

This research, which was conducted from July 2008 to January 2010, investigated what type of cycling infrastructure would encourage 'new cyclists' (ie people who either do not currently cycle at all, or people who do not currently cycle for utilitarian trips) to use cycling as their mode of transport for daily activities in New Zealand.

The research involved undertaking an international literature review followed by national surveys and Christchurch-based focus groups, to gain an understanding of some of the motivations and barriers associated with utilitarian cycling, and to evaluate a range of cycling facilities.

The research showed that safety was the most significant issue for potential cyclists, particularly in relation to vehicle driver behaviour and traffic volume. Other significant issues included having facilities at the destination for showering and changing, enjoyment, and the perception that car drivers are not courteous.

The solutions that were most likely to effect a significant change in cycle numbers related to the nature and consistency of infrastructure, and education for motor vehicle drivers and cyclists on how to best and safely use it. The researchers recommended that along with a number of other cycling-supportive steps, planners could develop a comprehensive, consistent network of cycle-only paths with separation from motor vehicles, and with dedicated intersection facilities such as hook turns and cycle signals.

1 Introduction

Since the 1950s, the increasing dominance of the motor vehicle in many western countries has led to a decline in utilitarian cycling (also known as 'utility' cycling); ie where the bicycle is used for day-to-day travel (Pacione 2001). In more recent times, an increased awareness of the environmental impacts of transport modes has led to a focus on encouraging cycling because it is an active, environmentally friendly, flexible and relatively affordable transport mode that can cover greater distances than walking (NSW Government 2004). However, the policy challenge is that the current urban environment in western cities is orientated towards motor vehicles, and this creates many obstacles for cycling as a mode of transport. Therefore, this research focused on the motivations and barriers regarding utilitarian cycling, with a focus on the level of infrastructure (ie physical street facilities) that is needed to attract new cyclists. Throughout this report, the term 'cycling' refers to utilitarian cycling – commuter and recreational cycling – are referred to specifically when necessary.

In urban areas, a significant proportion of trips made are related to work or education. Consequently, one of the primary goals of transport planners is to reduce the dominance of the use of private motor vehicles for the commute to work or education, and also for wider utilitarian travel (Handy et al 2002). As lack of exercise is a major cause of the current obesity epidemic, the use of active transport modes is becoming increasingly important (McClintock 2002b). Cycling is a minor transport mode in New Zealand – only 2.5% of workers cycled to work on census day 2006 (Statistics New Zealand 2008) – and both local and central governments aim to reverse the decline in utilitarian cycling.

1.1 Research aims

The primary aim of this research, which was conducted from July 2008 to January 2010, was to identify the type of cycling infrastructure that would encourage 'new cyclists' to use cycling as their mode of transport for daily activities in New Zealand.

In this report, the term 'cycling infrastructure' refers to any physical street facilities used to assist cycling, such as cycle lanes, paths, signals, and so on. It does not include other related infrastructure such as bike-parking or changing facilities, although these are discussed in the research.

'New cyclists' are people who either do not currently cycle at all, or people who do not currently cycle for utilitarian trips but may engage in, say, recreational cycling.

The research objectives were to:

- carry out a comprehensive international literature review on the barriers and motivations associated with cycling, as well as the design of cycling infrastructure and its impact on the use of cycles
- identify the biggest barrier for new cyclists when considering cycling as a transport mode
- assess the demand for different types of cycle route provision, such as quiet streets, cycle lanes and off-road pathways
- identify the impact of cycling infrastructure on the likely uptake of utility cycling by current non-utility cyclists
- provide recommendations for local and central government on the type of cycle route design required to encourage a growth in cyclist numbers.

Research was undertaken in Christchurch, New Zealand, a city that was known as a cycling city in the 1930s (Thull and Lausterer 2003) – but the level of utility cycling has declined since then. At the time of the 2006 census, 6.5% of Christchurch people cycled to work (Statistics New Zealand 2008) – the second-highest rate of commuter cycling in New Zealand cities.

Note that it was not clear whether cycling infrastructure was the key factor affecting people's decisions about cycling – there were also other issues, such as logistical constraints, parking provision, the weather, etc. Therefore this study first sought to obtain views on these other issues before investigating cycling infrastructure preferences.

1.2 Report structure

Section 2 sets the context for utilitarian cycling in New Zealand, and section 3 provides findings of our background literature research regarding the motivations and barriers associated with cycling. Section 4 then outlines the research method undertaken in this study, with the survey findings reported in section 5 and the focus group findings summarised in section 6. Final conclusions are given in section 7, and recommendations are in section 8.

2 Cycling and transport

As a mode of transport, cycling has a greater distance range than walking and can also be faster than motorised transport for short journeys. It is also a low-cost mode of transport (McClintock 2002b).

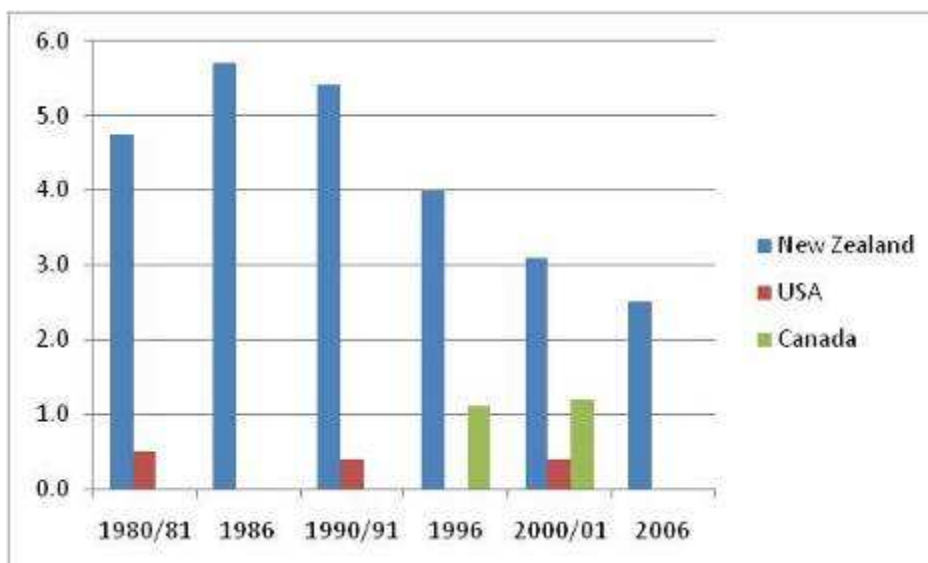
Benefits of cycling include:

- reduced traffic congestion and energy dependence
- roadway cost savings
- reduced parking problems and cost
- greater and more equitable transport choice
- a reduction in community severance because of a reduced need for roadways
- increased social and community interaction (McClintock 2002b, Noland and Kunreuther 1995, Tolley 2003).

This section of the report describes utilitarian cycling, current trends in numbers, the benefits of cycling, the potential for more utilitarian cycling, and the characteristics of people who cycle. These last two points are important to the objective of identifying which people are potentially interested in cycling, by using the known characteristics of people who currently cycle.

Cycling developed in the 1800s and reached its peak in the 1950s. At that time in Britain, more distance was covered by cycle than by motor vehicle (Mathew 1997). However, by the 1960s there had been a cultural shift to motorised transport (Jensen et al 2000, Pucher and Buehler 2005b), and cycling became a marginalised transport mode (British Medical Association 1992, Pucher and Buehler 2008). This decline in cycling can be seen in the commuter cycling mode share that was recorded in various censuses (see figure 2.1). The New Zealand commuter cycling rates shown in this diagram are higher than those in Canada or the US, but lower than those in other countries not shown, including England and Wales (11% - Office for National Statistics 2008), Japan (17% - Koike et al 2000) and the Netherlands (25% - Mobycon et al 2009).

Figure 2.1 Rates of commuter cycling in New Zealand (Statistics New Zealand 2008), US and Canada (Pucher and Buehler 2006)



In some parts of Western Europe, changes in policy that were designed to curb motorised transport began in the 1970s (Pucher and Buehler 2006) and really took effect in the 1990s (Welleman 1997). This led to a cycling revival in countries such as the Netherlands, Germany and Denmark (Pucher and Buehler 2008). It is likely, therefore, that a significant investment in cycling in New Zealand could have a result in 10–15 years, but the current reactive, piecemeal approach will not have a significant impact on cycling rates.

2.1 Impacts of transport

The impacts of transport can be environmental, social and economic, and the benefits of promoting cycling occur in society as a whole, as well as on an individual level (Jensen et al 2000, Morris 2004). Environmentally, air pollution and greenhouse gases are significant issues (Banister 1994) causing health and environmental problems (Pacione 2001). Cycling, however, has an almost negligible environmental impact, and has beneficial impacts such as traffic congestion, energy dependence, air and noise pollution (Hillman 1997b, Noland and Kunreuther 1995, Pucher and Dijkstra 2003).

Social costs resulting from auto dependence include adverse effects on community sustainability and social exclusion (Docherty 2003). McClintock (2002b) found that encouraging cycling leads to more-equitable transport choice, reductions in community severance, and increased community interaction.

Cycling can improve health by providing a daily exercise routine in a world that is increasingly mechanised (Austroads 2005, Geus et al 2008, Hillman 1997a) – the recommended 30 minutes of exercise per day can be met by cycling to work for four or five kilometres (Jensen et al 2000). Because of its minimal impact on muscles and tendons, cycling is also an easily accessible form of exercise for both adults and children, and also for those with health issues such as arthritis (British Medical Association 1992, Hillman 1997a).

Economically, cycling facilities are known to be highly cost effective in terms of reducing roadway costs, traffic congestion, parking problems and parking costs (McClintock 2002b). More recent research has found significant quantifiable health benefits associated with cycling (Cavill and Torrance 2009, SQW Consulting 2007, SQW Consulting 2008, Genter et al 2008).

2.2 Urban transport

Urban form and transport are close linked (Banister and Lichfield 1995, Pacione 2001), and transport is crucial to the sustainability of urban centres, owing to its demands on land and energy (Stone 2008). In most western urban centres, motorised transport is now the dominant transport mode and has caused urban sprawl to spread rapidly during the 20th and 21st centuries. Negative effects of motorised transport include increased congestion, noise, air pollution, road accidents and land requirements (Bergstrom and Magnusson 2003), and diminished environmental quality, safety, social inclusion and community cohesion, and personal and public health (Tolley 2003).

Because motor vehicle numbers have increased since the 1950s, urban planners have focused on supplying sufficient infrastructure to accommodate them (Pacione 2001). In New Zealand, the number of people per motor vehicle decreased from 1.9 in 1976 to 1.6 in 1996, and to 1.2 in 2006 (Land Transport NZ (LTNZ) 2007, Saville-Smith 2000, Statistics New Zealand 2008). This change has resulted in a motor-vehicle-orientated society in which sustainable modes of transport have suffered (Badland and Schofield 2006, Handy et al 2002), and policymakers now face a significant challenge in effecting change away from motorised transport and towards walking and cycling (Skinner and Rosen 2007).

2.3 Potential for cycling

Because of the high number of journeys using motor vehicles over short distances, there is a great deal of potential for growth in utilitarian cycling. For example, 60% of motor vehicle journeys in the UK are less than 8km (Davies et al 1996), while in New Zealand, 46% of all 'simple' work commutes (ie no trip-chaining) are less than 10km (O'Fallon and Sullivan 2005). There is also evidence that people are interested in cycling; for example, a 2005 survey in Christchurch found that that 27% of non-cyclists were keen to cycle (Opinions Market Research Ltd 2005) and another study found that 37% of people were prepared to use walking or cycling to replace motor vehicle trips on two or more days a week (Sullivan and O'Fallon 2006).

2.4 Characteristics of people who cycle

Identifying the people who are potentially interested in cycling was an important aim of this project. The different types of people who cycle varies according to their skill level and trip purpose (LTNZ 2005).

Typically, groups include:

- vulnerable cyclists – children, the elderly, or those who are not confident, who have a variety of trip purposes
- commuter cyclists – typically more confident people travelling to and from work on a regular basis
- recreational cyclists – who may also cycle for utility reasons.

Recreational and utility cyclists are not separate groups (Howard and Burnes 2001) and the theory, although unproven, is that recreational cyclists (eg mountain bikers, road cyclists and multisporters, who undertake 40% of all cycling trips) are a significant group who could move to utilitarian cycling (Lumsdon 1997).

Many factors affect travel behaviour, including age, ethnicity, race, income (Pucher and Renne 2003), socio-economic status, home location and gender (Rissel and Garrard 2006). Younger people are more likely to cycle than older people (Stinson and Bhat 2004), with both recreational and utilitarian cycling rates generally decreasing with age (Sullivan and O'Fallon 2006).

Ethnicity also has an impact on cycling rates. In the Netherlands, the children of immigrants are less likely to cycle (Pucher and Buehler 2007), while US and New Zealand research has found that white or Pakeha people cycle more than other groups (Moudon et al 2005, Sullivan and O'Fallon 2006).

Research has shown that income and occupation can also affect cycling rates, although the research is not always consistent. For example, in Amsterdam, affluent groups cycle more than other groups (Pucher and Buehler 2007), while in the US some research has suggested that lower socio-economic groups have higher rates of walking and cycling (Dill and Carr 2003, Hoehner et al 2005, Plaut 2005). Other studies in the US have found that numbers of people cycling may increase with income (Moritz 1997, Pucher and Renne 2003).

In terms of occupation, professionals, engineers and students are more likely to cycle than other occupations (Christchurch City Council 2001, Moritz 1997, Skinner and Rosen 2007), while the number of people cycling is often higher in university towns than in other urban areas (Davies et al 1996, Pucher et al 1999, Zahran et al 2008).

Proximity and access to key destinations also affect cycle use, as distance can be a major barrier for cycling; therefore, the number of people walking and cycling is higher for those living close to their employment (Plaut 2005). There is also evidence that living close to a dedicated cycle path increases cycle use (McDonald et al 2007, Morris 2004), and the presence of a good cycle network throughout an area results in higher rates of cycling (Zahran et al 2008).

Gender is also a factor. The bicycle was originally a way for women to have independent movement (Simpson 2007); however, these days the rate of cycling for females is much lower than that for males (see table 2.1). These gender differences are more pronounced in countries that have low levels of utilitarian cycling (Dickinson et al 2003, Garrard et al 2008, Stinson and Bhat 2004). Countries with a high level of utilitarian cycling have relatively equal numbers of female and male cyclists. The following are some of the reasons for females cycling less:

- They often have more complicated travel patterns, usually arising from household and child-minding responsibilities (Dickinson et al 2003).
- They are often responsible for a household and are more dependent on the opening hours of educational, retail and recreational activities (Lehner-Lierz 2003).
- They are more likely to accompany young children to various locations, and this is easiest to accomplish by motor vehicle (Sullivan and O'Fallon 2006).
- They are more likely to have jobs closer to home.

The combination of all these factors results in women commonly making numerous shorter trips than males (Lehner-Lierz 1997, Howard and Burnes 2001).

Table 2.1 Rates of utilitarian cycling, by gender

Country	Cycling rate			Source
	Female	Male	Total	
US	0.5%	1.2%	0.9%	2001 National Household Travel Survey Modal Share ^a
Australia	0.4%	1.39%	0.94%	2001 Census Commuter Share ^b
New Zealand	1.15%	3.4%	2.35%	2001 Census Commuter Share ^c

a) Pucher and Renne 2003, p21

b) Rissel and Garrard 2006, p50

c) Statistics New Zealand 2008

3 Utilitarian cycling – motivations and barriers

While there are many motivations for cycling, there are also various barriers and it is important to understand both (Skinner and Rosen 2007). It should also be noted that some factors can represent a motivation to one person but a barrier to another, and this will be discussed where necessary. As well as focusing on cycling facilities, this project researched the broader motivations and barriers associated with cycling, as it was important to understand whether the motivations and barriers perceived in New Zealand were similar to those identified in international research. This section sets out the international findings regarding motivations and barriers so that they can be compared to those found in our research.

Reasons to start cycling include health, fitness, concern for the environment, traffic congestion, the cost of fuel, parking availability and enjoyment of cycling (Moritz 1997). Barriers can include weather, social constraints and physical infrastructure.

It is also important to remember that there is always a section of the population who simply do not wish to cycle. A UK study of workplaces found 24% of respondents would not cycle even if they lived a short distance away and tangible incentives were provided (Dickinson et al 2003). A study in New Zealand found that 41% of respondents would never cycle even if the conditions were favourable (Sullivan and O'Fallon 2006). A study in Chile showed that even if there was a fully integrated cycling network, 87% of trips would still not be cycled (Ortúzar et al 2000). Despite all this, there is also evidence of potential for increasing cycling rates.

A wide range of factors affect the decision to cycle, including:

- distance
- weather
- topography
- cost of transport
- availability of motor vehicles and public transport
- exposure to fumes
- convenience
- gender
- previous experience of cycling and riding ability
- expectations of dress
- attitudes to health and fitness
- awareness of, and perceived responsibility for, environmental issues
- physical exertion
- necessity of a motor vehicle for desired tasks
- social norms and cycling culture

- land-use density
- transport infrastructure
- availability of parking and related facilities at the destination
- road safety
- fear of accident and resulting injury
- cultural attitudes to safety (British Medical Association 1992, Goldsmith 1992, Jensen et al 2000, Jones and Solman 2003, Komanoff and Pucher 2003, Skinner and Rosen 2007, Stinson and Bhat 2004).

Safety is an extremely significant factor that influences the decision on whether or not to cycle. In particular, better or safer (or perceived to be safer) cycling routes and more consideration by drivers towards cyclists would potentially result in more people cycling (McClintock 2002c). Social safety and fear of cycling also play an important role in an individual's choice, together with many of the items listed above. These issues, including safety, cycling facilities and fear of cycling, are discussed separately in the following sections.

3.1 Distance and mode choice

The choice between using motorised or non-motorised forms of transport is often based on distance and connectivity (Geus et al 2008). Distance is one of the most frequently cited and important factors involved in deciding whether to cycle to work, and it can be a significant barrier. While it can be argued that distance is not the only measurement for ability to cycle (Noland and Kunreuther 1995), it does divide the population into those who live within a reasonable cycling distance from work and those who do not. Literature generally determines that a reasonable distance to cycle, while dependent on an individual's perception, is anything up to 8–10km (British Medical Association 1992, Dickinson et al 2003). Consequently, this research focused on people who perceived they lived within a reasonable cycling distance from their destination, so that the focus groups could consider motivations and barriers regarding cycling without being unduly influenced by distance as a barrier.

It should also be noted that while longer distances are, in general, a barrier to cycling, living too close to a destination can also be a barrier. The time required before and after the journey for issues such as changing, washing, locking the bike, walking from the bike storage area, and so on, can actually discourage people from cycling if walking is quicker or easier, or if the cyclist wants a long enough ride to justify the preparation time (the latter issue more likely to apply to people who cycle for exercise).

3.2 The effect of fuel costs on cycling

The cost of transport also has an influence on an individuals' choice of transport mode. New Zealand researchers Kennedy and Wallis (2007) found that a 10% rise in the real cost of fuel in this country would result in a reduction in traffic levels (see table 3.1). In the US and Canada, Pucher and Buehler (2006) found that a US10c increase in petrol prices would result in a 0.3% increase in cycle mode share for trips to work. Additionally, the start-up costs of buying a bike, helmet and whatever accessories a potential cyclist thinks are required could act as a barrier to cycling. However, the higher costs of buying and maintaining a car can act as a motivator for cycling.

Table 3.1 The impacts of a 10% (real) rise in petrol prices on urban motor vehicle traffic in New Zealand (based on data from Kennedy and Wallis 2007, p37)

Type of environment	Impact on traffic in first year	Impact on traffic after two years
Urban off-peak traffic	2.7% decrease	3.6% decrease
Urban peak traffic	0.9% decrease	2.4% decrease
Rural	1.6% decrease	1.9% decrease

3.3 The physical safety of cycling

People who walk and cycle are sensitive to the characteristics of the built environment (Rodriguez and Joo 2004), and safety concerns are one cause of low levels of cycle use (Noland and Kunreuther 1995). In general, cycling itself is not a dangerous activity, but it can be made dangerous by the transport environment (McClintock 2002b). Safety issues arise primarily due to the incompatibility between motorised traffic and non-motorised traffic (Godefrooij 1997). In fact, the first documented bicycle crash was a motor vehicle–bicycle conflict in New York City in 1896 (Allen-Munley et al 2004). It is important to note that perceptions and the reality of safety can be quite different. The perception of safety is arguably of greater importance than actual physical safety, as the risk perceived by potential and current cyclists is a more important criterion for behavioural response than the real risk (Parkin 2007).

While some argue that cycling is one of the riskiest modes for travel (Noland and Kunreuther 1995), studies have also suggested that the health benefits of cycling are likely to outweigh the costs, with more life years gained through health improvements than life years lost through accidents (British Medical Association 1992). One of the reasons measuring actual safety is difficult is the lack of reliable data on bicycle crashes, injuries, and kilometres travelled by bicycle. There is evidence that cycle accidents are under-reported (Turner et al 2006), especially the less serious ones (Allatt 2006). In the US, approximately 580,000 people are treated annually in emergency departments for bicycle accidents (Rosenkranz and Sheridan 2003), although the actual number of injuries is likely to be much higher. While this is a trend that also applies to other transport modes, under-reporting is more common for cycle accidents.

3.3.1 The safety of the physical environment

The incompatibility of motor vehicles and bicycles is responsible for a significant proportion of the safety issues associated with cycling. Increased provision for the private motor vehicle also marginalises the cycling environment. A lack of cycling facilities not only compromises safety, but makes walking and cycling inconvenient and unpleasant (Pucher and Dijkstra 2003). It is now recognised by planners that if goals for encouraging walking and cycling are to be met, then the environment they occur in must be safe (Allen-Munley et al 2004).

Creating cycling facilities is fundamental to the encouragement of more cycling (Hopkinson 1996), as well as using traffic-calming techniques to provide a safer physical environment for cyclists. For instance, increased safety and an expansion of cycling facilities in Canada is considered to be one of the key reasons for a growth in cycling there (Pucher and Buehler 2005a).

Despite this proactive rationale for providing cycling facilities such as separate cycle paths and lanes, and cycle traffic signals, the creation of these is often reactive, with facilities only introduced in response to safety issues such as a cycle accident problem (Davies et al 1996).

3.3.2 Segregation or integration

When facilities are being provided for cyclists, one of the major debates is whether to segregate cyclists from motorised transport or to integrate them (NSW Government 2004). Integration through to segregation is a continuum:

- Full integration means different modes are sharing the same space, with no guidance on how to share the space. Integration policies focus on modifying motor vehicle drivers' behaviour through reducing motor vehicle numbers and speed.
- Fully segregated facilities provide each mode with their own space that is separated from other modes' spaces by a barrier of some sort.

European guidelines suggest that whenever possible, it is preferable to separate different user groups (Ker et al 2006).

Separation also has the potential to be a barrier to cycling for a small group of cyclists for whom the speed of the journey is a key attraction – separated cycle routes can be longer than using roads, and a number of cyclists on a narrow, separated route can impede a faster cyclist.

Traffic calming is an integration method that has its roots in Delft, Netherlands. In 1968 residents put planters in the street to slow down traffic and reclaim the streets for their use (King et al 2002). Pucher and Buehler (2008) comment that while traffic calming is of greatest benefit to pedestrians, it also helps in decreasing serious bicycle accidents. Traffic calming is most effective when it is over a wide area and consequently encourages through traffic to use arterial routes rather than local streets, thus reducing the speed and amount of traffic (Pucher and Dijkstra 2003). In addition to the safety benefits of traffic calming, there are economic impacts, with traffic calming shown to positively affect house prices (Jensen et al 2000). While wide-scale traffic management (including redistributing space from motor vehicle drivers to cyclists) can be as effective as dedicated cycling facilities, the latter are more likely to affect the perception of safety for the cyclist (McClintock 2002a).

While integration of cyclists usually focuses on changing the behaviour of motorised traffic to increase its compatibility with non-motorised modes, there is an argument made by a movement called 'vehicular cyclists' who are against cycling facilities of any kind (Forester 1993). They believe that cycle paths and other facilities make cycling slower and therefore more dangerous for existing users. In addition, these facilities promote the perception that cyclists are not legitimate road users. A counterargument is that the integration approach does not allow for different groups of cyclists, including those who are more vulnerable (Pucher et al 1999). In general, academics and planners agree that some level of separation is required for cyclists' safety if there is no traffic management in existence. Alternatively, dual networks that cater for different groups of cyclists can be provided (Harrison 2002).

The argument for keeping cyclists in the motorists' view is valid, however, and is represented in debates for on-road cycle lanes or paths close to the carriageway. Conversely, fully segregated facilities can give cyclists a false sense of safety and not foster the road sense that is required to cycle on the road (Davies et al 1996). Goodefrooij (1997) notes that while segregation is important when traffic numbers or speed cannot be reduced, integration methods should be used when segregation is not possible. Angenendt et al (1993) suggest that providing for cyclists through on-road lanes is safer if there is insufficient space for a high-quality cycle path network. This is particularly important where it is not possible to design paths to a sufficient standard, as inadequate cycle paths are proven to be less safe (Hughes and Cummins 2000). On-road lanes mean that cyclists remain in the visual area of other road users. Jensen's (2007) before-and-

after study found that cycle paths created a higher number of new cycle trips than cycle lanes; however, they also led to more injuries.

Difficulties with on-road provision arise with misunderstandings about the rights of cycleway users and the legal status of on-road routes. For example, cycle lanes may be interpreted as parking space, particularly if there is limited available parking in the area (Godefrooij 1997). In Chile, it has been found that other road users do not respect cycle lanes and therefore there is a need for better cycling facilities (Ortúzar et al 2000). Another problem with on-road cycle lanes is that obstacles can force cyclists to take evasive action, often into the traffic flow, creating dangerous conflict with motor vehicles.

Cycling facilities that are adjacent to roadways but separate from the motorised traffic still provide a visual presence; however, they are also physically separated from the perceived and real dangers of cycling on the road, thereby encouraging new and casual cyclists to bicycle more often (Pucher et al 1999). Problems arise with providing fully segregated facilities. Firstly, cycling facilities are often provided in conjunction with provision for other modes, such as walking. While shared paths can reduce the possibility of accidents with motor vehicles, if they are built with insufficient space for all users they can increase the risk of cyclist–pedestrian collisions (McClintock and Cleary 1996). These conflict issues can arise from users not respecting space (eg not keeping to the left of a path or lane) or users travelling in groups (Ker et al 2006). While conflict concerns about shared paths can be real or perceived, any concern at all can affect a person's willingness to walk (Ker et al 2006) and potentially to cycle. In any case, cycling should not be promoted to the detriment of other active modes.

Pedestrians can have a negative view about footpaths being converted into shared paths (especially if no additional width is provided) – shared paths for cyclists and pedestrians that are newly created are more widely accepted (McClintock 2002a). Another negative impact of shared paths is that cyclists can get the impression that there is tacit endorsement for riding on footpaths, even if this is not allowed under a country's law (McClintock and Cleary 1996). In New Zealand, cycling on the footpath is prohibited unless the cyclist is delivering printed material, or signage indicates that the path is a cycle path (Ker and Huband 2006). Newly created shared paths, however, are often designed solely for pedestrian and cyclist users and it is important that they are designed to be safe for all users, including disabled and visually impaired pedestrians (Ker et al 2006). Other path users are also becoming increasingly common (for example, an ageing population means there are more people using mobility devices), and trails built for cyclists often lack the space that these other forms of transport require (Landis et al 2004). Forms of transport that are appearing on paths and are not specifically catered for include scooters, inline skates and segways (Landis et al 2004). Facility design can have an impact on this multiple use, with a high proportion of respondents to a Swedish study on safety reporting that the cycle track design was the cause of their injury event (Eilert-Petersson 1997).

While segregated routes may increase safety by reducing bicycle–motor vehicle conflict, there is a perceived social risk from cycling on paths where there is reduced visibility to passersby (Jensen et al 2000). This concern is most relevant where the cycle path is not alongside the road and is poorly designed, such as with high fences along each side of the path. Therefore users who have concerns about safety, particularly females, may choose to avoid these paths, especially at night. In this case, physical separation can become a barrier to some potential cyclists. When creating a high-quality cycle network that includes shortcuts, therefore, it is important not to overlook the personal safety of individuals (McClintock 2002a).

Another unintended consequence of providing off-road routes is the implication that roads are not safe for cycling (Horton 2007). Also, while segregation would remove the conflict issues between motor vehicles

and cyclists, avoiding all conflict between cyclists and motorised transport is often impossible, owing to the nature of intersections, including driveways (Pucher and Buehler 2008). Indeed, these locations are often made riskier and less convenient for cyclists if a pathway is behind the kerb line.

3.3.3 Motorised traffic

In most cases, no matter how separated bicycle and motor vehicle networks are, there will be instances when both motor vehicles and cyclists need to share the same space. This interaction creates a safety issue because of the conflict between the different modes and how they behave in regards to each other. One reason that traffic has become an increasing safety issue over the years is that higher traffic speeds mean motorists have less time to take evasive action (British Medical Association 1992) and such collisions cause more serious injuries. In addition, traffic numbers have increased and cyclists find that motor vehicle drivers are often unaware of cyclists' needs or rights. In the UK in 1992, three-quarters of cycling fatalities or serious injuries were due to collisions with a motor vehicle (British Medical Association 1992). In New Zealand, 3050 cyclists were hospitalised for injuries between 2002 and 2006, with 43% of these crashes involving a motor vehicle and 48 of these cyclists dying from their injuries (MoT 2007).

A large proportion of accidents are due to motor vehicle–cyclist conflict where the two groups have either failed to see each other or to understand the other's movements, and consequently have not given way (Jensen et al 2000). One New Zealand study found that the two most frequent causes that cyclists reported for major accidents were 'traffic failed to notice me' (48%) or 'traffic failed to give way to me' (28%) (Turner et al 2006). In another study, only a minority of Christchurch residents perceived motorists as considerate to cyclists (36% of the total respondents and 32% of respondents who cycled) (Christchurch City Council 2001). Research has found that in 64% of bicycle crashes, a motor vehicle was at fault (MoT 2007).

Although cyclists tend to blame motor vehicle drivers for incidents on the road, motor vehicle drivers also have difficulties with cyclists, particularly when they ignore the road rules (Jensen et al 2000). It should be noted that there is usually little education of drivers as to cyclists' rights (Pucher et al 1999), and studies have found that cycling promotion rarely addresses driver behaviour (McKenna and Whatling 2007). In the Netherlands and Germany, traffic laws require motorists to drive in a manner that minimises risk to pedestrians and cyclists, even if the pedestrians and cyclists are acting contrary to traffic regulations (Pucher and Dijkstra 2003). Overseas, one method of combating motorists' attitudes towards cyclists has been to offer traffic safety courses in lieu of fines (Pucher et al 1999). On the other hand, there is evidence that motor vehicle drivers who also cycle are more likely to anticipate cyclists' needs (British Medical Association 1992).

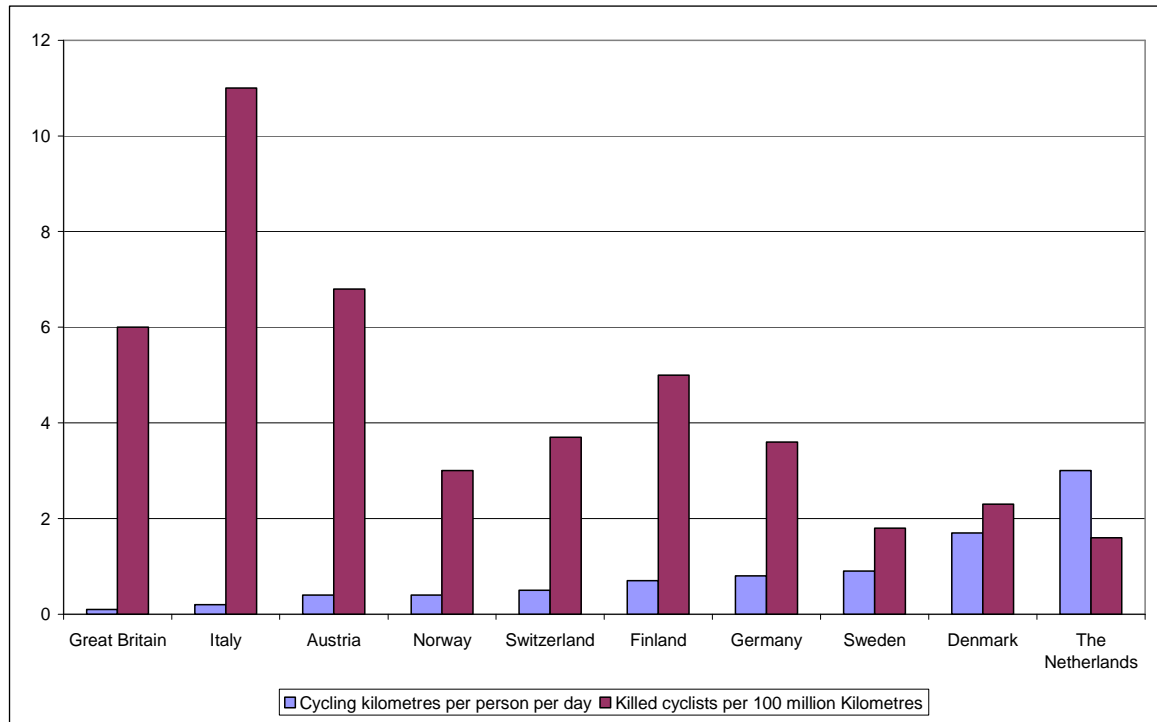
3.3.4 Safety in numbers

There is a theory that as the number of cyclists increases, cycling becomes safer. The reasoning is that when there are more cyclists on the road, visible to other road users, everyone becomes more aware of cyclists and their needs; therefore higher numbers of cyclists mean that drivers have higher awareness levels and a greater expectation of meeting cyclists (Wittink 2003). It is also more likely that when they are not driving, motorists themselves might be cyclists.

There is evidence to back this up. For example in the Netherlands, the number of kilometres cycled increased by 36% between 1978 and 2006, and in the same period, there was an 81% decrease in the fatality rate for cyclists (Pucher and Buehler 2008). According to Wittink (2003), the cities and countries with higher levels of cycling have lower levels of serious or fatal accidents – figure 3.1 shows that

countries with a lower rate of utilitarian cycling have a higher fatality rate. In New Zealand, Turner et al 2006 also found a reduction in crash rates as cycling volumes increased.

Figure 3.1 Cycled distance per person per day, and cyclists killed per 100 million kilometres (based on Wittink 2003, p172)



3.3.5 Helmets

The issue of whether or not helmets should be compulsory is hotly debated. While research has shown that helmets can reduce head injuries (Rosenkranz and Sheridan 2003, Taylor and Scuffham 2002, Thompson et al 1989), the counterargument is that the inconvenience or 'uncoolness' of the helmet discourages people from cycling (Taylor and Scuffham 2002). This means society does not get the benefits of people cycling, such as reduced traffic congestion and better personal health. This appears to be supported by the fact that the countries with the highest levels of cycling do not insist on helmet use and do not see them adding significantly to the safety of cyclists. Pucher and Buehler (2008) report that Dutch planners consider helmets to be detrimental to cycling, owing to their inconvenience, lack of comfort and style. They also feel that wearing a helmet could lead to cyclists undertaking riskier behaviour because of a false sense of safety. Helmets may also have an effect on the number of children cycling to school, with Thull and Lausterer (2003) arguing that making helmets compulsory in New Zealand in 1994 probably contributed to the decrease in cycling to school here.

3.4 Fear of cycling

One of the major reasons for not cycling is the fear of accidents and injury (British Medical Association 1992). However, an individual's fear of cycling is 'constructed' from their experiences of cycling, and therefore it varies enormously from person to person. Joshi and Senior (1998) argue that those who cycle for utilitarian reasons have less fear of traffic danger than those who have no experience, while a

European study found that those people who cycled regularly were more aware of traffic dangers, possibly due to personal experience (Titze et al 2007).

Gender is another factor that leads to significant differences in perception of safety. Males sometimes change their perspective on safety depending on who they are considering; for example, they may not worry about personal safety for themselves, but could be concerned if wives or daughters were to cycle (Skinner and Rosen 2007). While women may have greater safety fears, a Swedish study found that males had a greater risk of bicycle injury than females (Eilert-Petersson 1997). Perception is, however, the major factor, and there is a possible link between the traffic increases of the 1980s and the decline in female cyclists in the same period (Mathew 1997).

Arguably, perceived safety is more important than actual safety in its effect on an individual's behaviour. Perception of safety can be easily formed; for example, someone can get upset from one negative incident and be put off using a facility or transport mode (Ker et al 2006). Traffic is a major factor in the perception of safety and even if traffic speeds are low, the volume of traffic on a route can give rise to a cyclists' negative perception of safety (Jensen et al 2000). A study in Austria found that students who perceived traffic levels as high were less likely to cycle (Titze et al 2007). Fear of the urban environment has also contributed to the increasing use of motor vehicles and the decreasing level of active transport. A reason for increased motor vehicle use is that walking alone is now seen as more dangerous than in the past, and as a consequence, more people prefer to drive in a motor vehicle (Tolley 1997).

A fear of cycling, however, can be more than the simple fear of having an accident or exposing oneself to personal danger. It can include the fear of '*becoming a cyclist*', which is based on a constructed identity linked to gender, race, class and status, and because it is culturally based, is therefore difficult to change (Horton 2007). There are certain characteristics assigned to everyday cyclists in the western world, such as brave and fit, or alternatively, foolish and inconsiderate (Skinner and Rosen 2007). Cycling is perceived differently in the Netherlands, Germany and Denmark, where a cyclist is not considered to require expensive equipment, special clothing, or advanced training or fitness (Pucher and Buehler 2008), as they often are in New Zealand and other countries. In cities where cycling is prominent and has a high mode share, people who cycle are not perceived as eccentrics or enthusiasts, but as normal people using bicycles as transport (Komanoff and Pucher 2003).

While increases in the number of people cycling can lead to a reduction of some fears, a person's fear of cycling may also increase as the environment becomes more cycle-friendly (Horton 2007). People can fear being inept at cycling, which is linked to the vulnerability that can occur from undertaking physical activity in public spaces (Horton 2007). Some countries have a cultural bias against cycling. For example, in Chile, cycling for transport has been marginalised by various means, including motor vehicle advertisements (Ortúzar et al 2000), and this negatively affects cycling mode share.

It is therefore important to provide opportunities and encouragement for people to begin cycling as a mode of transport without making them feel pressured to cycle.

3.5 Cycling infrastructure

A person's perception of safety can contribute significantly to their fear of cycling; therefore it is important to address perceived safety as much as, or more than, actual safety. On the other hand, actual safety also needs to be addressed, and a balance between choosing infrastructure that is appealing to people interested in cycling, and actual safety, needs to be reached. Davies et al (1996) considered it essential to provide cycling-specific infrastructure (including lanes, paths, intersection facilities,

underpasses, etc) to create a safer and more convenient network (although it should be remembered, as discussed in 3.3.2, that for a minority of faster cyclists, infrastructure can be seen as an impediment to cycling). Planning for cycling can increase both the perceived and the actual safety of the urban cycling environment – and people often perceive they are safer when they have their own space in the road network. Routes should be safe, comfortable, direct, coherent and attractive (LTNZ 2005, NSW Government 2004). Within this context it is important to understand that utilitarian travel is more than just the journey to work, and that social and shopping trips can have very different logistical needs, such as luggage-carrying capacity (Stinson and Bhat 2004). Consequently, utility bicycles may need to be equipped with such items as luggage carriers, baskets and a child seat or trailer (Lehner-Lierz 2003).

As a bicycle requires only one-tenth of the space that a motor vehicle requires (British Medical Association 1992), it is seen as space efficient by traffic planners and also leads to reduced traffic congestion through a reduction in the number of motor vehicle drivers (Pucher et al 1999). Because of this, providing specifically for cyclists has gained momentum in recent years in some countries, although there can be difficulties retrofitting a motor-vehicle-orientated city with off-road cycle paths. This problem can result in on-road lanes being built for practical and economic reasons; however, these may not provide the level of separation needed to attract new cyclists (Garrard et al 2008). Provisions for cyclists in the urban space can have an effect on people's perceptions of safety and enjoyment, and research suggests that adults who perceive bicycle lanes to be present in most areas of the community are significantly more likely to cycle for transport (Hoehner et al 2005), although the provision of cycling facilities at junctions may lead to people perceiving cycling as more risky, owing to presence of facilities highlighting the presence of a hazardous situation (Parkin 2007).

The following sections discuss a variety of different types of infrastructure that were investigated in this study, ranging from 'no provision' to cycle lanes and separated paths.

3.5.1 No specific provision for cyclists

When no on-road provision is made for cyclists, they are required to find their own space where possible. In some cases a cyclist has a wide shoulder on which to ride (as in figure 3.2), while in others there is little space and all motor vehicles are expected to share the same space (as in figure 3.3), which can be especially difficult on some extremely narrow rural roads (see figure 3.4). Figure 3.5 shows a typical suburban street with no provision provided for cycling and no marked curb on which to ride, although of course these types of streets have significantly lower motor vehicle numbers compared with arterial roads, and lower speeds than rural roads.

Figure 3.2 A wide sealed shoulder on Marshland Rd, Christchurch, New Zealand (LTNZ 2005, p38)



Figure 3.3 An arterial road with little space for cyclists in Victoria, Canada (image inverted) (Glen Koorey)



Figure 3.4 Typical space on a rural New Zealand road (Land TNZ 2005, p14)



Figure 3.5 A typical suburban street, New Zealand (LTNZ 2005, p39)



While traffic calming on local streets is not always designed directly for cyclists, it can result in improved cycling conditions (LTNZ 2005). Davies et al (1996) stated that measures aimed at reducing the speed and volume of vehicles should benefit cyclists. Common techniques involve slowing traffic through the use of speed bumps or narrowed streets, or reducing the traffic flow. Some of these methods (eg speed bumps) can make the environment worse for cyclists (see figure 3.6); therefore planners should ensure that any such measures will improve the environment for cycling (Davies et al 1996). Figure 3.7 shows a Palmerston North example of how this can be done.

Figure 3.6 Traffic calming in Germany (unknown source)



Figure 3.7 Provision for cyclists associated with traffic calming in Palmerston North, New Zealand (S Morris)



3.5.2 Cycle lanes

Cycle lanes are the first stage of providing specific facilities for cyclists. They are usually identified through roadway markings on the outside of the lane, painted cycle signs inside the lane, and occasionally with cyclist signs on posts, or coloured paint. It is important that lanes are designed to be wide enough that cyclists overtaking others in the cycle lane can be safely overtaken by motor vehicles (Davies et al 1996). Figure 3.8 shows a typical cycle lane marked with a dotted white line and a cycle symbol, although the general standard nationally has now changed to a solid white line (figure 3.9). In figure 3.8 there is no parking provision, and therefore the cyclist does not need to watch for motor vehicle doors opening into the lane; in figure 3.9, cyclists need to be aware of motor vehicles in the adjacent parking space. The

primary problem with cycle lanes is that they are not always respected by drivers; common difficulties are motorists opening doors into the lane, and performing parking manoeuvres that result in crossing the cycle lane (LTNZ 2005), and many people do not perceive them to be a safe cycling environment.

Figure 3.8 Kerbside cycle lane, North Shore City, New Zealand (LTNZ 2005, p36)



Figure 3.9 Cycle lane with solid white line next to parked cars, Wellington, New Zealand (unknown source)



An important stage in increasing the visibility of cycle lanes without providing separation includes colour differentiation, where cycle lanes are painted – usually red or green (Davies et al 1996) (see figure 3.10). A kerbed lane (where an additional road kerb is placed along the edge of the cycle lane, as in figure 3.11) can serve the same purpose, as can a lane placed between the parking and pedestrian spaces, thus removing the need for motor vehicles to cross the cycle lane when they are parking (figure 3.12). One way to provide priority for cyclists and increase motorists' awareness is the 'contra-flow' lane. This lane permits cyclists to ride against the traffic flow, usually on a one-way street (LTNZ 2005).

Figure 3.10 Painted cycle lane, New Zealand (North Shore City Council)



Figure 3.11 Kerbed cycle lane with parking (in background of picture), Melbourne, Australia (H Barber)

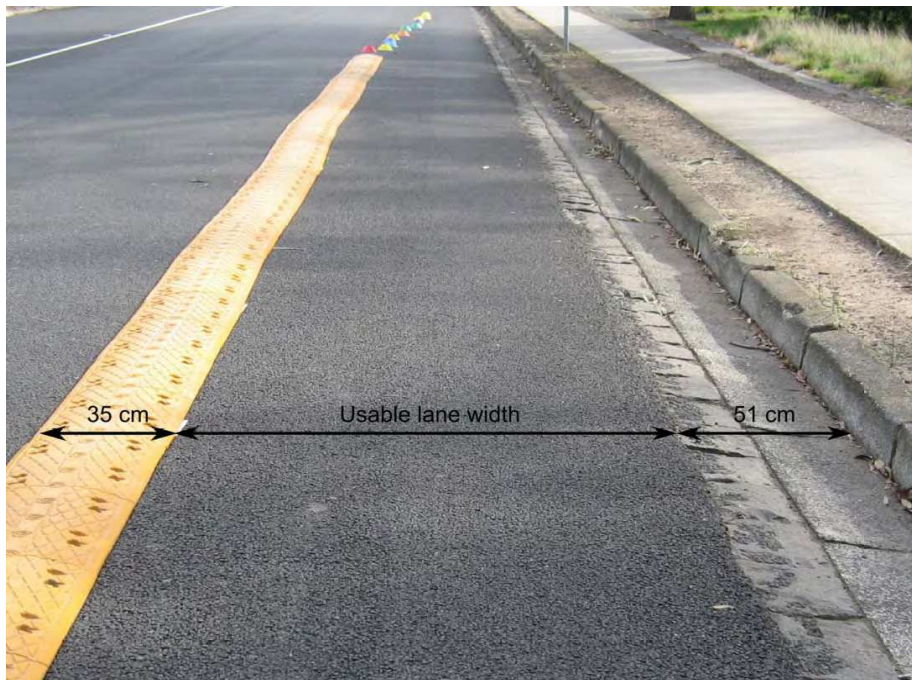


Figure 3.12 Cycle lane inside parking space, Denmark (H Barber)



An Australian study found that placing a separator between the traffic lane and a cycle lane (as in figure 3.13) created few problems for cyclists and made them feel safer, as the boundary was more obvious to motor vehicle drivers and they were more likely to stay out of the lane (Sinclair Knight Merz 2008).

Figure 3.13 Useable lane width and separator, Australia (Sinclair Knight Merz 2008, p36)



Cyclists are at the greatest risk at intersections (LTNZ 2005), and it is argued that a cycle network is only as good as its weakest feature (Davies et al 1996). At intersections, lanes typically continue up to the intersection space and restart on the opposite side (figure 3.14), leaving the cyclists to make their way

across the intersection in time with the traffic signals. Painted lanes are more common at intersections in Christchurch and other cities where it is recognised that cyclists need distinct space at intersections.

Figure 3.14 Cycle lane at an intersection in Christchurch, New Zealand (G Koorey)



Davies et al (1996) noted that on a bicycle, making a right turn can be difficult, particularly where motor vehicles are turning left or going straight. They suggested the use of 'advanced stop boxes' (ASBs – see figure 3.15) or 'right-hand-turn cycle lanes' (see figure 3.16).

Figure 3.15 Advanced stop box in the US (image inverted) (unknown source)



Figure 3.16 Right-hand-turn cycle lane in Christchurch, New Zealand (A Wilke)



Another solution is the ‘hook turn’ (see figure 3.17), which takes two signal phases to complete. On the first phase, the cyclist pedals straight through the intersection, then waits in a designated area until the signals change again, and then proceeds straight ahead into the side road.

Figure 3.17 Hook turn in Christchurch, New Zealand (A Macbeth)



Roundabouts can also be difficult and more cycle injuries occur on roundabouts than at any other type of intersection (LTNZ 2005). They are often the most feared feature for cyclists (particularly if they are multi-laned, and even experienced cyclists detour to avoid them (Davies et al 1996). In New Zealand, cycle lanes usually stop prior to the entry point of the roundabout. There are overseas examples of lanes provided around the outside of a roundabout (eg figure 3.18), and directional lanes that provide a clearer indication

of a cyclist's intentions (eg figure 3.19). However, some sources have identified safety concerns with having cycle lanes within roundabouts (eg Schnüll et al 1992).

Figure 3.18 A cycle lane around a roundabout, Netherlands (Jensen et al 2000, p92)



Figure 3.19 Directional cycle lanes around a roundabout in York, England (unknown source)



3.5.3 Cycle paths

The level of cycle path separation from motor vehicle traffic can vary, from being within view of the roadway to fully separated routes. Cycle paths that are at some distance from the carriageway tend to be attractive to inexperienced cyclists and families (Davies et al 1996), as they are separated from hostile traffic conditions and the paths usually have a higher comfort level. While these paths attract more people to cycling, a downside is that they require more land (Davies et al 1996). Figure 3.20 shows a separated cycle path alongside a motorway that otherwise would not allow for cyclists.

Cycle paths are usually shared with pedestrians, but can also include some separation from pedestrians. Paths such as those shown below are preferred for high commuter traffic (LTNZ 2005), but can also been

seen in rural areas (figure 3.21). Both of these cases provide cycling space away from all other forms of traffic; however, difficulties can arise when the path intersects with other traffic.

Figure 3.20 Cycle path in Auckland, New Zealand (LTNZ 2005, p24)



Figure 3.21 Cycle path alongside a rural highway, New Zealand (LTNZ 2005, p26)



Cycle paths can be alongside roads (as in figure 3.22) or highly separated (as in figures 3.23 and 3.24), potentially giving the cyclist shorter or alternative routes instead of following standard roads.

Figure 3.22 Marked cycle pathway, Netherlands (Jensen et al 2000, p54)



Figure 3.23 Off-road Australian cycle path (LTNZ 2005, p26)



Figure 3.24 Australian cycle path, away from the road (LTNZ 2005, p40)



The final type of cycle path studied here is a pathway that is shared, usually with walkers, but also with other types of transport. In Europe, shared paths typically suffer from inadequate width, interruption by side roads, hazards from driveways, and poor surfaces (Davies et al 1996). In many cases (eg figures 3.25 and 3.26) there are few markings indicating which side of the path walkers and cyclists should travel on, and shared paths can result in perceived or actual conflict between pedestrians and cyclists (LTNZ 2005) and can affect people's willingness to use them (Ker and Huband 2006). The wide range of other users on the path can cause confusion (Ker and Huband 2006). Clear separation of use types can reduce the conflict (LTNZ 2005), and separate cycle and pedestrian logos on clearly marked and separate areas of a path are one way to encourage people to keep out of each other's way (Davies et al 1996). However, this is not always an efficient use of the space, and separation by direction may be better. Despite the pedestrian/cyclist conflicts that arise on shared paths, they still provide a level of separation from motorised traffic for people cycling (apart from at driveways and intersections).

Figure 3.25 Shared path in North Shore, New Zealand (North Shore City Council)



Figure 3.26 Shared path through Jellie Park, Christchurch, New Zealand (LTNZ 2005, p28)



A difficulty with any form of separation for cyclists is what to do when they need to be reintegrated into motorised traffic. A simple way is to return cyclists to cycle lanes and provide for them as previously discussed. It is important that drivers know where to expect to encounter cyclists (Davies et al 1996). There are other techniques that involve maintaining separation of road users and not creating the problem of re-integration. For example, cyclists could remain on their separate cycle path and cross with traffic signals, either with pedestrians or cycle-specific signals (see figure 3.27). However, these can be difficult for right-turning cyclists, who may need two phases to complete their turn. On the other hand, there are examples of head-start signals (see figure 3.28) that give cyclists their own signal phasing for navigating the intersection.

Figure 3.27 Cyclist path crossing at traffic signals, Germany (A Wilke)



Figure 3.28 Right-hand-turning cycle head-start signal call button, Palmerston North, New Zealand (G Koorey)



It is also difficult to provide separate paths at roundabouts, but it can be achieved if there is sufficient space. These can be either with priority (as in figure 3.29) or without priority (as in figure 3.30). (For this research, the focus was on single-lane roundabouts in urban areas with speeds of 50km/h or less, rather than large, double-lane, high-speed roundabouts.) Where priority is given to the cyclist, space is provided for motor vehicles to give way to the cycle path and also to wait for access to the roundabout. Where motor vehicles have priority, cyclists wait at each road-crossing point and are usually provided with a rail to help them maintain their balance.

Another option for navigating roundabouts is the use of underpasses, which can keep cyclists completely separated from traffic (see figure 3.31). Unfortunately, personal safety issues commonly arise with this option, particularly when underpasses are poorly designed and do not allow sufficient light, or space for both walkers and cyclists.

Figure 3.29 Dutch roundabout with priority for cyclists (S Kingham)



Figure 3.30 Cyclists' path around a roundabout that does not allow cyclist priority (Christchurch City Council)



Figure 3.31 Underpass for cyclists, US (image inverted) (unknown source)



3.6 Policy options

On the question of investing to maximise benefit, a number of policy implications need to be considered. It has been argued that methods used to increase and promote cycling should utilise more than just infrastructural improvements, as the impact of infrastructure on its own will be limited if it is not implemented in conjunction with other promotional activities (McClintock 2002c). These can include both ‘hard’ and ‘soft’ campaigns and policies (Jensen et al 2000).

3.6.1 ‘Hard policies’

‘Hard’ policies focus on providing infrastructure for cyclists, based on a belief that creating new facilities will increase cycling levels (Skinner and Rosen 2007). Cycling networks need to be coherent, direct, attractive, safe and comfortable (Ploeger 2003), with minimal interaction with motor vehicles (Wittink 2003). There are geographical differences in rates of physical activity that are attributed to differences in the built environment, such as aesthetics, density of urban area, land use and street connectivity (Badland and Schofield 2006). To encourage walking and cycling, therefore, the spatial layout of cities needs to be designed with the main aims of creating direct routes, safety and convenience (McClintock 2002a).

A recurring problem with cycling infrastructure is route continuity, which Davies et al (1996) considered to be crucial. The facilities provided often fail cyclists at the places they have the greatest need, such as at intersections (McClintock 2002a). As the motor vehicle can provide reasonable door-to-door transport, cycling facilities need to be extensive in order to replicate this ability to travel from location to location with ease (Tolley 1997).

Having facilities at the place of employment is another policy often mentioned as a method of promoting cycling. Studies have found that workplace conditions are important for shaping mobility (Skinner and

Rosen 2007). Employers are now encouraged to provide facilities such as covered bicycle stands, maintenance kits, lockers, showers and changing rooms, as well as other incentives such as emergency transport, bicycle groups and financial incentives (Sport & Recreation NZ 2006). Cycle-friendly employer schemes can be very effective (Davies et al 1996). Deterrents to cycling can be perceived differently. For example, cycle commuters would prefer to have such facilities at work, but this does not have an effect on their cycling habits (Stinson and Bhat 2004). On the other hand, non-cyclists often mention lack of facilities at work as a deterrent.

3.6.2 'Soft' campaigns

'Soft' promotional campaigns may target regular and casual cyclists, to encourage them to continue cycling, or they may try to attract motor vehicle drivers and passengers into cycling (Jensen et al 2000). Travel demand management is one such method, but people can respond to these in a number of ways, such as creating more efficient trips through increased planning, or suppressing trips through activity changes (Loukopoulos et al 2004). Some programmes for encouraging active transport focus on the workplace, rather than the network that needs to be navigated to reach the destination (Howard and Burnes 2001).

Restricting motor vehicle use is another aspect of 'soft' policies. This option is based on the argument that the goal is not to increase walking and cycling as such, but rather to reduce motor vehicle traffic (Tolley 2003) – ie, making motor vehicle use less convenient should result in a decline in motor vehicle commuters (Noland and Kunreuther 1995).

Clearly, not all investment costs the same amount of money. In terms of infrastructure, greater separation of cyclists and motor vehicle traffic generally costs more, although it can be cheaper if cycling infrastructure is installed at the same time as making improvements to the road infrastructure. As a result providing definitive costs is difficult and consequently documentation that presents the data are rarely available in a useful comparative form. The most complete and relevant for New Zealand are from the NZTA/Viastrada Fundamentals of Planning and Design for Cycling Course Notes, specifically Table 6.1 (Wilke and Macbeth, 2008). This suggests an on-road cycle lane will cost anything between \$10,000 and \$200,000 per kilometre (depending on the level of extra work needed as part of the addition of the cycle lane) while a separated path will cost around \$100,000 per kilometre. However, while the benefit-cost ratio of road-building schemes is usually between two and three, ratios for cycling infrastructure in excess of 20 are common when the health benefits of cycling (eg reductions in obesity) are included (Cavill and Torrance 2009), and can exceed 40 (SQW Consulting 2008).

3.7 Conclusion

While cycling is currently a minor transport mode, there are a variety of reasons – environmental, social and economic – for increasing utilitarian cycling levels. The motivations and barriers regarding utilitarian cycling that have been identified include the following (noting that some of these can be perceived as either a motivation or a barrier by different people):

- safety
- helmets
- fear of cycling

- cycling infrastructure
- weather
- topography
- the cost of transport
- motor vehicle dependency
- exposure to fumes
- convenience
- gender issues
- previous experience of cycling
- cycling clothing
- attitudes to health and fitness
- awareness of, and perceived responsibility for, environmental issues
- the cycling culture
- availability of parking
- facilities at work.

In particular, safety, fear of cycling, and type of cycling infrastructure are arguably the most significant issues. These motivations and barriers, which were found through international research, formed the basis of this study's methodology, in particular influencing the questions asked in the surveys. The focus groups, and to a certain extent the questionnaires, aimed to discover whether these barriers were similar to those faced by potential cyclists in New Zealand, and which was the biggest barrier overall. In addition, on the assumption that safety would be the most significant issue, we used examples of the infrastructure that is provided internationally to find out the types of facilities that New Zealanders who were interested in cycling considered to be safe and attractive.

4 Research method

This research investigated what is needed to attract new people to cycling for transport, with a specific focus on what level of infrastructure this would take. This required the inclusion of all possible people who might be interested in cycling for transport. Research into perceptions of cycling facilities often focuses on people who currently cycle (Durdin and Ferigo 2007, Hughes 2007). However, commuter cyclists and non-commuter cyclists perceive the motivations and barriers differently (Stinson and Bhat 2003).

Consequently, this research investigated the issues for people who are interested in cycling but who currently do not cycle regularly for utility purposes.

A multi-method approach, consisting of qualitative and quantitative data gathering, was chosen. Quantitative questionnaires were used to survey a wide range of people. From these, we identified a smaller group of people who were interested in cycling and invited them to undertake a qualitative investigation, through focus groups, into the issues involved with utilitarian cycling – particularly the journey to work or education.

4.1 Questionnaires

The primary purpose of the questionnaires was to identify people who may belong to the latent demand group. Respondents were asked a variety of travel questions aimed at gauging current travel behaviour and openness to sustainable modes of transport. These included questions about how the person usually travelled to work; their reasons for using this form of transport; other forms of transport they used to get to work; whether they lived within a reasonable cycling distance from work; and what, if anything, would encourage them to cycle to work. Finally, respondents were asked if they were prepared to participate in further research, and if so, to provide contact details. This allowed the researcher to identify potential cyclists and then invite them to focus groups, the next stage of the research.

It should be noted that one potential drawback of self-reporting about behaviours is that what people say may differ from their actual behaviour (Parfitt 2005). The questionnaires and focus groups were designed to minimise this, with corroboration between related questions. Travel surveys were carried out at workplaces, among recreational cyclists, and more broadly within the community. These are described in more detail below.

4.1.1 Workplace travel surveys

Workplace surveys were undertaken at the University of Canterbury (UC) and the Canterbury District Health Board (CDHB).

The UC travel survey was undertaken on 22 July 2008 (a copy of the questionnaire can be found in appendix A). For this survey, no pilot was run as the questionnaire was based on previous surveys. The majority of respondents completed the survey online (and a small number of support staff who did not have an email address were given paper questionnaires). Topics covered in the questionnaire were broader than required for this research; however, the relevant information could easily be separated out, including respondents' willingness to participate in further research. Responses were received from 1027 staff (37% of all staff employed at UC) and 3745 students (26% of all those enrolled). No specific sample of people was chosen; rather, the survey was advertised to all students and staff, and respondents self-selected to complete the questionnaire, with the incentive of a prize draw for all surveys submitted.

The CDHB survey was carried out online by Beca in July and August 2008 at two Christchurch sites: Community and Public Health (CPH), an organisation that works on policies for improving health in the community; and Princess Margaret Hospital (PMH), a hospital that specialises in older persons' care and mental health. The data and final reports from these questionnaires were not completed at the time of this research and therefore cannot be reported in this research. It was, however, possible to identify focus group participants from these questionnaires.

4.1.2 Recreational cyclists' questionnaire

To ensure consistency, a questionnaire for recreational cyclists was developed from the questions asked in the UC questionnaire. A pilot survey was run with a small number of people and minor adjustments were made, but the questions and possible responses were kept as close as possible to those in the UC survey. The target group, recreational cyclists, was identified through population characteristics rather than geographical or temporal boundaries (Parfitt 2005).

The questionnaire was conducted via two methods:

- In November 2008, an electronic questionnaire was promoted through forums on the popular cycling websites Vorb (www.vorb.org.nz) and Ridestrong (www.ridestrong.org.nz). This method resulted in 268 online responses.
- Between August and October 2008, a paper intercept questionnaire was carried out at weekends at four popular recreational cycling sites: McLean's Island, Bottle Lake Forest, Sumner and the Little River Rail Trail. Anyone participating in recreational cycling activities at those sites when the research team was there was asked to undertake the questionnaire. A total of 111 paper questionnaires were completed, with a response rate of approximately 95% (see table 4.1).

Table 4.1 Number of recreational questionnaires completed

McLean's Island	Bottle Lake Forest	Sumner	Little River Rail Trail	Subtotal	Electronic questionnaires	Total
34	33	18	27	111	268	379

Limitations of the recreational cyclists' questionnaire were:

- lack of respondents from different subgroups of recreational cyclists (ie road cyclists, family cyclists and mountain bikers) – the different locations mentioned above were selected to try to capture these different groups
- self-selection on the electronic questionnaire – recreational cyclists who were interested in utilitarian cycling, or who cycled to work, responded in greater numbers than those who had no interest in utilitarian cycling.

4.1.3 Community questionnaire

The community questionnaire was based on the workplace and recreational cyclists' questionnaires. However, additional travel destinations were added, including supermarket, local shops, mall, library, restaurant, community centre, church, community class and sport's practice facilities. In addition, respondents were asked about their commuter habits and willingness to participate in focus groups. Advertisements were placed in the public newsletters of Environment Canterbury (ECan) and Christchurch

City Council, as well as those of a local sports club, a school, and a church. These advertisements directed people towards the online survey, and 147 people responded. Some self-selection may have occurred, with people who already cycled, or were interested in cycling, responding to the questionnaire. However, since this section of society was the target of our research, we felt the bias would not have a significant effect.

4.2 Focus groups

The second stage of the research was to undertake focus groups with potential cyclists to discuss issues related to utilitarian cycling. These were held between late October 2008 and March 2009. A total of 48 people participated in eight focus groups.

The majority of participants were recruited from workplace survey respondents at the UC and the CDHB, with a few respondents from the recreational and community surveys. A small number of additional participants were recruited through direct contact at CPH, the University and ECan. In all cases the criteria for inclusion in the focus group were as follows:

- Their usual mode of transport was not the bicycle, and preferably was the motor vehicle.
- They perceived that they lived within reasonable cycling distance from their workplace.
- They indicated that something could encourage them to cycle.
- They had no other significant barriers to cycling for transport.

While there was an attempt to balance the genders, no other characteristics, such as age or ethnicity, were used to select the focus group participants.

The groups ranged in size from two to seven people and were primarily held at the UC (see figure 4.1). Other locations were at worksites for CPH, PMH and ECan. Each session lasted approximately 90–120 minutes and refreshments were provided. As part of the ethics application, each participant was fully briefed via an information sheet prior to participating, and signed a consent form (see appendix B) that included giving permission to be tape recorded. Full confidentiality was assured for all participants.

Figure 4.1 Focus group in action at University of Canterbury (G Koorey)



The focus groups covered a variety of topics regarding transport issues in general, and more specific issues regarding cycling (see appendix C for a list of topics). In the second part of the focus group, a PowerPoint presentation showed a range of types of cycling infrastructure (see appendix E), and participants were asked to complete a short questionnaire rating how comfortable they would be to cycle on that type of infrastructure (see appendix D).

The following cycling facility examples (listed in appendix E) were shown to participants:

- mid-block (sections of road between major intersections)
 - no specific cycling provision
 - simple on-road cycle lane
 - cycle lane with extra highlighting
 - kerbed cycle lane
 - cycleway directly behind parking
 - cycleway behind parking, with separation
 - shared path with pedestrians
- straight-ahead manoeuvres at signalised intersections
 - no specific cycling provision
 - on-road cycle lane
 - off-road cycle path going with general traffic signals
 - off-road cycle path going with cycle/pedestrian signals
- right-hand turns at signalised intersections
 - no specific traffic provision
 - right-hand-turn traffic lane
 - right-hand-turn cycle lane
 - advanced stop box
 - hook turn
 - head-start signals
- roundabouts
 - no specific cycling provision
 - circumferential on-road cycle lane
 - on-road cycle lanes with directional splits before exits
 - circumferential cycle path with no priority
 - circumferential cycle path with priority
- underpasses.

Participants were shown a simple plan view of the typical layout plus photos of various examples from around the world (there were often a number of variations). Where necessary additional motor vehicles were artificially added to the photos so they all had similar levels of traffic. For the mid-block sections, a photo from the same length of road (not from Christchurch, to avoid emotional bias) was digitally 'mocked up' to allow a direct comparison between the options. This photo featured parking, driveways and side-roads to help participants consider those aspects of the facility.

Participants rated each facility as it was shown and then afterwards discussed the positive and negative aspects of the example facility. It was also conveyed to participants that the facilities shown were concepts and that the photos were to demonstrate the concepts, not to show how they would be specifically implemented.

There was a concern that showing the slides in a particular order could create bias, particularly if this was infrastructure in order of 'worst' to 'best' from the researcher's perspective. Therefore each group was shown a slideshow with the slides in a different order.

5 Survey data

5.1 Questionnaire data

The data from the University of Canterbury Travel Survey, recreational cyclists' questionnaires and the community questionnaire was analysed to identify potential cyclists as well as gather more data on the characteristics of current commuter cyclists. In addition, focus group participants were drawn from CDHB questionnaires that were part of the workplace travel-plan process at PMH and CPH.

The questionnaires also gathered data on motivations and barriers regarding cycling, and respondents' usual mode of travel to work and other locations. In particular, the questionnaires gathered information on the factors that would encourage people to cycle (or cycle more frequently) to work. The information from these questionnaires is outlined below and was used to identify the main cycling issues for a broad range of people. The order of categories on the graphs is taken from the order of responses in the questionnaires, rather than organised through the proportion of responses.

5.2 University of Canterbury questionnaire

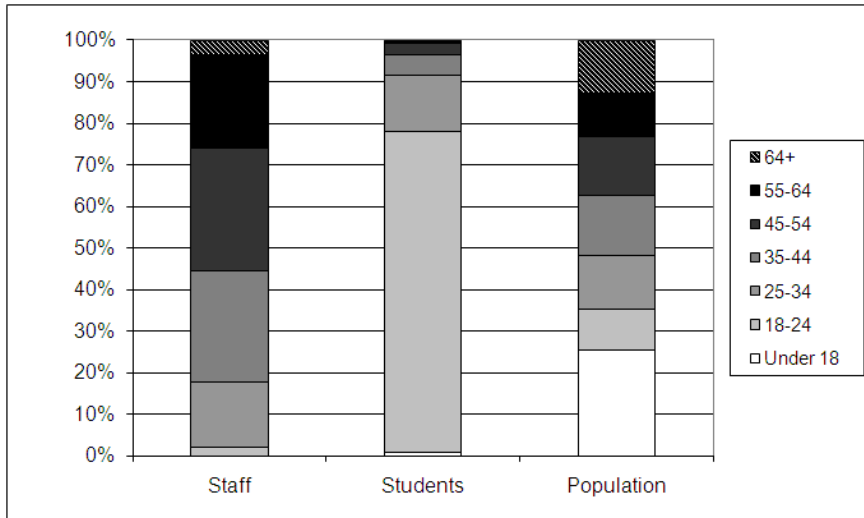
The University of Canterbury Travel Survey 2008 consisted of a questionnaire completed online by 4772 respondents in July 2008. This survey occurs every four years and the information gained is used to inform and drive the University's transport policy. Table 5.1 shows the breakdown of gender and staff/student proportions for respondents to the questionnaire, which broadly reflect the population of the university (although students make up a greater proportion of the entire population of the country).

Table 5.1 Cross-tabulation of respondents' gender and university status

	Male		Female		Total	
	No.	% of responses	No.	% of responses	No.	% of responses
Staff	456	44%	571	56%	1027	22%
Students	1756	47%	1989	53%	3745	78%
Total	2212	46%	2560	54%	4772	100%

A significant proportion of respondents, mainly students, were aged between 18–24 years, which created a bias in our sample, compared with the general population (see figure 5.1 following).

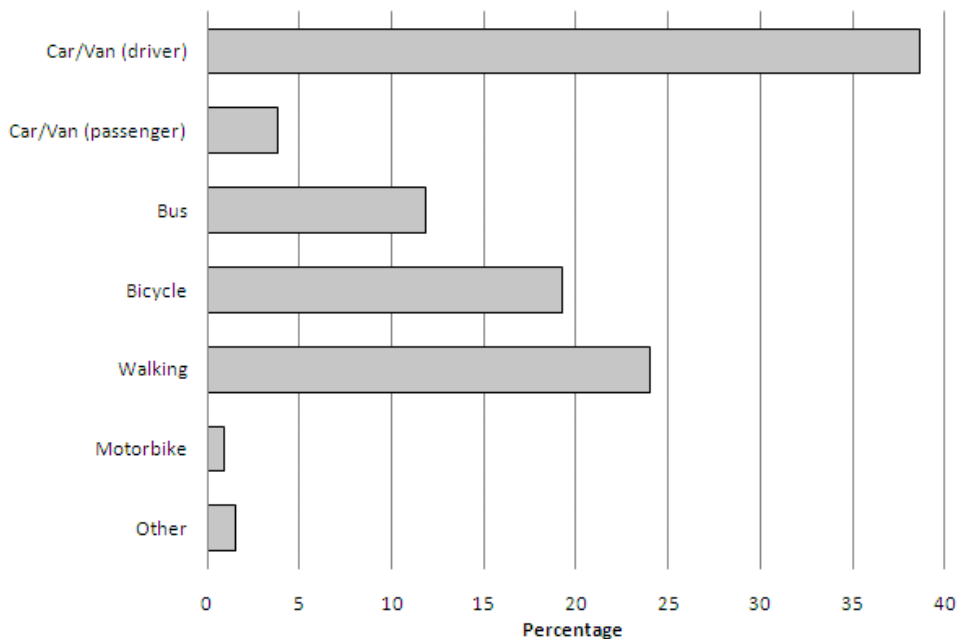
Figure 5.1 Proportion of staff and students in each age group



5.2.1 General transport patterns

All respondents were asked to report their usual (most frequent) form of transport to the university – 39% said they drove to work, while another 4% were passengers in a motor vehicle (see figure 5.2). This commuter mode share for motor vehicles was much lower than the commuter mode share for motor vehicle drivers for New Zealand or Christchurch, both of which are above 70% (Statistics New Zealand 2008). Walking, cycling and using the bus all had higher commuter shares than the national or regional trends, reinforcing the proposition that students and academics are higher users of sustainable transport modes compared with the general population (Pucher et al 1999). On the other hand, this trend may mean that for UC staff and students, the issues experienced in regards to cycling are different from those for the rest of the population. For students at least, income and age appear to have a major influence on their travel mode.

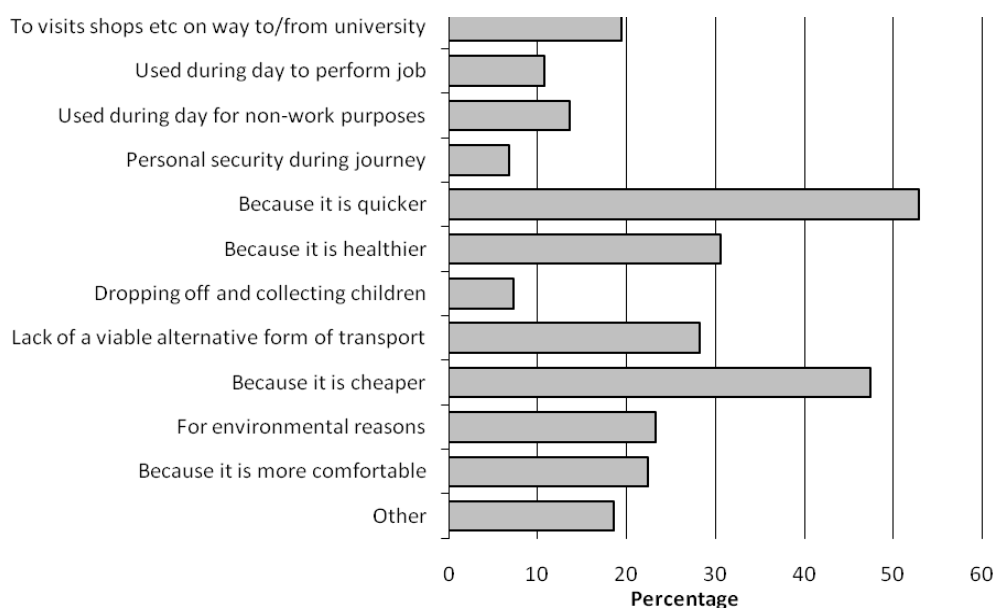
Figure 5.2 Usual (most frequent) mode of transport for all respondents



Another issue with regard to general transport modes was the reasons that people gave for their modal choice (see figure 5.3). These reasons could also be used to evaluate the latent demand for utility cycling, as some impediments to people cycling rather than driving could be more difficult to overcome – eg transporting children to school on the way to work. Respondents could indicate as many reasons as applied to them and, therefore, the percentage of total responses was more than 100%. The highest proportion of responses was ‘because it is quicker’, followed by ‘because it is cheaper’. This latter reason may have motivated students to walk, cycle or take public transport. Other reasons that were frequently reported were ‘because it is healthier’ and ‘lack of a viable alternative form of transport’, suggesting that some people lived too far away from the university to walk or cycle, or did not have a direct bus route.

Finally, respondents were asked to indicate which reason was *most* important in their modal choice – 27% said ‘because it is quicker’, and 23% said ‘because it is cheaper’. ‘Lack of a viable alternative’ (14%) and ‘because it is healthier’ (6%) were the next most popular options, although 11% chose ‘other’ reasons, such as weather and the need to transport gear. All other reasons had fewer than 5% of respondents identifying them as most important.

Figure 5.3 Reasons for using current mode of transport, for all respondents



5.2.2 Quantifying latent demand

One of the main aims of the questionnaire was to identify the latent demand for utility cycling. Part of the questionnaire, therefore, asked questions relating to each transport modes’ accessibility, such as whether people lived within a reasonable cycling distance from the university, or whether they owned a bicycle.

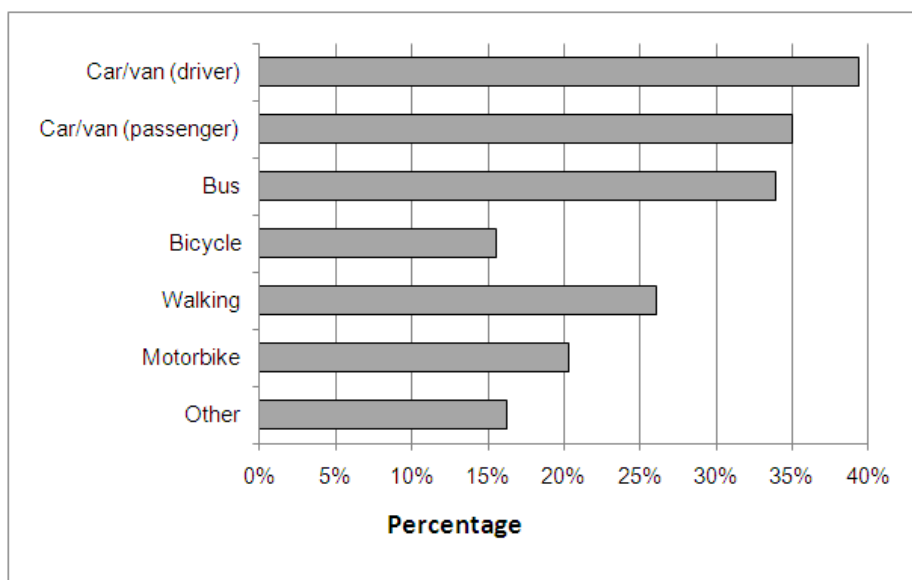
Firstly, the proportion of respondents who owned or had access to a bicycle was considered. More than half of respondents were not asked this question, as they had previously indicated they cycled to university at least some of the time; another quarter had access to a bicycle; and the remaining 24% did not have access to a bicycle. These figures suggested that more than 75% of people (within this population, at least) had direct access to a bicycle, and therefore one obvious barrier was discounted or removed. However, not having access to a bicycle is not necessarily a barrier to considering cycling for

transport, so these people were not automatically removed from the latent demand group – their responses about cycling had indicated that they were interested in cycling as a transport mode.

Another question in this process was to ask respondents whether they lived within a reasonable distance for cycling to university. The response to this question reflected the respondent’s perception of a ‘reasonable distance’, usually considered to be up to 8km, as discussed in the literature review. Of all respondents, 70% said they lived within a reasonable cycling distance from the university (including those that already did so), meaning that for a high proportion of the university population, the most difficult barrier to overcome, distance, was not an issue.

While some may have had access to a bicycle and lived within a reasonable cycling distance, they may still not have been open to the idea of cycling. As part of the question asking respondents what, if anything, would encourage them to cycle (or cycle more frequently), the option of ‘Nothing would encourage me to cycle (or cycle more frequently) to University of Canterbury’ was provided, and 30% of respondents selected this answer. These people generally belonged to the group of people who were not included in this study, ie non-cyclists who were not open to the idea of commuter cycling. The exception to this is shown in figure 5.4, which shows the proportion of people in each travel mode who could not be encouraged to cycle (or cycle more frequently) to the university. Just over 15% of those who already cycled to university chose this option, presumably indicating that they could not cycle more. Two possible reasons could be that either they already cycled every day, or had barriers that they believed could not be overcome on the days that they did not cycle. Motor vehicle drivers had the highest proportion of people stating that nothing would encourage them to cycle, followed by car/van passengers and public transport users. A quarter of walkers also stated that nothing would encourage them to cycle – perhaps because they lived too close to university, as opposed to motor vehicle drivers, who possibly lived too far from campus to cycle.

Figure 5.4 Proportion of respondents in each mode of transport who stated that nothing would encourage them to cycle (or cycle more frequently) to university



A cross-tabulation between the factors of whether people perceived they lived within a reasonable cycling distance and their transport mode was completed (see table 5.2). Around 50% of the people who travelled to university by car or bus perceived that they lived at an unreasonable distance for cycling – meaning that around half of them felt they did live close enough to cycle. This suggested that distance was only half the

problem in increasing cycle use. Nearly everyone who cycled, walked or came on a skateboard/blades/scooter considered that they lived within a reasonable cycling distance.

Table 5.2 Modal share for respondents' perception of whether they lived within a reasonable cycling distance from university

Transport mode	Reasonable distance
Car/van driver	46%
Car/van passenger	52%
Bus	48%
Cycle	99%
Walk	98%
Skateboard/blades/scooter	95%
Motorbike/moped	68%

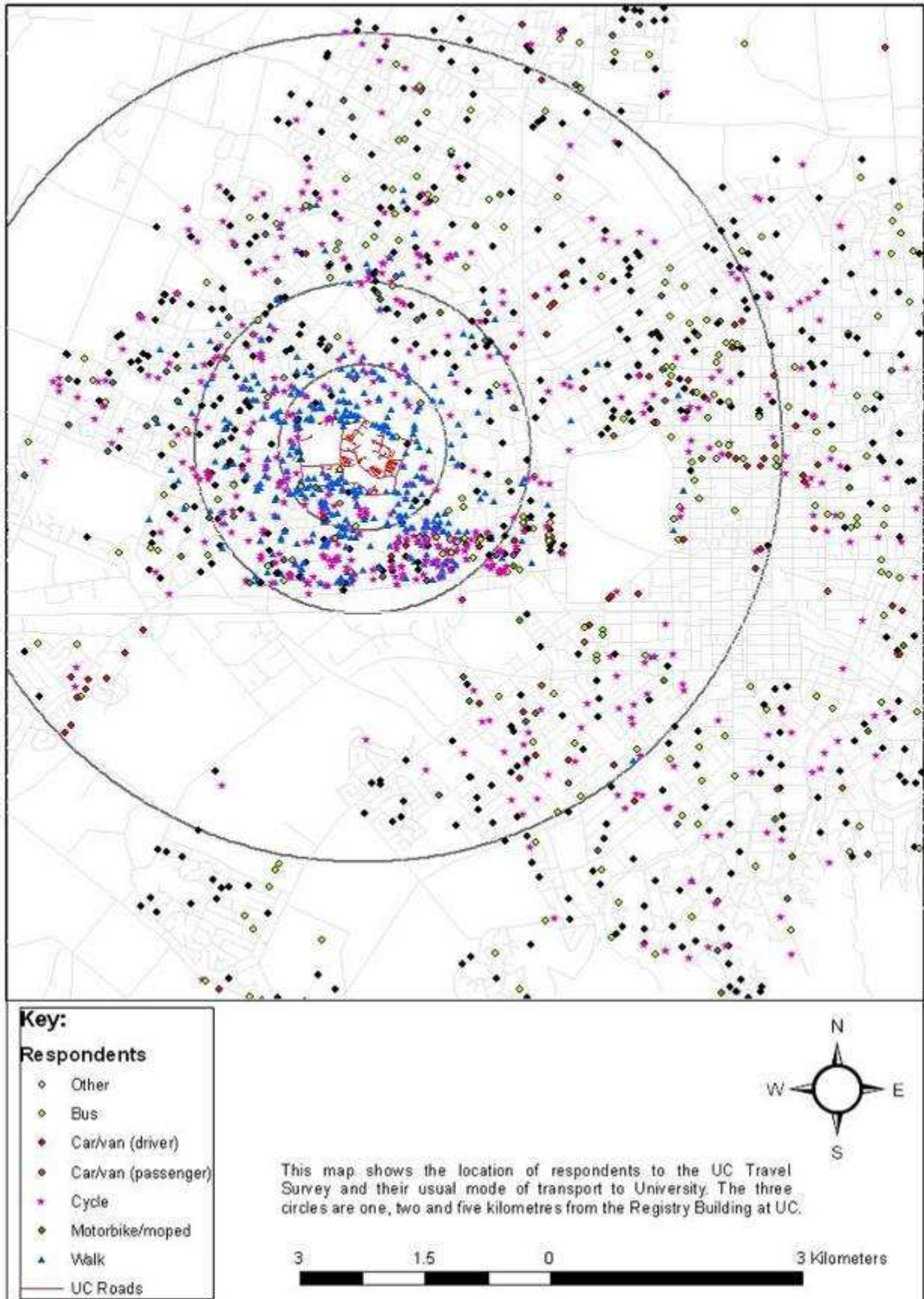
5.2.3 Distance

As part of the questionnaire, respondents were asked to supply their address. These addresses were geocoded in ArcGIS so that a spatial analysis could be performed regarding distance and mode of transport. Out of the 4772 respondents, 2767 supplied addresses that were successfully geocoded (see figure 5.5); the remaining 2005 respondents did not provide a useable address or street number. Table 5.3 shows the occurrence of the geocoded addresses in each distance category. One limitation of this data is that distance is calculated in a straight line from the university rather than actual distance travelled along the road network. Another limitation is that although there were education students and staff who responded to the questionnaire, the College of Education was not included within the UC spatial file.

Table 5.3 Frequency of geocoded addresses in each distance category

Distance (radius) from UC	Frequency of addresses		Cumulative distance	Cumulative frequency	
	Count	Percentage		Count	Percentage
<1.0km	983	36%	<1km	983	36%
1.1-2.0km	336	12%	<2km	1319	47%
2.1-5.0km	661	24%	<5km	1980	72%
5.1-10.0km	485	18%	<10km	2465	89%
10.1-15.0km	168	6%	<15km	2633	95%
15.1-20.0km	63	2%	<20km	2696	97%
20.0km+	71	2%	Overall	2767	100%
Total	2767	100%			

Figure 5.5 Geocoded location and usual mode of transport for UC Travel Survey respondents



Spatial analysis was then undertaken to calculate the modal share for respondents in each distance category (see figure 5.5 above and table 5.4 following). Drivers and passengers in a motor vehicle were combined into one category. Other modes such as bus, skateboard and motorcycle were not included in this analysis of modal share, but were not removed from the total number of respondents. As one might expect, walking had the highest modal share (66%) for people who lived less than 1km from the university. Walking mode share then dropped dramatically over longer distances, as cycling and motor vehicles became more dominant. Cycling was used for a reasonable proportion of trips that were up to 5km long, but then dropped away once trips were 10km or longer. Motor vehicles were the dominant mode used when the trip was more than 2km, and the level of motor vehicle use steadily increased as distance increased.

Table 5.4 Modal share for cycling, walking and motor vehicles for each distance category

Distance (radius) from UC	Frequency of occurrence	Cycled		Walked		Travelled in a motor vehicle	
		Count	Percentage	Count	Percentage	Count	Percentage
<1.0km	983	208	21%	651	66%	70	7%
1.1–2.0km	336	113	34%	65	19%	111	33%
2.1–5.0km	661	152	23%	21	3%	337	51%
5.1–10.0km	485	72	15%	6	1%	279	58%
10.1–15.0km	168	5	3%	0	0%	119	71%
15.1–20.0km	63	1	2%	0	0%	53	84%

In order to further understand the distance for which people were willing to use a bicycle for transport, the spatial dataset was used to identify the proportion of people who perceived each distance category to be a reasonable distance to cycle. These figures are shown in table 5.5, and it is clear that the majority of people considered 5km or less to be a reasonable distance to cycle. Even 43% of people who lived 5–10km away perceived that distance to be reasonable for cycling, but the proportions dropped dramatically after that distance. One of the issues with asking people what they perceived to be a reasonable distance to cycle was that people were unaware of how far they could cycle in a ‘reasonable’ time period (Geus et al 2008).

Table 5.5 Proportion of people who perceived the distance to be reasonable for cycling

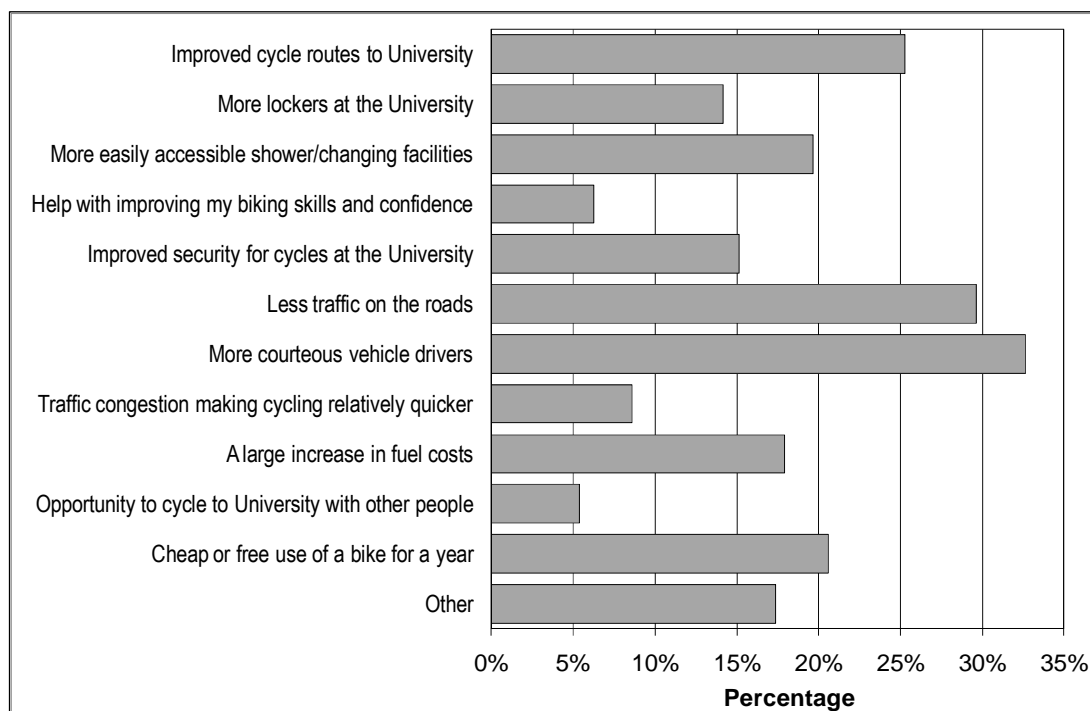
Distance (radius) from UC	Frequency of occurrence	Number who stated it was a reasonable distance to cycle	Percentage who stated it was a reasonable distance to cycle
<1.0km	983	960	98%
1.1–2.0km	336	325	97%
2.1–5.0km	661	515	78%
5.1–10.0km	485	208	43%
10.1–15.0km	168	16	10%
15.1–20.0km	63	3	5%

5.2.4 Barriers and motivations associated with cycling

This section discusses the responses to the question on what factors would encourage people to cycle (or cycle more frequently) to University. In part, this provided information on the barriers and motivations that people perceived around cycling, and which were the most significant factors to consider when improving the environment in order to encourage cycling. Because respondents were able to indicate as many factors as they wanted (see figure 5.6), the proportion of responses to each option is shown. The most frequently cited factors were ‘more courteous motor vehicle drivers’, followed closely by ‘less traffic on the roads’, both with 29% or more of participants giving these responses. These factors indicated that the interaction between motorised traffic and cyclists was of serious concern to many people, although it should be noted that we would expect the experiences of non-cyclists and existing cyclists to be quite different. The third most commonly cited factor (25%) was ‘improved cycle routes to University’, which was also a factor closely linked to the issue of traffic interaction. There were then four different factors that scored 15–20% of responses. Of these, the selection of ‘cheap or free use of a bike for a year’ was interesting, as it reinforced the idea that people who did not have access to a bicycle were open to the idea of utility cycling if they could overcome this hurdle. Seventeen percent of respondents also listed ‘other’ factors that could encourage them to cycle, including living closer to university, owning a bicycle, and better weather.

Overall, this data suggested that the major factors of safety, motor vehicle interaction and cycle-specific facilities that were identified in the literature review were also the most commonly perceived issues for the respondents to the University of Canterbury questionnaire.

Figure 5.6 Factors that would encourage staff and students to cycle (or cycle more frequently) to UC



When asked which out of the 12 responses was the *most* important factor that would encourage them to cycle, aside from the 30% who chose the option of ‘nothing’, the next most common was ‘other’ (15%). This probably reflected the fact that, for example, if they didn’t currently have a bicycle or lived too far away, then this was the key sticking point to taking up cycling at that time. Of the remainder, the next most important factors were ‘improved cycle routes’ (9%) and ‘cheap or free use of a bike for a year’ (10%),

which were rated more important than ‘less traffic on the roads’ (7%) and ‘more courteous motor vehicle drivers’ (8%) – two factors that we expected to be higher, given their rating in figure 5.6.

5.3 Recreational cyclists’ questionnaire

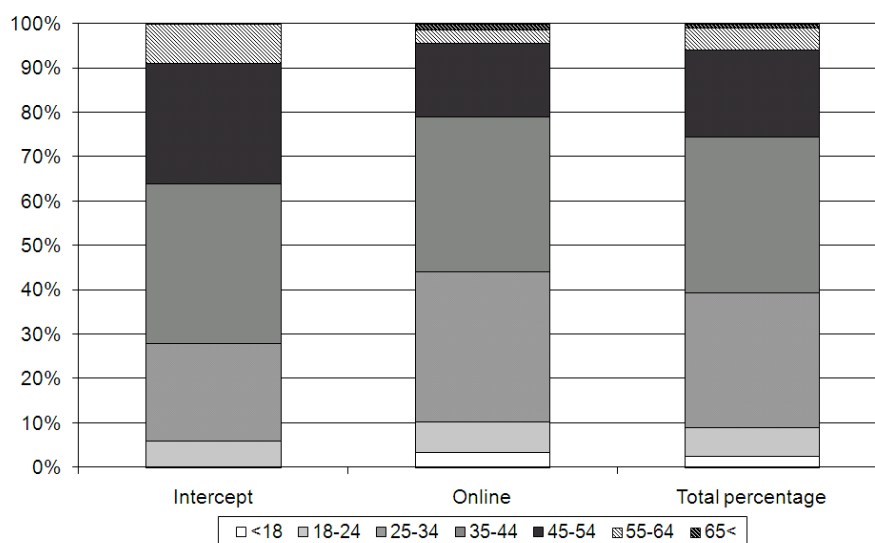
The recreational cyclists’ questionnaire was completed in two parts: the paper questionnaires were completed as an intercept questionnaire, and the online questionnaire was distributed through cycling forums in New Zealand. The results for both questionnaires are shown here, and are discussed both as two separate groups and as the overall group of recreational cyclists. The intercept questionnaire had a total of 111 respondents, while the online questionnaire had 268 responses, resulting in a total of 379 recreational cyclists surveyed through the two methods.

Table 5.6 shows the gender proportions of respondents to the recreational survey – 69% male for the intercept questionnaire, 85% for the online questionnaire. The statistic for the online questionnaire was disproportionate to the general population in New Zealand. However, the Ministry of Transport’s Household Travel Survey Data (2008) shows the male:female ratio of cyclists is approximately 3:1, which is close to the response rate of the recreational cyclists’ questionnaire. It is also probable that males are more likely to participate in recreational cycling than females. Overall, the data from the recreational cyclists’ questionnaire may have a bias towards males’ perceptions.

Table 5.6 Gender of recreational cyclists’ survey

	Male	Female
Intercept respondents	69%	31%
Online respondents	85%	15%
Total respondents	80%	19%

Figure 5.7 shows the percentage of respondents to the intercept and online questionnaires in each age category. The proportions were broadly similar for each survey type, but with a distinct bias towards younger respondents in the online survey. One possible reason for the lack of older respondents to the online questionnaire could be that older people might be less likely to be surfing internet sites and posting on forums.

Figure 5.7 Age breakdown of respondents

The online recreational questionnaire allowed for, and expected, non-Christchurch respondents, although these were not a target group as they could not easily be recruited to focus groups, which were only held in Christchurch. Consequently, the online questionnaire included a question about where respondents resided (see table 5.7). A significant proportion of the online respondents were from Greater Wellington (31%), with lower proportions from Canterbury (28%) and Greater Auckland (15%), and the remainder scattered throughout the country.

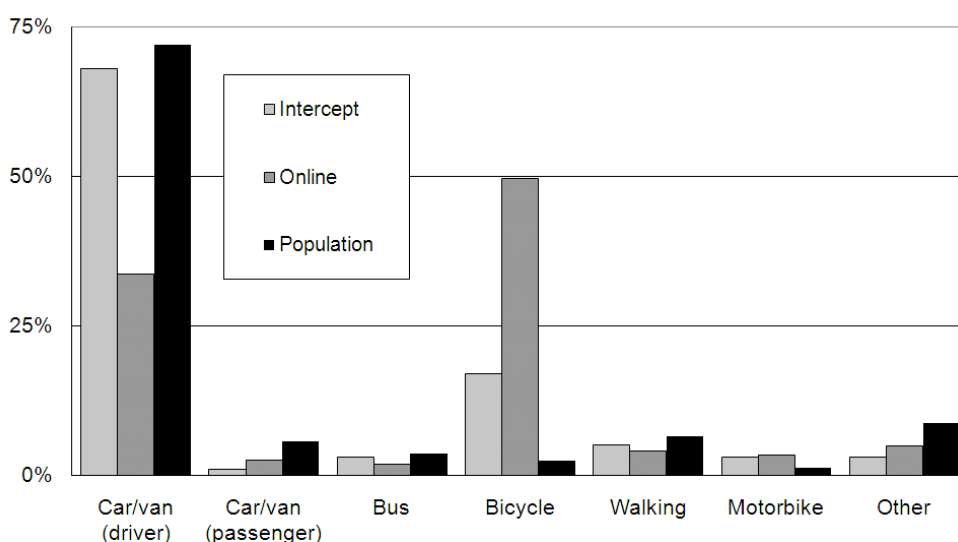
Table 5.7 Location of respondents to the online questionnaire

Location	Percentage
Northland Region	0
Auckland Region	15
Waikato Region	3
Bay of Plenty Region	8
Taranaki Region	1
Gisborne Region	0
Hawke's Bay Region	4
Manawatu-Wanganui	3
Wellington Region	31
Tasman Region	0.4
Nelson Region	1
Marlborough Region	1
West Coast Region	0
Canterbury Region	28
Otago Region	3
Southland Region	1
Other	1

5.3.1 General transport patterns

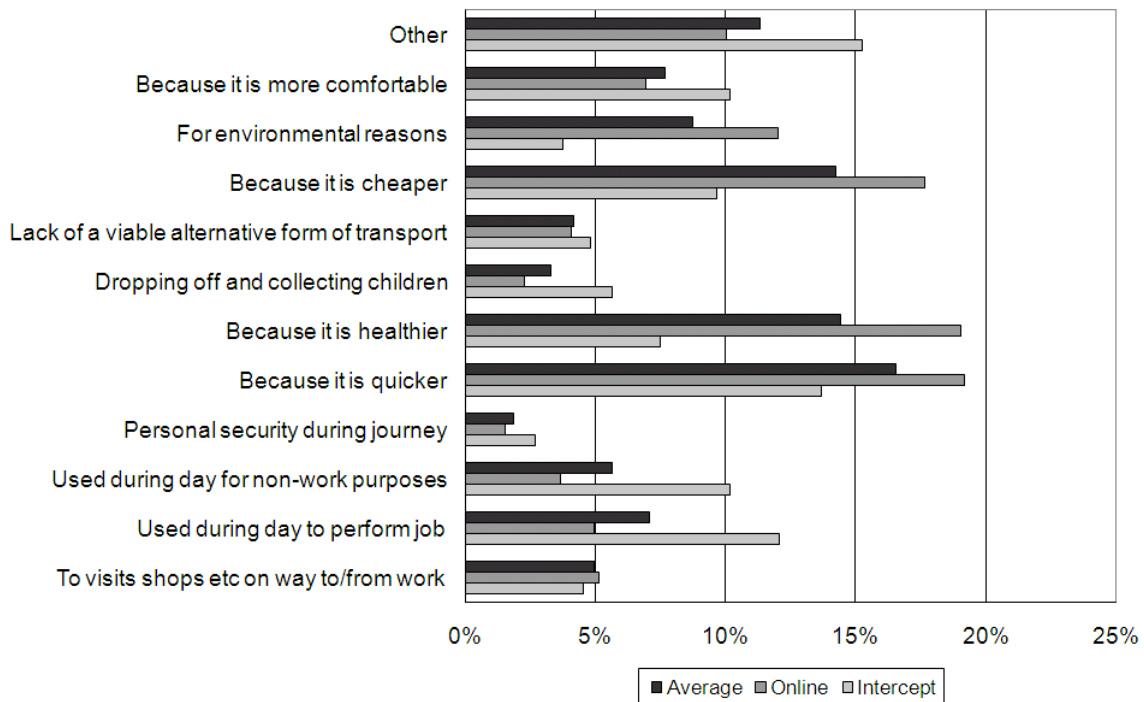
General transport patterns for recreational cyclists who responded to the intercept questionnaire were, in some respects, similar to national trends – 68% usually drove to work and a further 5% walked (see figure 5.8). The difference came, as might be expected, with 17% of the intercept questionnaire respondents cycling to work, and fewer travelling as car passengers or by bus. However, the findings from the respondents to the online questionnaire were significantly different, with 50% cycling to work and only 34% percent driving. It is highly likely that for the online questionnaire, an element of selection bias occurred through recreational cyclists with an interest in utility cycling responding, whereas intercept respondents were chosen randomly within the target audience of recreational cyclists. Also, respondents to the intercept questionnaire who drove to work often appeared during the interviews to be embarrassed that they did not cycle to work. This might also have been the case for some recreational cyclists who found the online questionnaire on the forums, but simply chose to not respond to it, thereby contributing to the difference in findings. Those who selected ‘other’ mode included respondents who normally used the train or worked at home.

Figure 5.8 Usual (most frequently used) form of transport for recreational survey respondents



Another important factor in investigating utility cycling was finding out why people used their chosen transport mode (see figure 5.9). All respondents were asked to indicate as many responses to that question as applied to them. Respondents to the intercept questionnaire selected ‘other’ as their most frequent response, followed by ‘because it is quicker’ and ‘used during day to perform job’. When being interviewed, many respondents replied that they used a company motor vehicle, but otherwise they would be likely to cycle. For respondents to the online questionnaire, the top two reasons were the mode being ‘because it is quicker’ and ‘because it is healthier’, and the third reason was that their usual mode was cheaper. These reasons reflected the higher modal share that cycling had for this group of respondents.

Figure 5.9 Reasons for using main form of transport



Respondents who selected ‘other’ were asked to specify their reason. For cyclists and motorcyclists, one of the major reasons was enjoyment (the word ‘fun’ came up quite regularly, particularly amongst respondents to the online questionnaire), as well as for fitness/training. Amongst respondents to the intercept questionnaire, motor vehicle drivers often identified shift hours, equipment to carry, laziness and company motor vehicle as reasons for driving to work. Having a company motor vehicle was also a common reason given by recreational cyclists. Unfortunately, none of these people were able to participate in focus groups, so this issue could not be further explored.

5.3.2 Qualifying latent demand

The recreational questionnaire did not ask respondents if they had access to a bicycle, as it was assumed they would if they were participating in recreational cycling activities. Unfortunately, no discussion was held with respondents about the type of bicycle they would use to commute to work, compared with the bicycle they may use to undertake recreational activities, and this resulted in a limitation for this study.

Eighty-five percent of respondents perceived that they lived within a reasonable cycling distance from work (more than for the UC questionnaire). The figure for respondents to the online questionnaire was slightly higher than for respondents to the intercept questionnaire. This figure for online respondents corresponded with the higher number of respondents cycling to work. It was also possible that compared with the more general population surveyed in the UC questionnaire, recreational cyclists had a better perception of how long it took to cycle a certain distance, and consequently they were better able to perceive whether the distance between place of residence and workplace was reasonable for cycling. The proportion of respondents for each mode who perceived they lived within a reasonable cycling distance from work is shown in table 5.8.

Table 5.8 Percentage of respondents who felt they lived a reasonable cycling distance from work, by mode (sub-divided by type of survey)

	Intercept questionnaire	Online questionnaire	Total
Car/van (driver)	70%	82%	73%
Car/van (passenger)	100%	100%	100%
Bus	100%	100%	100%
Bicycle	100%	94%	95%
Walking	83%	50%	67%
Motorbike	100%	100%	100%

The majority of the people who perceived that they did not live within a reasonable cycling distance from work drove there, although there were some walkers who felt they lived too *close* to work to cycle. Of the online respondents, 6% of those who cycled to work perceived that they lived too close to work for it to be an acceptable ride. This finding was interesting when compared to the National Travel Survey (MoT 2008), which found that more than half of all cycle trips are less than 5km long, with an average of 3km; yet many of these respondents found that distances more than 5km were still too short to bother riding. This may have reflected a bias in the fitness-oriented people who responded to these surveys.

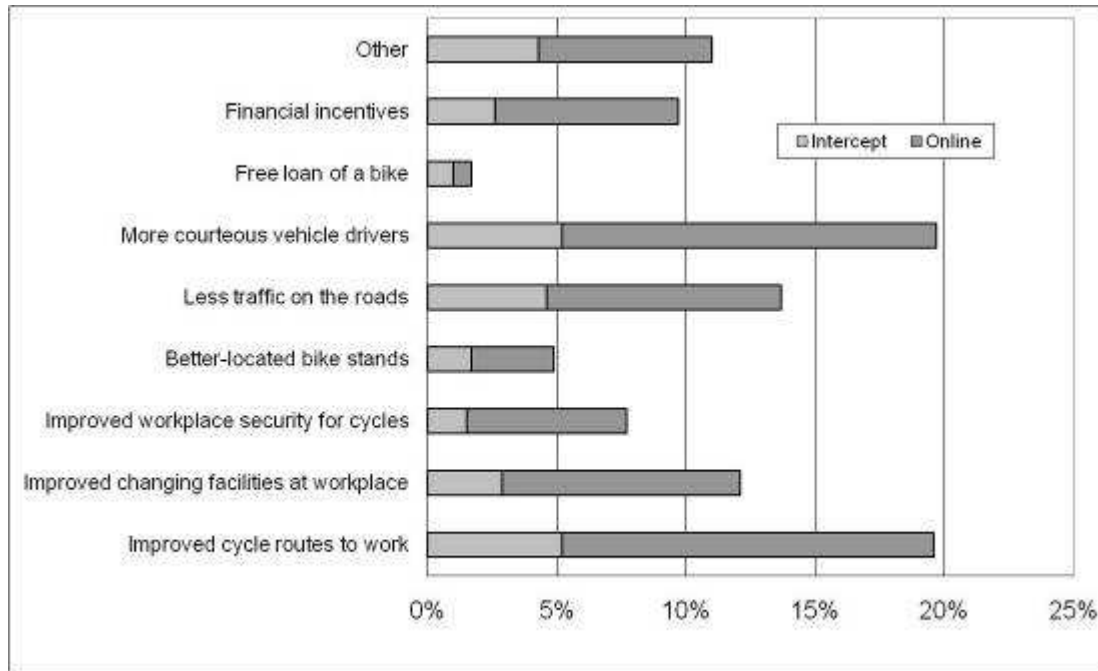
Other factors people identified as reasons for not cycling to work included safety (which was further investigated in the focus groups) and topography. The issue of topography was not researched in depth in this study because the terrain in Christchurch is predominantly flat.

The other aspect that we investigated regarding latent demand was the reasons for people saying that nothing would encourage them to cycle (or cycle more frequently) to work. Nine percent of recreational cyclists said nothing would encourage them to cycle – 23% of these came from respondents to the intercept questionnaire, 3% from respondents to the online questionnaire, again highlighting the difference between the distribution methods. These respondents were then cross-tabulated with their answers to the question about perception of distance – 55% of them also perceived that they did not live within a reasonable cycling distance from work, suggesting that 45% of people who perceived that they did live within a reasonable cycling distance had non-distance-related barriers to overcome. Of these people, the majority (84%) drove to work

5.3.3 Barriers and motivations associated with cycling

The top three factors for encouraging recreational cyclists to cycle to work (see figure 5.10) were the same as for the UC questionnaire; namely, ‘more courteous motor vehicle drivers’, ‘improved cycle routes to work’, and ‘less traffic on the roads (but having changing facilities at work was rated significantly higher than in the other questionnaires). Apart from ‘other’ (which included having better weather and not having to use a car for work purposes), the next most commonly cited factors were ‘improved changing facilities at workplace’ and ‘financial incentives’. ‘Improved workplace security for cycles’ and ‘better-located bicycle stands’ both had more than 5% of responses, but were obviously of less importance than the safety and traffic interaction issues. These responses reinforced the theory that safety and provision for cyclists were the most important factors in utilitarian cycling, but unlike the UC survey, this questionnaire did not allow respondents to indicate which factor was the most important to them.

Figure 5.10 Factors that would encourage recreational cyclists to cycle (or cycle more frequently)



5.4 Community questionnaire

The community questionnaire was completed online and had a total of 147 respondents. Firstly, respondents were asked how often they cycled for transport to any activity, including work, education and shopping, and then, depending on that response, they answered a set of questions. More than half of the respondents cycled frequently (more than twice a week), and more than a quarter of them cycled hardly ever/never (a couple of times a year or less). The remainder cycled occasionally (several times a month) (see table 5.9).

In particular, this research wanted to target those people who cycled occasionally or hardly ever; or in the case of frequent cyclists, those who cycled to work but not to other locations.

Table 5.9 Frequency of cycling for transport

Frequency of cycling for transport	No.	%
Frequently	77	52.4%
Occasionally	29	19.7%
Hardly ever/never	41	27.9%
Total	147	100.0%

Respondents were also asked classification questions on gender and age. Unfortunately, nearly 20% of respondents did not answer either question, so for the purposes of comparing this data to other questionnaires, the percentages were calculated out of the total community survey respondents who did give their gender or age, and just over half of these were female (see table 5.10), which is similar to the census data for 2006 and the other questionnaires that we conducted. The majority of the respondents were aged 35–54, and 20% were aged 55–64 (see table 5.11). These figures meant the respondents to the

community questionnaire were slightly older than those for the other questionnaires, reflecting the wider social group surveyed as opposed to the specific groups of university students, recreational cyclists and workers at specific organisations.

Table 5.10 Gender of respondents

Gender	No.	%
Male	55	46.6
Female	63	53.4
<i>Subtotal</i>	<i>118</i>	<i>80.3</i>
Unanswered	29	19.7

Table 5.11 Age of respondents

Age	No.	%
<18	2	1.7
18-24	5	4.2
25-34	10	8.4
35-44	39	32.8
45-54	34	28.6
55-64	23	19.3
65+	6	5.0
<i>Subtotal</i>	<i>119</i>	<i>81.0</i>
Unanswered	28	19.1

Respondents were asked whether they lived in Greater Christchurch or in a different area of Canterbury (the surveys were advertised in Canterbury-wide newsletters). Again, nearly 20% of respondents did not give a location, but of those who did, 94% lived in the Greater Christchurch area (table 5.12).

Table 5.12 Location of respondents

Location	No.	%
Within the Greater Christchurch area	112	94.1
Other	7	5.9
<i>Subtotal</i>	<i>119</i>	<i>81.0</i>
Unanswered	28	19.1

5.4.1 Work and education

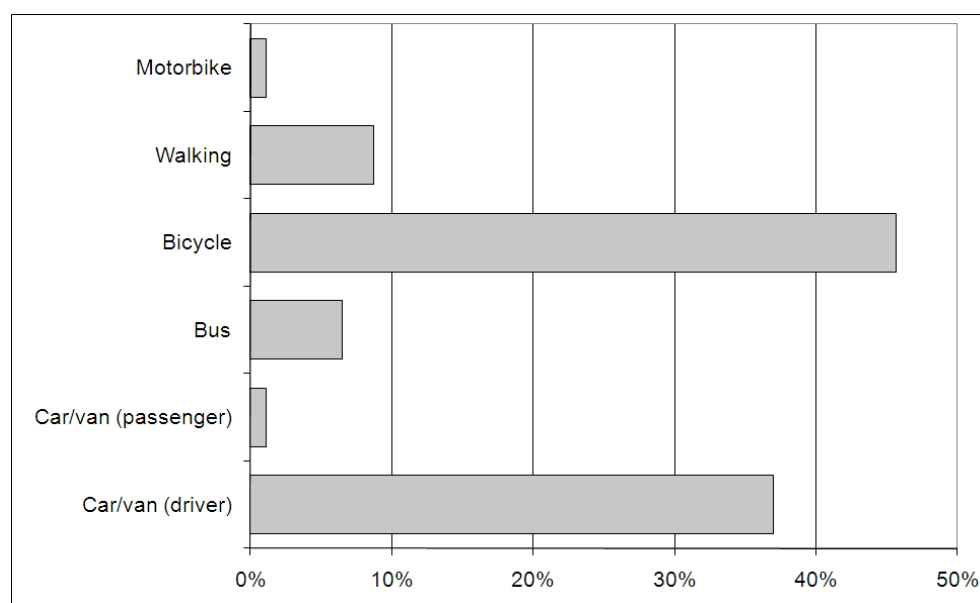
Respondents to the community questionnaire were asked whether they had a regular destination for work or study (see table 5.13). Twenty-two of them did not answer this question. Of the rest, 77.6% had a regular destination for work and study, and they were then asked how they travelled to work, using the same questions as in the other questionnaires.

Table 5.13 Respondents travelling regularly to work or study

Regular travel to work or study	Frequently		Occasionally		Hardly ever	
	Count	Percentage	Count	Percentage	Count	Percentage
Yes	49	77.8%	21	84.0%	27	73.0%
No	14	22.2%	4	16.0%	10	27.0%

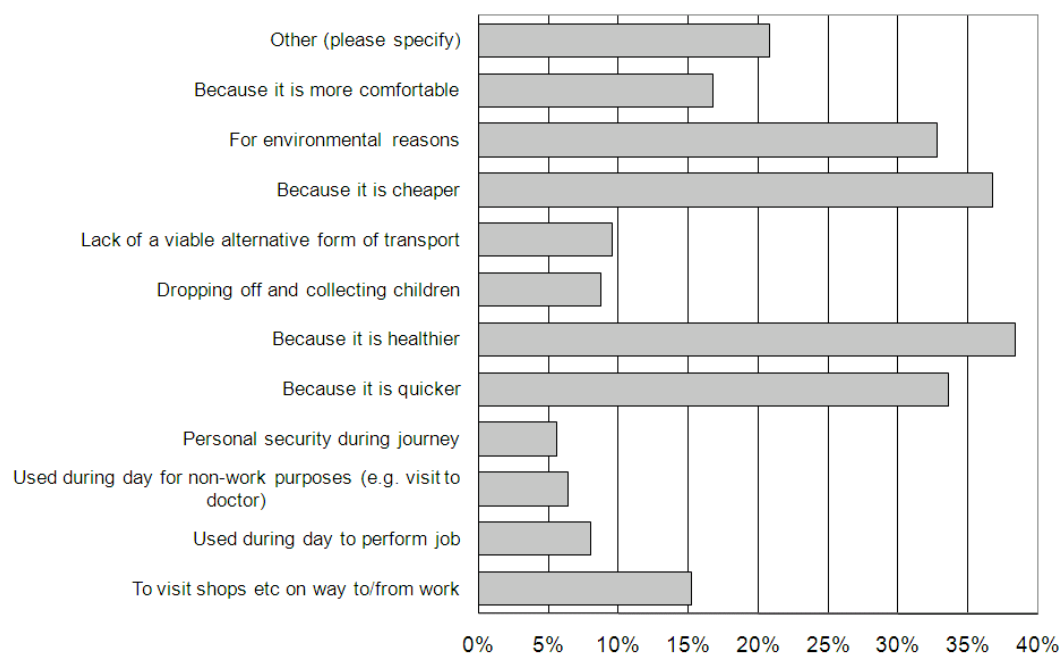
Of these, 46% cycled to work and a further 37% drove (see figure 5.11). This questionnaire and the online recreational questionnaire were the only ones where cycling to work was more common than driving to work, reflecting the high interest of people who already cycled regularly.

Figure 5.11 Usual mode of transport to work or education



The most common reasons for respondents' usual mode of transport (see figure 5.12) were 'because it is healthier', 'because it is cheaper', 'because it is quicker' and 'for environmental reasons'. These accounted for more than 14% of the total responses and were rated much higher than the other reasons. They also reflected the proportion of people who cycled to work, as these responses are often motivators for active transport.

Figure 5.12 Reason for usual mode of transport to work or education



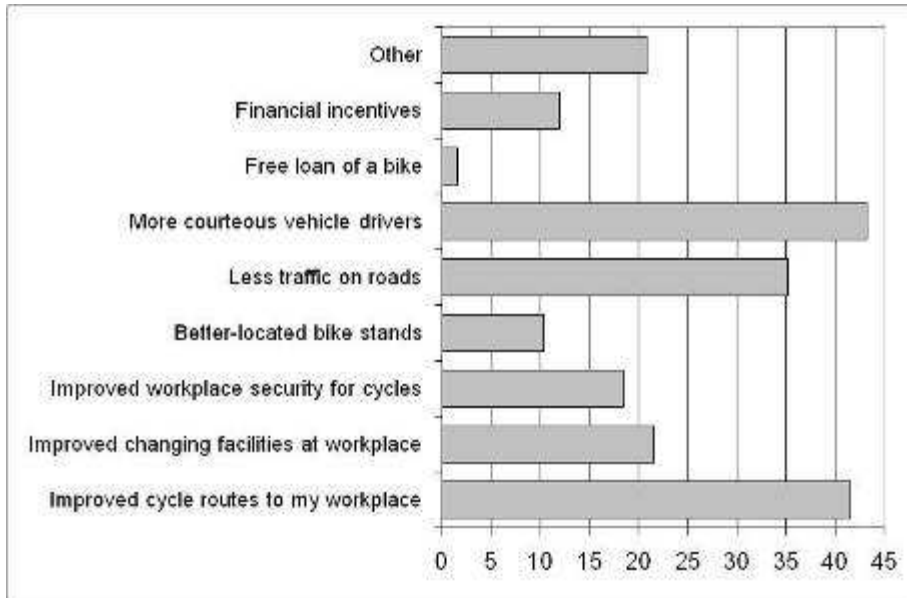
Respondents to the community questionnaire were asked to indicate which distance category their trip to work/education fell within, rather than to estimate the actual distance. They were also asked whether they considered it a reasonable distance for cycling. Thirty-four people did not give a distance to work and 33 did not say whether or not they perceived it to be a reasonable distance. Of those who did answer these questions, a high majority (64%) lived 5km or more from work, and 90% indicated that they lived within a reasonable cycling distance, clearly including a number who lived more than 5km away (see table 5.14).

Table 5.14 The distance respondents lived from work or education

Distance category	No.	%
<1 km	5	5.5
1-1.9km	5	5.5
2-4.9km	23	25.3
5-9.9km	38	41.8
10+km	20	22.0

As with the other questionnaires, the factors that would encourage people to cycle more were ‘more courteous vehicle drivers’, ‘improved cycle routes to my workplace’ and ‘less traffic on roads’, indicating that safety and traffic behaviour were again the most important factors for encouraging cycling (see figure 5.13). Again, ‘improved changing facilities at workplace’ was the next most common response. The option of ‘nothing would encourage me to cycle (or cycle more frequently)’ was also given, and 13 people (10%) selected this response.

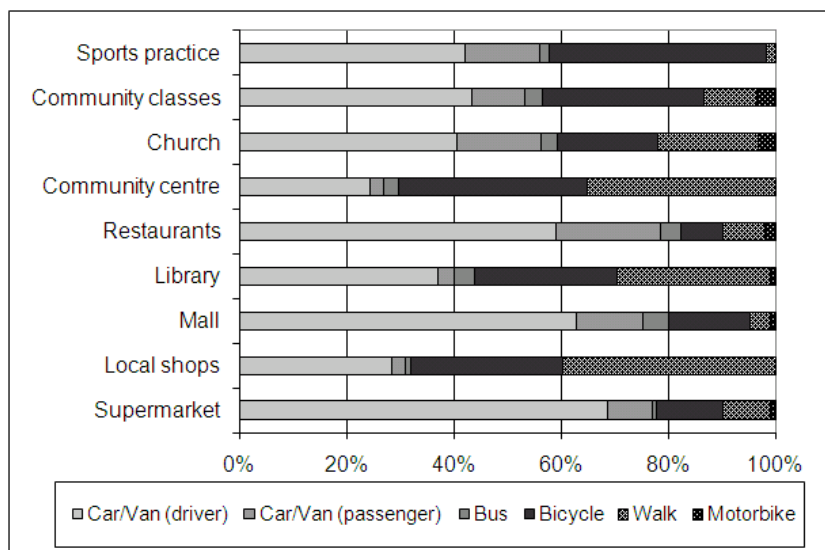
Figure 5.13 Factors that would encourage respondents to cycle (or cycle more frequently) to work or education



5.4.2 Community transport

In general, the main mode of transport to the various community locations was the car/van, although this did vary for each location – for going to local shops, walking was higher, followed by cycling (see figure 5.14). These two latter modes were also high for going to the library. For going to sports practice, cycling and driving had relatively equal levels of modal share, while for going to restaurants, a high proportion of people were passengers in a car or van. Supermarkets and malls were also primarily accessed by driving in a car or van. A number of respondents did not undertake any travel to some of the community locations, and these were removed from the data on what people used as their usual mode of transport. Unfortunately, this meant that the sample group for some activities was as low as 30 people, despite the survey having a total of 147 respondents.

Figure 5.14 Usual mode of transport to each of the community locations



Convenience was a significant reason for the selection of the main mode of transport to most destinations, particularly to local shops. Environmental reasons were important for people travelling to community centres and libraries. Speed was most important to people travelling to libraries, while trip chaining was important to people going to a mall or supermarket – destinations that were accessed by car or van.

Carrying capacity was the primary reason people did not cycle to the supermarket and the mall. Arriving in a presentable state was most important for people going to restaurants, and was also important for people going to church. Concern about traffic danger and the lack of cycle lanes were important to a higher proportion of people going to other locations, including the ones above. This data suggested that similar concerns were held by people travelling by bicycle to locations other than work – eg safety and appearance, or the ability to have a shower and change clothes.

For most destinations, the factors that could encourage cycling were primarily ‘improved cycle routes’, ‘more courteous vehicle drivers’ and ‘less traffic on roads’. This mirrored the findings in all the other questionnaires.

5.5 Conclusion

In general, the workplace travel questionnaires showed trends for commuter transport patterns that were consistent with the nationally collected census data. University students, who had a younger demographic and low income, and staff with a predominantly professional composition were more likely to walk, cycle or use public transport than the population in general. Recreational cyclists were also much more likely to cycle than the general population, and it was interesting that some of those who were heavily into fitness/training considered the journey to work too *short* a distance to ride. Respondents to the community questionnaire were older than the other groups, but their demographics were similar to the wider population.

There was definitely potential for more utilitarian cycling in all the groups surveyed, and these people were invited to participate in focus groups to further discuss the issues around utility cycling.

With regard to encouraging cycling to work, the most important factors were:

- improving safety
- increasing the number of cycling facilities
- reducing traffic levels
- having more courteous motor vehicle drivers.

Other important factors were having showering and changing facilities at work, and financial assistance with purchasing a bicycle.

6 Findings of the focus groups

Focus groups were used to investigate the motivations and barriers that potential cyclists perceived around utilitarian cycling, with a particular focus on the type of infrastructure required to attract new cyclists. The responses to the questionnaires showed that the most important issues for potential cyclists were related to safety, including traffic and infrastructure. Similar concerns were raised in the focus groups, with safety being the most important, followed by having showering and changing facilities at the workplace.

Primarily, discussions centred on commuter cycling rather than utilitarian cycling in general, although many of the issues, such as safety, clothing, luggage-carrying capacity, helmets, etc, would apply to both. In this section, specific quotes from the focus group participants have been used to emphasise the most significant points they made. In some cases, the quotes highlight the participants' lack of understanding or misperceptions; presumably many of the general population would have similar problems. Names and identifying details have been removed from the quotes, and participants are identified using their gender, classification ('student', 'worker', 'recreational' or 'community'), and a unique letter. Some of the groups had crossover; eg community people also cycled recreationally, and recreational cyclists generally worked. However, each group has been identified by the way they were recruited to the survey.

6.1 General transport issues

Although many of the focus group participants used the private motor vehicle as their usual transport mode, they also occasionally used a variety of other modes. In particular, ECan and health workers used a mix of walking, cycling and public transport.

One of the factors in selecting participants had been that they lived within a reasonable cycling distance from their workplace or other activities, and this characteristic was confirmed during the focus groups. While their reasons for driving to work varied, they were generally issues that could potentially be overcome, rather than the more entrenched issue of the distance between home and destination. Topography was generally not an issue for participants, owing to the predominantly flat terrain of Christchurch, although some participants lived on the Port Hills on the southern fringe of the city. Discussions of transport issues covered the 'push factors' of fuel cost and the environment, as well as the suitability of other transport modes and the general dominance of the motor vehicle in New Zealand transport.

6.1.1 Participants' current mode of transport

When participants were asked why they used their primary transport mode, they generally talked about why they did not *cycle* to work (perhaps because they were aware of the nature of this research project). Their reasons included safety, ability to transport luggage or equipment, trip chaining, the need to take a shower after cycling to work, and children – these were all discussed in more depth during the focus groups. For recreational cyclists, the issue that came through strongly was the need to be organised. Several people also commented that they had previously cycled for transport, investigated cycling, or wanted to cycle, but had encountered difficulties. This confirmed that the focus group participants were potential utilitarian cyclists who were constrained by a variety of reasons. Perhaps the most interesting aspect was that issues of the environment and petrol costs were not significant for the respondents drawn from the specific workplaces, but were more important for students, recreational cyclists and respondents

to the community survey. Habit was also a factor – people talked about ‘needing to get into the habit of cycling’, or ‘falling out of the habit of cycling and starting to drive to work’.

Female recreational A: *I normally drive because if I intend to do something after work ... occasionally I do bike, but it's ... load up my lunch, load up my clothes ... that's my excuse (laughs).*

Male recreational A: *... for me to get into work at [workplace] there is a reasonably direct [route] ... it's not so much the traffic that's bad for me, I am quite happy about that, but it's probably the timeliness of getting to work at the hour of the day when I need to, and the other sorts of commitments that I have.*

Female student B: *I carry quite a lot of stuff with me to uni, like textbooks [and] my laptop, which is in a really awkward case to try and both walk with and, I guess, bike with.*

Female worker B: *I live over [suburb] ... a lot of people cycle from there, but I don't. I drive most days, usually just because it is easier.*

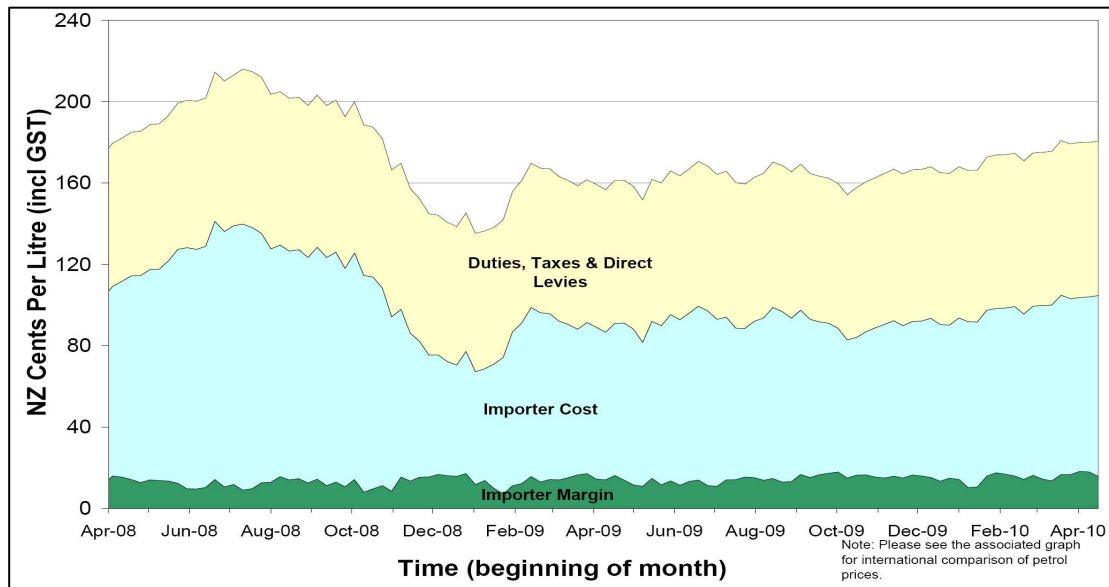
Female worker H: *... whatever allows me to get to work without getting too hot and sweaty.*

Male worker D: *I don't really know, [I've] ... got into the routine of going by car, leaving early to get a park ...*

6.1.2 Petrol

Petrol prices have risen sharply over recent years, and the fluctuation in prices has evoked wide discussion in the media about the cost of fuel (Brown 2008, Williamson 2008). The cost of travel, particularly petrol prices, was a topic of discussion in the focus groups, particularly as the cost of fuel is associated with the number of commuters cycling (Dill and Carr 2003). Interestingly, the cost of transport was not often brought up by the focus group participants themselves, but once they were prompted, it was usually considered a factor in participants' modal choice. Generally, petrol cost had not resulted in a change of transport mode, but it had certainly led to thoughts about the cost of transport. Some participants mentioned changing their travel patterns and reducing unnecessary trips, and some said they had changed the vehicle they used for day-to-day travel. Petrol prices dropped considerably (see figure 6.1) during the time the focus groups were held (October 2008-March 2009), meaning people were less likely to feel the need to cycle.

Figure 6.1 Weekly average components of the price of regular petrol (Ministry of Economic Development et al 2010)



Overall, we found that petrol had been a concern to many people but the recent drop in prices meant it was no longer a significant 'push factor' for changing to sustainable transport modes – but a future rise in petrol prices could make it a factor again. The comments below represent participants' comments about the issue of cost of transport:

Female recreational A: ... *[cost of travel] was a factor, but ... it's definitely not my primary reason ...*

Female recreational B: ... *I noticed it about the petrol, but I didn't use the car any less.*

Female student B: ... *to use the car is ... a treat really, rather than just something I do in the background of my life – it's like an actual decision 'I'm going to drive because ...', and not do something else maybe ... I don't use it on the weekends anymore ... I go on the bus sometimes, or I just walk with friends ... or my boyfriend's car's cheaper than mine ...*

6.1.3 Environmental issues

Environmental concerns, including air pollution, arose occasionally during the focus groups, mostly when prompted. In general, participants did not see environmental issues as a major motivation for adopting more sustainable transport behaviour. There were some comments that suggested participants had thought about the need for more sustainable practices, but were not ready to change their habits for environmental reasons alone. The other issue that arose was air pollution, with participants being concerned about breathing more air pollution when cycling than when driving (despite research suggesting that the exposure may be greater when driving).

Female student B: *I think it's an environmental thing as well. I mean for me ... the cycling seems like a better long-term option ... for a lot of people living in the city, than cars ... it's*

kind of, cars are number one – way, way, number one, way up there – but I think that probably needs to change, particularly in the city ...

Female worker H: *I also wonder, personally, in the winter, if it's really that good for you with some of the air, especially early in the morning – it can be quite smoggy ...*

Female worker O: *I'd probably feel pretty guilty taking a car every day to work.*

Female worker Q: *... especially ... short trips – I'd really avoid taking the car for just going down the road ...*

6.1.4 Comparing walking and cycling

Several participants mentioned walking to work (either currently or previously), often quite long distances, with some people walking up to one hour each way and also mentioning they would like to cycle, as this would cut down on their travel time. In general, the reason people chose to walk rather than cycle was that they perceived walking as safer and more relaxing. In particular, having their own space on the footpath removed the issue of having to be constantly vigilant about traffic (as on a bicycle), thus making the journey by foot more enjoyable. In contrast, recreational cyclists commented that they preferred cycling as an enjoyable mode of transport. These comments highlighted the issue of transport being enjoyable, suggesting that people would cycle more frequently if the journey was pleasant and relaxing, as opposed to the current perceived stress of cycling. Note that the lack a need for vigilance or awareness professed by many when walking may be an issue on shared walk/bike facilities.

Male worker E: *I find the attraction of walking [is] that I can organize my day and my thoughts. Walking isn't for me [a situation] where you need to watch out for traffic much, and I also have quite a scenic walk, including a section along the Avon River.*

Female worker F: *I find [walking] more relaxing, I do that on the way home ...*

Female worker G: *You're not so conscious of space when you're walking, whereas if I'm on the road on a bike I'm always ... thinking what car's behind me, or when I need to turn ...*

Female worker F: *... what's that car door doing?*

Female worker G: *... yeah, who's going to open their car doors or walk in front of you ...*

Female worker I: *... but I never daydream on a bike, never, ever, ever. I think I'm hyper-vigilant. I'm just looking around all the time. I just never, ever allow myself to ... like, you walk to work and you can think about things ...*

Male worker E: *... you can switch off ...*

Female worker I: *You do that in traffic more, but I feel like I'm thinking on behalf of the drivers as well as for me, and that's quite stressful, but I'm used to it ...*

Female student E: *Because I don't want to get sweaty ... I work hard a lot and sweat a lot ... I would just rather walk ... if you're cycling, you are pretty much guaranteed to sweat.*

6.1.5 Buses

Public transport was discussed, particularly with regards to the convenience of bus routes and the time it took to travel by bus from participants' homes to their workplaces. Many participants had to take two different buses to get to their workplaces and found this too time consuming compared with taking their own motor vehicle. Several comparisons were drawn with travel in other cities, with people mentioning they were happy to use public transport elsewhere, and that the public transport services overseas seemed to be more reliable and frequent than in Christchurch.

Female worker A: ... *in fact I'd probably rather cycle than catch the bus ...*

Female worker L: ... *I have to catch two buses, so that's another incentive to wanting to either bike or walk, because by the time I would wait to get two buses ... because ... it's so close [to] here, but there's nothing direct ...*

Female student B: ... *it's a frequency thing as well ... each bus only comes every half hour ...*

Female student C: ... *there's also time constraints, for me ... if I want to bus, it's an hour and a half for two buses and so ... it would be easier for me to put my bike on the bus, head into [school], then hop on my bike and cycle the rest of the way to uni.*

6.1.6 Priority of transport

In Europe, sustainable modes are more important than motor vehicles in transport planning, and this leads to higher levels of sustainable transport use – 75% of European Union residents think that cycling should be given priority over motor vehicles, even if motorists are disadvantaged (Tolley and Hallsworth 1997). However, transport planning in New Zealand tends to prioritise motor vehicles above sustainable modes, including cycling. The focus group participants generally thought transport planners should put more emphasis on sustainable modes, but that motor vehicles should still have a high priority in the transport system because of the current social status and dominance the private motor vehicle has as a mode of transport here. There were, however, some people who said that cycling should be placed very high in the transport system.

Female recreational A: ... *[priority of transport] needs to be equal – maybe not predominantly, but just more accepting of cyclists. I mean, Christchurch has got a huge cyclist population probably, but I guess for the size of the city it's amazing it is so big, given some of the ... barriers I guess there are ... maybe it's more accepting of cycling, if that's the right term ...*

Female worker A: *Yeah, I think that [giving pedestrians and cyclists priority] would be wonderful. I think they should build [kerbed] cycle lanes ...that only have cycles in them, like in the Netherlands. Or I was in Belgium for a few months earlier this year, and there they had cycle lanes that were off the road and were for just these people cycling to university on university cycles ... it was wonderful.*

6.2 Motivations and barriers

The following sections cover the findings from the focus groups relating to the general motivations and barriers associated with utilitarian cycling. Firstly, some destination issues are presented, including bicycle parking, work transport and showers, followed by the luggage constraints of the bicycle, and cycling equipment. The issues of time, personal organisation and trip chaining are then discussed, followed by issues of fear, including night-time cycling and confidence. Finally, distance, weather and gender are discussed, as well as the more minor issues of cycling culture, fitness and enjoyment.

6.2.1 Bicycle parking

In general, participants' workplaces had plenty of bicycle parking, usually undercover and often including lockable bicycle storage. One workplace had only limited space available and would have to consider expanding available bicycle parking spaces if more people began biking to work. One person was concerned that their workplace did not have a lockable facility, but this did not appear to be an issue to other people at the same workplace. On the other hand, while some bicycle parking was freely available, it was not always in the most convenient location at large workplaces. At other locations around town, people commented that there was usually a place to tie up a bicycle, even if it was just a lamppost. However, it was suggested that more bicycle railings should be provided, as when bicycles were tied to poles they could be blown over in the wind.

Female worker G: There's also the issue of where you put your bike ... there's nowhere safe over in Manchester Street ... they're talking about upgrading the bike [facilities], but you can [only] just get into the bike sheds ... so it's ridiculous, I've only ever biked to work once, and I brought my bike with me up to my office. I'm not leaving my bike outside ...

Female worker C: ... and our one here gets full pretty quickly, doesn't it ...

Female worker G: ... yeah ... there's two rooms, and [for] one of the rooms, you can get locked in. I was a bit late leaving and it was about quarter to six, and if I was two seconds later I would have been locked in and I wouldn't have been able to get out ...

Female community C: I just attach [my bike] to anything that's permanent; I don't give a monkey about proper racks and stuff. I think the pavements here are wide enough to [tie it to a lamppost] safely. I know that it's not everybody's favourite thing to have bikes attached to lampposts, but it doesn't bother me.

Female community A: I find it really annoying to come back and find that it's toppled over, and when you're talking about convenience for cycling ...

Female community B: [We need] solid rails ... My tyres are too wide for [regular stands].

Security of bicycles was a concern. People who also cycled for recreation often commented that they had two or more bicycles and used the cheaper, replaceable one, for day-to-day travel.

Male community B: Like here, for example, wouldn't it be nice if there was one [rail] just somewhere positioned around here, instead of just leaning [my bike] against the pillar ... I'm more concerned that it [might] topple than [about] security.

Female community B: *If this is your primary mode of transport and someone nicks it, you're going to be extremely cheesed off!*

Male community B: *I've got another [bike], but the way I look at that bike is it doesn't really owe me anything – it's 15 years old, it's my commuting bike ... in the UK we have a big theft problem – you are always just waiting for your car to get stolen, or broken into, the house or the bike ...*

6.2.2 Work vehicles

A specific difficulty mentioned was the need to travel during the day for work-related reasons. People who said they had to go off-site were asked if they had access to work motor vehicles, and how much of an issue work travel was when they made their modal choice. In all cases, work vehicles were available to participants, although there were varying levels of access. In the case of the CDHB workplaces, participants had ample and easy access to work motor vehicles or taxis, and there was no requirement to use personal vehicles. For participants from the university, however, it was more difficult to use the available work vehicles, particularly for people not working at the main campus site – their primary issue was that they still had to travel, usually with equipment, from their workplace to where the work vehicles were located. A variety of options were available for ECan employees – work vehicles were usually accessible, and work journeys were not an issue in modal choice.

The responses from the recreational questionnaire noted that having the use of a company motor vehicle at home was a common reason for driving to work rather than cycling or using some other sustainable mode. This issue was raised during the focus groups, and should be an area of further research.

Female worker L: *I'm out and about, but we just use the work car, so there's no expectation to have to use your own car ...*

Female worker N: *Well that's the difficulty. We are [at work location] and the fleet cars are here on [main campus]. So if, for example, I am going [off-site] and I don't take my own car, then I have to get a taxi to here to get a fleet car ... we can get reimbursed for our mileage if we use our own car, but it actually is quite frustrating, because if you are going out of town – like I went to Timaru yesterday; I left about 6.30 in the morning – and it's, like, do I get up an hour earlier to get there to pick up a car ... so it's just a timing thing, and then if you are going over a certain distance you use a rental car, and if I am taking a rental I'll get my husband to drop me off. But the only other difficulty is the budgets we try to put together. So transport is a very big part of my work ... yeah, our carbon footprint is shocking when you think about it.*

6.2.3 Appropriate facilities at the destination

One of the differences between using active transport modes to commute, compared with driving or using public transport, is the commuter's level of exercise. Some people want to be able to shower and change their clothes after this type of exercise. Therefore, it was important for us to investigate whether workplaces had adequate facilities for showering, changing and storing clothes. The workplaces that the focus groups were recruited from varied on this issue, and the degree to which the lack of these facilities could present a barrier also varied. Several people said they would be cycling to work/study for transport,

rather than for exercise, and would therefore cycle at a rate that would result in little perspiration and therefore no need to take a shower or change their clothes.

The location of showering facilities within a large workplace, such as the university, was also an issue. One suggestion was to integrate showering and changing facilities with the lockable bicycle parking sheds, to increase convenience and ease of use.

On the other hand, several people were not aware of the showering and changing facilities available at their destinations, often because they had not investigated them because there were more significant barriers than showering when considering cycling as a mode of transport. Students, particularly undergraduates, had more difficulties because they did not have their own space and had to use communal facilities for storing equipment.

Discussing showering and changing facilities often brought up other issues, such as needing to factor into the day the time it took to change, and having to carry extra items on their bicycle.

Female worker N: ... certainly showers ... don't know about clothing to be honest, I haven't investigated that. I guess I've kind of dismissed it because of the other constraints, which is the timeliness issue more than anything else.

Female worker M: That wouldn't be a problem [for me]. I'm all set to go. I just need safe roads and I'm off.

Male worker A: ... at [workplace] that's one of the issues – to have a shower, a place to hang a suit overnight ...

Male worker C: ... you guys must bike faster than me if you need a shower (laughs) ...

Male worker A: I wouldn't dream of biking to work if I [couldn't have] a shower ...

Female worker A: I struggle to get biking for a number of reasons, one of which is that I'm lazy and I don't like getting up much of a sweat ... but I'd like to do that for fitness purposes ... But I think the real barrier for me is that I arrive and I'm like, you know, messy, and I really need a shower badly. There is nowhere to have a shower close to where I work. I have to trek halfway across the [workplace], and as far as ... appearing for work at the right time ... it's taking up so much time ... Yeah, if we had a shower in the [department] where I work, that would be great. It'd be perfect ... I could park my bike reasonably close to the [department] and pop up there and have a shower.

Female worker B: We've got lockers, if we want them ... [but no] place for changing and showering.

Female worker C: I think it makes more sense to have, like, a situation where you could keep some stuff in your locker near where you work, and have the shower right there as well. And so you've got all this stuff and you don't have to go out in public with your toiletry bag with you – you could leave one in your locker and it's right next to the shower. So that would make a lot of sense.

With regard to cycling to other destinations, the issue of changing and showering was a problem if people were concerned about their appearance on arrival at their destination. Knowing the location of toilets was also important.

Male community A: *There are few [toilets] in public parks ... you've got to know where they are.*

6.2.4 Luggage-carrying capacity of the bicycle

One of the obvious differences between the bicycle and the motor vehicle is their luggage-carrying capacity. The issue of having to carry more clothes and equipment was raised when we discussed showering and changing facilities, but for most people there were a range of other items that also needed to be carried, such as books, laptops and purchases. While it is possible to outfit a bicycle with luggage-carrying capacity, most participants said they would use a backpack. One person said they had a basket on the front of their bicycle, despite the negative image this can invoke. Generally, it seemed that people were more concerned about other issues and had not yet fully considered the idea of how they would carry equipment on their bicycle. Some people said they would not purchase specific luggage-carrying equipment until they had tried cycling and were in the habit of cycling regularly.

The issue of luggage-carrying capacity was also significant for other utilitarian travel, such as cycling to shopping facilities. In general, people were concerned that they might shop somewhere and be unable to take purchases home on their bicycle. There was also the associated issue of security – firstly, it is not easy to lock items to the bicycle and secondly, bags often cannot be taken into shops, yet there is no safe location to leave them while shopping.

Female student A: *... it's kind of one of the reasons I put a basket in front. ... if it works for me, I don't really care what people think (laughs) ... it may not look pretty, but I like it, so I have it ...*

Female recreational A: *I've got my backpack ...*

Female recreational B: *Yeah, I use my backpack ...*

Male worker C: *I live in [suburb], and at [suburb] shopping area there is just about everything that you need around you, and you can get around quite easy on a bike. The problem with a bike often is that you go to Mitre 10 and you buy a garden shed ... well, you can't bring that home on your bike. Or you go to Mitre 10 not planning on buying anything, but you buy a whole lot of **** and you can't bring it home on a bike anyway (laughs). [When we] go to the supermarket, it's not an issue about one little green bag, it's about 10 little green bags, and you're just going to say well, you've got to use the car ... but yeah, a bike that could store stuff [would be good] ...*

Female student C: *... the other thing is you're going to a shop and you've got your backpack – you've got to leave it at the door, and they're not secure anymore ... I've left my backpack and someone's come along and whipped it, and it had my library books and some other things in it, so I had to pay for them ...*

Male community A: *If I go to the supermarket I pay several visits on the bike, but today I had a box that was too heavy.*

Male recreational B: *I admire you for doing that, because I often thought about going to the supermarket on the bike, but I don't. One, I worry about coming out and the bike's not there – but I could use an old training bike that's got a saddle bag and a carrier. It is wonderful for training on. That wouldn't do me any harm would it?*

Male community A: *I often stop at the supermarket on the way back from town. If it's a convenient one, I'll stop in and get a few bits and pieces. I use saddlebags rather than a backpack. My bike's not an old dunga, it's fairly new.*

Female community C: *I get hot and sweaty ... If I'm going to a meeting, I never cycle because I know I wouldn't be able to change a shirt, or I've got to carry a shirt. I have panniers for my shopping but I don't have the confidence to leave the panniers on the bike here ... [it] would be nice to have lockers or somewhere where you can store things. Otherwise you are carrying around panniers when you really just want to pop in somewhere ... you could lock the panniers, but people can just take the panniers off ... locking them on is really hard. I've often thought ...that's an issue, going round picking things up, and these days I have to leave things on the bike, so that's another [factor in the] decision on whether I use the bike or not.*

Female recreational C: *I must admit that for bulky stuff like toilet paper, I do devolve to the car.*

Male recreational D: *Just buy two rolls and then go every day. I reckon if you do your groceries on your bike more often, you have fresher vegetables.*

6.2.5 Cycling equipment

While cycling is seen as a cheap transport mode, there is an initial set-up cost of getting a bicycle, and then the costs of purchasing safety equipment such as lights and fluorescent (fluoro) vests. Although a few people were concerned about the cost and would not purchase such equipment, most people said that safety equipment was a necessary part of setting themselves up for cycling. The people who said they ought to have safety equipment were more likely to be those who had cycled occasionally than those who had little experience of cycling.

Female recreational A: *I haven't got one of those [fluoro vests] either, I probably should have [one].*

Female recreational B: *... yeah, I have to say I did get myself a fluoro vest ...*

Male worker E: *I have one general comment, which is that cycling is relatively cheap to get into [relative to] other forms of transport. I bought my wife a 12-speed bike off Trade Me for \$70 and all we did was get her a better seat and a helmet, and to me that's pretty cheap, for getting a form of transport.*

Female worker F: *... you've got to [get equipment] in stages really ...*

Female worker H: *I actually prefer to wear a backpack [than have panniers] because I find it's more stable ...*

Female worker F: *I've never ridden with [panniers]. I don't know whether I'm going to like it or not ...*

A number of the people who did not own a bicycle had investigated purchasing one, and some in the focus groups had already purchased a new bicycle. The people who did not know much about purchasing a bicycle said for them, this was a barrier to cycling. (Workplace bikes that can be borrowed could be a solution to this). Of those who had purchased a bicycle, some found advice from a bicycle store very helpful. Some found that the bicycles available in New Zealand were not ideal for commuter cycling.

Female worker L: *... yeah, it's just kind of knowing where to start – I don't know ... what type of bike do you need? I guess probably the main barrier is maybe safety, like I don't know the road rules on a bike ...*

Male worker D: *... same here ...*

Female worker L: *... and that's probably the biggest thing for me in buying a bike ... like, I can ride a bike, but not actually knowing all those things ...*

Male worker F: *It's easy to carry things [walking, but] a bit hard on a bike, unless you've got the right bags set up and that ... But ... talking about going in and buying a bike ... we actually got a bike for half price, so you [can] get a very reasonable bike ... and the thing about it is getting on the bike and taking it for a ride, and they actually set it up for you ... 'Oh no, that seat's a bit low, let's get that right' ... just go around the car park and test out the gears and that sort of thing ...*

Male recreational P: *I'd probably look at a different cycle to the one I've got as well. I mean, I've got a mountain bike, I wouldn't actually choose to ride that to work because it's actually not that great for cycling on the road.*

Female worker N: *I think that is a good point ... if you need a different bike from the one you have now, that is something to consider ...*

Interviewer: *... do think there's less available in New Zealand, in a way?*

Female student A: *... yeah, and you know the size of it as well ... like, I have short legs, so I can't use a lot of bicycles that have been sold here because they're too high for me, and back in Japan we would have tons of those shorter peoples' ones available – it's just availability ...*

Male worker C: *Yeah, there's some interesting things about that. One is that if ... you want to buy a commuter bike, there's only one style per brand. If you want a road bike there's about 100 different styles per brand, but if you want a commuter bike there's only one style and it's basic – it hasn't got any of the extras on that you actually might like for commuting around town, in terms of doing those things, so you then have to buy a carrier, and all this other stuff ...*

6.2.6 Clothing

One of the issues with cycling is that when cycling, people often prefer to wear different clothing from when they are using other modes of transport. This preference is tied up with the issue of sweating (as discussed earlier regarding changing and showering facilities), which arises for most people when undertaking a physical activity (noting, however, that some cyclists are deliberately using the ride as an

opportunity for vigorous exercise). In addition, there is also the issue that clothes for one situation may not be appropriate for another. University students mentioned this, as unlike workers, they could attend their education in casual clothes, but these clothes may not be appropriate for going to other places on the way to or from university. Overall, there was a definite view that cycling to work in a suit or business attire would not be the first choice for participants in the focus groups.

The issue of clothes and sweating also relates to the issues of luggage-carrying capacity (because of having to carry extra changes of clothes) and the extra time it takes on arrival to change and shower to be 'presentable'.

Female worker M: *You know, getting into this type of weather, particularly in the summer ... and in the type of job I have where your students are disappearing shortly, you've kind of got a window there where you can be more casually dressed. That's the time when I would ... look at that type of activity ...*

Interviewer: *So you don't want to come in and change?*

Female student A: *No, so if I'm cycling here, I just wear jeans and comfortable shoes and then I would know what's happening for the rest of the day, for sure, because if I feel like going shopping afterwards, I can't.*

Female recreational B: *Personally, I haven't [perceived clothing as an issue], but that's probably more about me not feeling pressured to do that – but I can easily see how some people would for sure ...*

Female recreational A: *Yeah, I'm all for my own choice, I'm quite independent enough ... I mean I actually like that look, but it's what I can afford and so I just go for choice and I just wear comfort I guess, more seasonal, practical ...*

Interviewer: *... you've both indicated that if you were cycling to work you'd probably wear something down and then get changed – would that be true?*

Female recreational A: *Yes.*

Female recreational B: *Yep.*

Male worker F: *I mean, I just tend to wear pretty casual [clothes]. I will not be seen in lycra ... I will not put on lycra ... I will not wear lycra (laughs) ...*

Female worker J: *... it's not the fact about being hot and sweaty, it's the fact that it eats into your time when you get into work to [have to] get showered and changed ...*

Female worker I: *... and you have to carry your clothes with you ...*

Female worker G: *... you have to carry everything, yeah ...*

Female worker I: *... we do have lockers, but you've still got to get your clothing here and [there's] no hooks anywhere, and you think, oh **** ...*

6.2.7 Helmets

Helmets are another issue linked to the clothing people wear when cycling. In New Zealand, helmets have been compulsory for cyclists since January 1994 (Taylor and Scuffham 2002). However, some people

dislike having ‘helmet hair’, and feeling uncomfortable or ‘uncool’ (both literally and figuratively) when wearing a helmet. One of the prompts, therefore, was asking participants whether they would continue to wear their helmet if the law was changed so that it became optional. There was almost complete agreement across all focus groups that people would continue to wear a helmet for safety reasons. There was some discussion around the benefits of not wearing a helmet, and there were several participants who would prefer to not wear a helmet. The conclusion drawn by the groups was that in the current situation in New Zealand, helmets were a necessity, but people would prefer to not wear helmets if safety could be improved. They also noted that the number of people cycling without a helmet was increasing and it did not appear that the law was being enforced.

Female student A: *I would be happy to cycle in high heels if I felt comfortable, but then again, you know, the helmet – you have to wear the helmet. Back in Japan I didn’t have to wear the helmet, but it’s a safety thing, so I agree with it ...*

Interviewer: *If the law was changed and the helmets were optional, would you still wear your helmet?*

Male worker F: *Yes, too many close calls ...*

Female student A: *In New Zealand, with the circumstances, I would never cycle without a helmet – I don’t think it’s safe. I think it’s far too dangerous ...*

Female worker A: *I’m surprised at how many people don’t wear a helmet ... particularly around here. I mean, I don’t know why you wouldn’t wear a helmet when you were cycling ...*

6.2.8 Time and organisation

The issues of travel time and the need to be organised drew a greater variety of responses than the issues of safety and equipment. This topic included the time taken for travel, including whether cycling was perceived to be faster or slower than other transport modes, and the extra time that people thought they would need to get organised to cycle to work. In most cases people perceived cycling to take a similar amount of time as driving to their workplace/study, particularly at peak commuting time. Some participants indicated they were happy for their trip to take a little longer than normal, as they enjoyed cycling. In general, it appeared that those who were more open to the idea of cycling saw the time factor as less of an issue than those who were less interested in cycling. For recreational cyclists, the time issue was that getting organised for the bicycle ride could take as long, if not longer, than the actual ride, and would have no direct benefits for their training or recreational activities.

Female student B: *...it would depend what time of day I was going from my house ... I live near two schools, so at 8.30 in the morning [the traffic is] just crazy and my flatmate always sees me [in my car in traffic] when he bikes [and I drive] ... [The time it takes to cycle] doesn’t really bother me, because I like the fresh air and I like the exercise, if I’ve got the time ...*

Male worker F: *... I’ve found even like biking home, I would get home at the same time as I do in a car ... you’re keeping up with traffic, and actually when I worked out at [suburb], you were actually faster ...*

Female worker I: ... *and [arriving wet] all takes time ... to get yourself sorted again ...*

Interviewer: ... *so it goes back to the time factor, primarily?*

Female worker G: *Yeah.*

Female worker J: ... *especially when you've got children and you're trying to get your hours in, but [by] the time you've got them to school, you're not getting here until nine – if you've then got another 20 minutes [to shower etc], that takes you till 20 past nine – where do you make that 20 minutes up? It's an eight-hour day ...*

Female cyclist B: ...*not unless I did [training] after work, and left my bag at work. I've done that when I've worked in the weekends – I've sort of biked to work in the weekend and then done ... whatever the training is, and then come back – that's the only way I'd incorporate it into my training, because seven minutes is nothing ...*

Female recreational A: ... *it takes longer to pack all my stuff up ...*

Female recreational B: ... *seriously, yeah, absolutely ...*

Female recreational: A: ... *yep, go out to the garage, get my bike out of the garage, lock the garage up ...*

As well as the time taken to cycle to work, participants also said it would take longer to get ready to cycle to work than to drive there. The contributing factors were packing required items into appropriate bags, getting the bicycle ready to go, locking the bicycle up at work, and, for some, showering and changing after arriving at work (although it was not clear whether they would have normally showered before going to work anyway). This issue was raised by participants who had tried cycling to work, and by recreational cyclists who said the organisation factor was often one of the biggest deterrents. Recreational cyclists also said there was an element of laziness in not making the effort to get organised to cycle to work – a comment that was not repeated by most of the other participants. The participants who had children mentioned that this was an additional factor that made cycling to work organisationally difficult, particularly in the mornings.

Female recreational B: ... *for example, tonight we have this spin class after work – we've done what, about six or seven weeks of that ... and then went to spin, and then cycled home, and that was absolutely fine, and I just happened to have been organized enough to do that. Other nights, um, we have bunch riding on a Wednesday night after work – I really do need to go home and get my bike and then go ... I guess I could leave my work stuff at work ... yeah, I don't know, it just becomes far too difficult ...*

Male worker F: *Um, no – I suppose I've got very [few] barriers because I've been on a bike before and it's just getting back into [the] practice of using that instead of the car, you know. The car's being used out of pure added convenience more than anything – I mean, if it was a short walking distance to a shop ... [I'm] likely to walk, not cycle – it's easy to carry things. A bit hard on a bike, unless you've got the right bags set up ...*

6.2.9 Trip chaining

Another barrier to commuter cycling is trip chaining (ie completing several different tasks at different attractors, such as shops, or appointments) during the same trip. Participants often said they would only

cycle to work, and would not complete other tasks on the journey, because, for example, the distances or logistics prevented cycling, or trip chaining required more pre-trip organisation. Trip chaining also related to the issue of luggage-carrying capacity, as it often included shopping. Another problem was dealing with emergencies that arose during the day, particularly in the case of children who might need to be picked up and taken somewhere, which could be difficult on a bicycle. While participants had ample access to work vehicles for the purposes of work, there was no indication that they had similar access to them to deal with emergencies.

Female worker L: *I mean, if I had something else on, I probably wouldn't do it every day ... if I had something on after work, then I'd have to bring the car or go on the bus ...*

Female worker H: *Mainly I don't cycle because I've got quite a few things to do on the way home ...*

Female worker B: *I guess a lot of the time I go to the shops after work, so I wouldn't do that on a bicycle because I'd have too much stuff to carry ... I mean, there would be more than you could get in a backpack. And if I had to go somewhere else, often it would be late – like I'd go into town to do something in the evenings, or I would wait at work and then go ... then it would be dark and I wouldn't want to cycle at night, for safety reasons ... I guess it's not worth it. So yeah, doing those other things, I probably wouldn't do them on a cycle. But I guess you could start re-arranging things so that if you did have the car one day, you could ... you know, plan your timetable a bit better, rather than [go] 'oh yeah, I'll just do that today' because I have the car ...*

Interviewer: *... if you're going down the road to the shops, would any of you cycle, in that instance, at all?*

Male worker F: *No.*

Interviewer: *Would you consider it?*

Female worker L: *Yeah, probably would. In [suburb] I'd walk to the shops, though, because they're really close, so, because I don't have a bike at the moment ... I'd walk to the library or to the bank ... but if I had a bike I could ... [go more places] ...*

Female worker M: *If I was biking, I would be less likely to do those little things on the way home than if I was driving.*

6.2.10 Night-time cycling

Cycling after dark presented people with difficulties that were different from cycling during the day – specifically, that they felt less safe because there were fewer people around, or because there was limited visibility. On the other hand, some people commented that they preferred cycling at night, as having fewer people on the road meant the significant issue of safety in traffic was reduced.

Groups discussed the latest time that people would feel comfortable cycling, particularly in winter. Most were prepared to cycle in the dark if there were still people around – for example, until approximately 6pm in winter, or 9–10pm in summer. There seemed to be a gender difference regarding safety – females were more concerned about the lack of personal safety because fewer people were on the street, while males were more concerned about not being seen in the dark.

Female recreational A: *During winter ... it's dark quite early in the mornings and it gets dark quite early in the evenings ... that kind of does put me off ...*

Male worker F: *... at night you don't have as many cars on the road. There's a big difference between biking home at 5[pm] and biking home at 8[pm] ... at 5[pm] it's all there, it's actually 'oh, game on', you've really got to concentrate on what you're doing ... but ... I worked at midnight for a while and [biking] to work [was] no problem at all, you were lucky if you saw 10 cars ...*

Interviewer: *So the visibility issue doesn't worry you?*

Male worker F: *No, because you're going through lit streets. If you were going on dark streets it would be a bit different ...*

Female worker L: *I wouldn't bike [in the dark] either, because I'm probably more a morning person than a night [person] ... a couple of mornings I do a [gym] class at 6.30am, so there's no way that on those days I would bike from home into town to [the gym] and then bike from [the gym] to work and then home, because I'd have to get up so early and it would be dark - maybe not so much now, it's quite light in the mornings, but definitely in the winter - I wouldn't feel safe ...*

Female student A: *Safety would be a big thing for me ... at the moment the weather is getting warmer and the day is getting longer, so I don't have to worry about that nearly as much. But it does help to feel safe and at night-time, cycling doesn't feel safe.*

Female worker H: *I'd have lights ... you have to have lights.*

Female worker I: *... you need to be a bit more prepared, definitely - [you] need to have lights on your bike that you can actually turn on when you need it ...*

Female worker H: *Are you just meaning in the dark - like 6 o'clock can be dark sometimes - or do you mean 10 o'clock at night? ... I'd feel less safe at 10 o'clock [at night] ... there's less people around ...*

Female worker F: *Probably the traffic would make you feel safer, surely ... or do you think there's a different type of traffic?*

Female worker I: *Yeah.*

Female worker H: *Yeah.*

Female worker F: *More boy-racer types, crazy guys ...*

Female worker H: *People that want to grab you and hurt you ...*

Female recreational C: *I'm dressed up like a Christmas tree. I'm lit up anyway. I wear a fluoro helmet to and from work ... 'cos I don't want to get hit. You are silly if you don't wear bright colours, especially in traffic and after dark. I've got a couple of lights on the bike - I don't like not being seen.*

6.2.11 Confidence on a bicycle

Participants' confidence on a bike was very varied, and included many who had had past experience cycling, as well as those who had never attempted cycling. The more experienced people were more likely

to cycle in the dark than the less experienced, and were, in general, more confident on the road. Women had more concerns about their skill level for cycling on the road, particularly knowing how to navigate intersections and how to correctly use cycling infrastructure. Although several inexperienced cyclists said they did not know where they should position themselves at intersections, this did not appear to arise from the inconsistency of cycle lanes. A related issue was a fear of acting incorrectly and having people, particularly vehicle drivers, behave offensively towards the cyclist.

Female worker L: *... the way that I come would be down the main roads and there would be like two intersections and then a roundabout, so I wouldn't get through (laughs) ... I would if there wasn't any traffic coming, but I would ... obviously need some training, because I don't bike on the road ...*

Male worker D: *Intersections are probably the biggest worry for me – I mean, do you sit in the queue at the back, or do you ride to the front? ... as a driver I seem to recall that cyclists would come right up past the big long queue and sit at the front, and I'd think 'oh lucky you', but when I'm cycling I'm wondering, well, is that an appropriate thing to do? Or is it even a safe thing to do?*

Female worker D: *I felt very unsure of just how I was expected to behave. In fact I felt very much ... that the car drivers were ... pretty aggressive on the whole, that I needed to take a ... submissive sort of role here, and what would I have to do to be least provocative to the motorist ... I sort of don't really want to be in that position either, frankly, you know, not knowing [whether] what I was doing was right or wrong, or safe or unsafe, but what would be the least provocative ...*

Male worker D: *Well, it's true, you're absolutely right because ... no one wants to have someone yell at them or [get] a loud toot or something like that ...*

Female student D: *... I don't bike, but ... I wouldn't know what to do in an intersection on a bike – like where do you sit ... there's one little intersection on Clyde Road where the bike lane's in the middle, but what do you do if you want to go straight ahead? Do you have to come and go on the left and then get in the way of the people turning left even though the bike's on the right? If you go straight ahead from there you're on the wrong side, so I don't know what you do.*

Female worker D: *I have to say, I'd be hopelessly ignorant, and I hadn't realised how ignorant I was about that until I actually came to try and do it.*

Female recreational A: *... or suddenly car doors opening – I'm paranoid, I hate parked cars ... it's probably the time of the day, too, with traffic, depending on where I'm going or what I'm doing – like at the moment I hate the downhills, so I'm not going to be doing that in the peak hour when all the cars are coming through, because that's just scary ...*

Female recreational B: *Yeah, yeah, I'd say the same, a few times I've cycled ...*

Female recreational A: *It depends what you're doing or ... if you've not got the confidence ...*

Female recreational B: *I did a ... training session here a few months ago about cycle week safety, and that was really good and gave me heaps of confidence about cycling in peak-hour traffic – just, you know, signalling and where to position yourself on the road, and those kind of things – so that definitely helped and motivated me to try and get on my bike a little bit more, so I think things like that would help encourage people ...*

6.2.12 Distance

To be eligible to participate in the focus groups, people had to perceive that their commuting distance was reasonable for cycling. Discussion in the groups about the distance people were prepared to cycle revealed that 6km was easily acceptable and 15km was an upper limit. This was different for recreational cyclists, who said longer distances were preferred for commuting, and generally the distance they lived from work/study was too short to constitute 'training'.

Female worker M: *I live within 6km of work, and to me that is too far to walk in the morning, but I'd like to cycle.*

Interviewer: *... you said the distance was too short?*

Female recreational B: *... when I've timed it, it's between a 5- and 7-minute bike ride – it's not really a warm up ...*

Interviewer: *So how long a distance would you be happy to bike to work?*

Female recreational B: *Oh, well, I'm contradicting what I'm saying there, because I'd probably be happier ... the shorter the distance the better ... but ... you said I could incorporate it into my training, but it hardly would be for that distance ...*

Male worker E: *... just continuing on, it's the infrastructure for me, but it's also the journey length ... [for] 2km, I'd probably still want to walk for that distance – it would need to be longer for me to feel that the time I'd save cycling would be worth the change.*

Female worker F: *I live at 10km out, so probably it's going to take me about – I don't know, with traffic and that's 25 minutes – half an hour at the most.*

6.2.13 Weather

Weather was generally not a significant issue, although there were different views about it. Rain was the most commonly mentioned impediment to cycling – some people were prepared to cycle in the rain, while others would opt to take a motor vehicle and would never cycle in the rain. Wind, particularly the north-west wind that is prevalent in Canterbury, was an issue for some participants, while others noted that they had not considered wind before someone else brought it up. Another issue was ice on the roads in winter making cycling surfaces slippery. It is unlikely that anything could be done to reduce the barrier of weather for any of these conditions – rather, it should be accepted that there are people who will cycle in the rain or wind, and others who will not.

Female worker B: *... I've got the gear, but I still wouldn't want to be biking if the weather was horrible.*

Female worker M: *... I'm certainly averse to cycling in the rain.*

Male recreational: *Yeah, I probably feel a bit uncomfortable in some of the poor weather we get in ... winter. Wet weather in particular. Cycling in the cold isn't so much a problem, I dress for that – but it's more the wet weather, icy roads ...*

Interviewer: *So is it a safety concern rather than being uncomfortable?*

Male recreational: *Yeah.*

Female worker N: *For me, it would be ice that would probably scare me most, because when I broke my leg, I broke it quite badly [and] it took me a year to be able to walk again – and ... 15 months ... after the first break I slipped on a wet floor and broke my tail bone ... it's naturally very uncomfortable for me on my bike, and I just don't think ... I could do that.*

Female worker I: *One thing I would say about the weather – in summertime the wind puts me off, it really does – not so much going home, because you can just slog it out and have a good workout, but coming to work against the wind – no, I wouldn't be interested ...*

Interviewer: *Is wind much of a consideration for anyone else?*

Female worker G: *No.*

Female worker I: *Biking up against a headwind.*

Male worker E: *Christchurch has been notorious in terms of cycling, with either the easterly or the southerly.*

Female student B: *No (laughs), not much fun, and cycling in the snow ... I've got a mountain bike, so I at least have some grip and things, but still ...*

Female student A: *Yeah ... I used to cycle in the rain and the snow back in Japan, and it was alright, but it does slip in the snow ...*

Female student B: *You're always having to think, 'Is [the weather] going to change?'*

Female student A: *That's right, you look at the sky and you think 'Mmm, it looks quite nice', but then ... you have to change what you wear as well – I mean, if I didn't have to think about what I wear, ... or am I going to put make-up on today, or am I going to not bother – it's important when you're cycling. I mean, you can't wear skirts and high heels [on the bikes you have] in New Zealand.*

6.2.14 Gender

The literature shows that there is a gender disparity for cycling to work, with females considerably less likely to cycle than males. Focus group participants were asked why they thought this difference occurs. This section reports only the ideas that arose from this prompt, not the other trends that have come through the transcripts. The most common responses were that women were more likely to have different responsibilities, such as children and households, or to be more concerned about their appearance. It was interesting to note, however, that everyone seemed very reluctant to say that 'female responsibilities' were an issue – possibly because that might not be seen to be 'politically correct'.

Female recreational A: *Probably vanity ... some of them – well, not me personally, but some with bad-hair days and things – to help my hair, I don't know ...*

Female recreational B: *It could be to do with the workplace. It's easier for a guy to roll a suit up or to leave his suit jacket at work, or whatever. I guess that's part of the issue for me ... I often do wear high heels and a skirt, so it just becomes a whole lot more complicated. If I could wear jeans and T-shirt [at work] then it wouldn't be such an issue.*

Female recreational A: *...that's if [they] fit in [my bag] ...*

Female recreational B: *I also wonder if it has something to do with females – this is a generalisation – they're more likely to be the ones to ... do errands, like pick up the kids or do the grocery shopping on their way home, and things like that.*

Female worker N: *Maybe the helmets and the hair thing ... it does bug me a lot.*

Male recreational: *I wonder just what types of other activities that males and females end up doing. And the sort of normal traditional roles of caregiver – sort of functional roles – that they might ... be likely to have ... if I look at my own family environment, it would be much more difficult for my wife to undertake ... cycling ... to work, because she is probably more of the caregiver for our children in that regard than what I am. It's probably more acceptable for me to be earlier to work and later home ... which I could manage if I was cycling, because she is the one that would tend to try and be home for the kids ... Incorporating cycling into that [would] create another time pressure, and issues that would be really challenging for her. So I wonder if it is related to the nature of family ... I mean, that's a very stereotypical theory, dare I say it, but it is the reality of life.*

Female worker M: *... don't really know why it would be, necessarily – I mean, I know a lot of women who cycle, and some cycle to work.*

Female student A: *Back in Japan I used to cycle with a skirt on ... it was no problem because people around you do that too – and then I came to New Zealand, and then I found that the bicycles here have put that bar across in the middle that was much higher, compared with what I was used to – so I stopped cycling in a skirt, really because to start with I couldn't go over the bar with a skirt ... I found the [bike] that has [a] lower [bar] ... I could use that, but ... it's not structured the same, it's not designed to accommodate for that sort of need.*

6.2.15 Children

This research did not communicate directly with children. Instead, parents who participated in the focus groups were asked to discuss the issue of utilitarian cycling with children, and a few comments were recorded. Some people said that the presence of children made it more difficult to organise themselves to get ready for work, especially in the mornings. They were also worried about the safety of cycling to work with children on bicycle seats. Some commented that children ought to cycle on the roads to become independent.

Male worker F: *... that's our job to make sure he knows what to do on the road. I mean, eventually he'll get to an age where he'll be cycling on the road – we'll be cycling with him ... if he wanted to go on the road at 8 ... he's not going to be on that road at 8 by himself ...*

Female worker J: *I'm ... hoping that I can do it when he goes to his Dad's, but when I've got him, I can't physically get on the bike, take him to school, get here on time, pick him up after school ...*

Female worker H: *I think the thing with children on a bike – we've got a bike seat, but I only really use it on little tracks ...*

Female worker K: *... little tracks, or round the back streets, yeah ...*

Female worker H: *... I feel that I probably, hopefully, wouldn't fall off, but I just don't trust other drivers when I've got a small child ...*

Female worker J: ... *not on the road ...*

Female worker H: ... *not on the road ... (all talking at once, all agreeing)*

Female worker F: ... *yeah ... I cringe when I see kids on the back of bikes on a busy road – yeah, it's a big barrier for mums ...*

Female worker O: *One of my friends has got one of those [trailers] on the back of your bike that you stick your kids in ...*

Female worker N: *I think they're a bit dangerous.*

6.2.16 Transport culture

Most of the participants recognised that cyclists and motorists had different needs, accepted that people needed to co-exist on the roads, and did not feel that the road infrastructure belonged to any particular group – ie they were neither cyclist-orientated nor motorist-orientated. It can therefore be concluded that there are not simply 'motorists' and 'cyclists' (as is often portrayed in the media), but there is also a group who both cycle and drive, and are open to the viewpoints of both groups.

Female student B: *It's weird – a lot of my friends bike, but they're mostly guys ... none of my girlfriends bike. I think [it's] the 'cool' factor – afraid that if you do something stupid, everyone will laugh if you fall off; or if you have a basket on the front, whether people are going to tease ...*

Male worker B: *Well, we have a culture of driving cars – we don't actually have a culture of biking, or community cycling ... as opposed to Holland or Denmark and places like that, where cycling is cultural. There you could get on your bicycle, with your wife on her bicycle, and you could go into town to a restaurant – I mean, fancy doing that in New Zealand (laughs) – so it's nothing to do with facilities, it's all to do with behaviour and the way use the roads.*

Female student D: *Some cyclists ... perhaps 10% of them – they're really anti-drivers and you see them ... do whatever they feel like and slam on the brakes ...*

Female worker D: *Yeah, this is what I've picked up ... I went to this groupie thing ... about overcoming your fear of [cycling] ... the two people who dominated it – it was as if there was a real 'way you have to be' ... you've got to take one side or the other, there's no accommodation for each other. Cyclists seem to hate motorists and motorists seem to hate cyclists. It's weird, in Christchurch ... because it does work both ways ...*

Male worker D: ... *yeah, there is quite a hard-core cycling fraternity, isn't there ...*

Female worker D: ... *whether it's just their collective experience, or whether it's just part of an in-built psyche thing ...*

Male worker D: *Yeah, it's almost as if you're [in one group or the other], which is interesting, but that isn't the way to go about it ...*

Female student D: *Yeah, some of them don't obey the red lights ... I think you should either be a vehicle or you should be a pedestrian – like cyclists belong in the vehicle category, [but] ... they'll come to a red light and you see them stopping ... and they turn themselves into a pedestrian so they can go across the pedestrian crossing, or they'll just bike down the footpath for a bit and come across, and like that sort of thing is kind of worrying ...*

Male worker D: ... *very tempting though, isn't it, as a cyclist – I mean, it's really tempting to do that ...*

Female student D: ... *but as a pedestrian it scares me to death when I'm crossing the crossing and a bike comes at you 100k ... I mean, I'd say that's a minority ... (like motorists) ... that are really aggressive ...*

Interviewer: *Do you think that there is a culture around cycling that makes it hard for people to start cycling, because they don't want to be perceived as a cyclist?*

Female worker I: *No.*

Female worker F: *No.*

Female worker J: *No, but listening to this lot has put me off.*

Female worker H: *It's kind of funny because I biked a lot ... in between having kids ... you can see from both sides – you can see it from being a driver and from being a cyclist.*

Female worker F: *I think if you've been a cyclist, when you're driving I think you're looking out for cyclists. I think it's the people who don't [cycle], or have never really been on a bike before – they're the ones who just don't look and they don't care.*

Female worker I: ... *and they own the road – what are we doing there?*

Female recreational C: *Most cyclists are drivers too. They are teaching their kids to be careful about cycling. In about 20 years time, it will be a totally different culture, I reckon.*

6.2.17 Fitness and health

One of the benefits of cycling discussed in the literature review was the undertaking of physical exercise through transport (Hillman 1997a, Jensen et al 2000). It was also mentioned how fitness could be both a motivation and a barrier, as people may perceive that they are not fit enough to cycle to work. In general, most participants considered the fitness and health aspect of cycling to work to be a positive motivation. For the recreational cyclists, however, their commute was usually not long enough to be part of their training program, making a short distance a barrier for them. Other people also mentioned how they undertook other exercise and then drove to work, suggesting that cycling to work would be a good substitute for this activity if their other barriers to cycling could be broken down.

Male worker A: ... *that's how I deal with that at the moment. I go for a walk at 6 o'clock in the morning, come home and have a shower, put my suit on, hop in the car ...*

Female student A: ... *I don't do a lot of exercise, so fitness would be one of the motivations for me, for sure ...*

Female student B: *It seems like a good way of getting fit and actually doing something as well. I guess that's kind of the work thing too – if you don't have time to go to the gym, just cycling to work would be a good way of keeping fit [as well as] functionality – getting to work ... I know that most of my friends and I don't go [to the gym] during the day because we don't really want to have a shower at the gym and stuff – so yeah, biking is a good thing. Fitness would be one of the main considerations, apart from the cost of petrol.*

Female worker A: *And fitness – that would be an advantage, but ... I'm really unfit, so I don't know if I could manage to bike to work. I don't know how long it would take me because I haven't [got a] bike and I'm not fit. So ... I would probably be a bit of a mess when I got to work, but ... a shower and a bit of a recovery would probably be alright ...*

Female recreational C: *It's got me healthy. I had a stroke when I was a kid and it affected my balance ... I was petrified that I would lose my balance. I used to be cock-eyed going down the road. Cycling is an activity [where] you've got to use all your 'bits'. I love cycling. I'm converting.*

6.2.18 Enjoyment

One motivation for cycling that was brought up in both the focus groups and the questionnaires (especially by the recreational cyclists) was enjoyment, with some cyclists saying they cycled because they enjoyed it as a transport mode. Enjoyment is probably a factor that differentiates potential cyclists from those people who are not interested in cycling. Making cycling more enjoyable could be a way to encourage more people to take part in this activity. If a perceived lack of safety reduces enjoyment, then improving this could be significant.

Female student A: *I cycle only when it's comfortable or functional (laughs). Yeah, only if I'm doing something else and it just becomes convenient – or maybe I can just enjoy the weather because it happens to be a nice day ...*

Interviewer: *So how often would you cycle to other activities ...?*

Female student A: *Once a week or so. I have only a road bike – it's not a racing bike, or a mountain bike – with a basket in front, so you know, I'm not exactly a recreational cyclist.*

Female worker D: *Well, I just quite like it. This is why early in the morning on the weekends is great, because I can go from my place down to [destination], and I can go there for a quick coffee and read the paper or something, and then bike home, [a] decent sort of ... activity ... Also, I've got a friend in [suburb] and I'm sort of trying to gear myself up to thinking that I could do that as well ... [it's] a bit further from where I am in [suburb] ... So really I keep my cycling to the weekends.*

6.2.19 Recreational cyclists

Recreational cyclists were identified in the literature as being potential cyclists (Howard and Burnes 2001, Lumsdon 1997), as they have access to a bicycle and a degree of confidence in cycling, although their experience may not be on the road. One issue raised by recreational road cyclists was that the distance to work was not sufficient for their training, and they chose not to cycle to work because they were cycling greater distances each day as part of training. For recreational off-road cyclists, cycling was more of a family activity, or they preferred it because it was away from the traffic, reducing the concerns about safety. One focus group suggested that the apparent increase in females cycling for recreation may have the potential to transfer into greater numbers of women cycling for transport.

Female recreational A: ... *I'm probably more inclined to bike once I've done the Long Bays [race]. Maybe I'll get back into ... biking to work when I'm not so much into training in the evenings.*

Female recreational B: ... *my intention was to cycle to work at least two days a week ... because I cannot go to the gym two days of the week ... but that kind of hasn't happened with this training I've been doing for the last eight weeks ...*

Female recreational A: *Yeah, it's been full on ...*

Female recreational B: ... *but I will try, once the training programme's over in a couple of weeks time, to try and do that ...*

Male recreational E: *I guess for me at the moment, the cycling thing is probably more of a recreational activity that I focus on. Particularly because it is an activity in which I can actually engage with my children. And it's a great activity for two boys, at 12 and 9, to go and do ... it's good fitness work for us all and it's a nice thing to go and do, 'cause we can just go out to Bottle Lake and cycle at Maclean's Island, and whatever. So, it's more ... pleasure-orientated, as opposed to a necessity ... going backwards and forwards to work [by bike] ... all the constraints I talked about before make it just tough, unachievable.*

6.3 Biggest issue

All survey participants (as well as those in the focus group discussions) were asked directly what their biggest issue regarding to cycling to work was. Overall, the biggest issue for most people was safety, including the behaviour of traffic, and the infrastructure for cyclists. This issue was closely followed by lack of showering facilities at the place of destination. This matched the findings of the questionnaires, although for some people, showering was a bigger issue than safety.

In the community focus group, which was small and was focused on non-work journeys, safety was less of an issue than some of the other logistical requirements, such as luggage-carrying capacity, but it was still a significant issue.

Interviewer: *And that's for all of you – traffic is the really big one, isn't it? It would be a nice issue to get solved.*

Female worker C: *Well, I think it's the shower.*

Female worker B: *I would say that [traffic and route] would be my main issues, because obviously, after a while you get used to cycling and fitness, and I could work out how long it would take and prepare for it, and have a shower when I get here, and the rest of it ... really, it's the route that is the problem.*

Male worker D: ... *for me it would just be having a designated cycle route, or routes, throughout the city ... infrastructure – that would be it for me, then I could cope with other things ...*

Female worker D: ... *traffic and confidence I think – I mean, it is scary ...*

Interviewer: ... *what do you think is the biggest issue for you ...?*

Female student A: *Car drivers.*

Female student B: *... I think the safety comes before everything else really, probably my main obstacle ... getting over wearing a helmet, wearing sensible shoes (laughs) ... having just driven in cities, I actually think having things like the coloured bike lanes ... would help me to know what to do, 'cos that's a fear as well ... I know [the] road rules from a driver's point of view, but I don't know – I mean, I suppose cyclist's rules are pretty much the same ... in many ways, but that would help me to know where I'm supposed to be on the road as well ... it clarifies [it] for everyone on the road ...*

Female student A: *... ideally, though, there shouldn't be the need for ... elementary level markings. I mean ideally, if everybody respects everybody else there would be no accidents ... I just think there is a lack of respect and lack of awareness to start with, that's the problem.*

6.4 Encouraging cycling overall

One topic brought up in the focus groups was how cycling could be broadly encouraged, rather than just considering the individual barriers and motivations. In general, these ideas included cycling training courses, public campaigns (including campaigns to make cycling look 'cooler'), and developing a properly constructed cycle network that provided for the different types of cyclists. (Infrastructure is discussed later in this chapter.)

Female recreational A: *I think the cycle safety thing is really good ... I was relatively confident on my bike before I did that little course thing a couple of months ago, but there were other people ... who really weren't very confident and in fact, even on this training programme I noticed when I went out that some people [were] not aware of the fact that they need to be signalling, so that other cyclists and other vehicles can see and know what they're intending to do ... I think things like that are really important, although I do notice that schools take ... school kids out ...*

Female recreational B: *... that's what my flatmate does – he takes out the cycle safety [groups]*

Female recreational A: *... maybe it's just that I missed that, I didn't do that at my school ... I think that ... offering more of those kind of things would be really good. I guess making people more aware that's available too, for the adults ...*

Female recreational B: *I hadn't thought of [that] ... I do agree, but there's [also] a lot of advertising now ... of different events, fun events and things happening ... particularly through my work with health ... so they're just making people more aware ...*

Female student A: *... maybe a public awareness campaign ... would kind of push more awareness, but do I feel more like cycling or not? I quite like the idea, but there are just too many obstacles [so] I don't want to do it regularly. If the weather is nice, it's fine, but ...*

Male worker D: *... [as] a nice kind of utopia ... I feel quite comfortable with this idea in my head which was ... either at 5 or 5.30, or whenever people finish their work, we just get on our bikes, it's a relaxing ride home, the sun is shining (laughs), birds are singing ... there's not too many cars on the road, there's a nice cycle lane, and there's lots of other people out*

there enjoying their cycling as well ... that would be bliss ... you could say 'hi' to people at the traffic lights (laughs) ...

Female student D: ... although the other thing is ... people ... are different – you'll get the fast people who are just like 'get out of my way' ... and you'll have to pull over and let them past ... they're in such a hurry, and they come to the traffic lights and they don't want to get off their bike because it takes too much effort to stand up there ...

6.5 Safety

One of the issues most frequently raised and discussed by participants was safety. This supported the suggestion in the literature that concern about safety is one of the major reasons for low rates of utilitarian cycling (Noland and Kunreuther 1995). This concern was mainly based on a fear of getting hurt, most commonly from a previous incident involving motor vehicles. The possible conflicts that participants brought up were:

- getting hit by a moving motor vehicle
- parked vehicles doors opening into the area where a cyclist was cycling
- a lack of road space for cyclists.

The comments suggested that *perceived* safety was more important than knowledge of the *actual* safety of cycling.

Female worker M: I'd like to cycle, but I consider the roads to be too dangerous. And that's what puts me off. ... the amount of traffic on the road and just what I've seen ...

Female student B: ... you can't even get off the road, really, when there's cars parked ...

Female student A: Yeah, cycling beside those parked cars, and then [there's] cars flying past you, and then sometimes I notice there's no cycle lane at all, and I'm thinking, ok, I have to watch this one, for people swinging their doors open – and then the cars coming behind me ...

Female student B: ... which is really hard to apply when you're biking ...

Female student A: Well, you have to be smart and everything, it just makes it much harder, yeah ...

While there were some concerns about traffic numbers and speed, the main concerns related to the lack of respect drivers gave cyclists, a finding supported by Jensen et al (2000) who noted that accidents often occurred when cyclists and drivers failed to understand and respect each others' movements. Participants agreed that at times, some cyclists failed to act responsibly.

One suggestion was that motor vehicle drivers needed to be given more education about how to act around cyclists and how to respect cycle lanes. Some people (especially recreational cyclists) said that the cycling facilities in Christchurch were adequate, but were not perceived as safe because of how drivers treat cyclists and cyclists' space. They suggested that drivers might not be aware that it is illegal to drive in the cycle lanes.

Female worker J: *I just think the cycle paths are a token white line ...*

Female worker F: *... they're a door-opening path, not a cycle path.*

Female recreational B: *... and the drivers [need to] be more aware – like, the drivers that go and pull over in the cycle lane ... My flatmate ... does cycle safety as a job and so I'm learning from him, and I'm telling people off now – you know, ... educating drivers about the cycle lane, or just being more considerate of cyclists ...*

Female recreational A: *... for me it's [motorist] numbers, probably ...*

Female recreational B: *... probably behaviour more than anything ...*

Female student A: *... I have had a couple of incidents because of stupid, stupid drivers who just cut right across you, because they don't see you, they don't think – or, you know, I'm not going fast so I could stop, but ... I have no protection, they have a car ...*

Female student B: *... car versus cyclist (laughs) ...*

Female student A: *Yeah, you know, you can get injured ... some people just don't think, some of the drivers are so rude here ...*

Female worker D: *I find the traffic here quite alarming ...*

Female worker I: *... I think it's not just in Christchurch, but in New Zealand in general – [motorists] think they own the road, they just don't care about bikers ...*

Female community A: *I don't think [traffic] volume or speed are issues so much, as long as people stay in their lanes, don't cut you off and all that – that's a bit frightening. But having said that, as a cyclist I really feel that we should be allowed to bend the rules. One place in particular is Armagh St, [going] towards town ... it is a cycle lane and there are tram tracks there. You're approaching Durham St, which is one-way, and invariably you get up there and the light changes, and so I just cross in front on the red light and carry on down. I know I'm not going to get run over, because I'm going with the flow of the traffic, but I'm probably irritating the drivers that had to stop at the lights, because he or she can't do that.*

6.6 Cycling infrastructure

As described in section 4.2, images and plans of a range of types of cycling infrastructure were shown to focus group participants, who were asked to rate them in terms of how comfortable they would be to cycle on that level of infrastructure in peak-hour traffic. The types of infrastructure were subdivided into mid-block, signalised intersections, and roundabouts. Appendix E shows the slides presented to the focus groups. The images and plans of the facilities were presented to the focus groups in random order, to minimise bias in the testing process. However, the results are presented here in a more logical order of broadly increasing separation. For each type of infrastructure, refer to the picture(s) in appendix E that have the relevant reference codes.

6.6.1 Mid-block

For mid-block situations, participants were asked to imagine they were cycling along the straight piece of main road shown in the pictures at peak traffic time, and to make comments about how they viewed the infrastructure shown. They were asked to disregard intersections at this stage, as signalised intersections and roundabouts would be dealt with later.

6.6.1.1 No specific mid-block cycling provision (A4)

For use as a baseline, there was one set of diagrams and pictures that showed no provision for cycling. The types of road where there might be no specific cycling provision included roads both with and without a shoulder (the latter meaning that people had to cycle in the traffic lane). Participants' facial expressions and comments indicated a dislike for cycling along a piece of road with no provision for cycling, mostly because of the lack of space on the road. Recreational cyclists were generally comfortable with cycling where there was no provision, but said that they would do so with caution.

Female worker A: *No room ...*

Female worker B: *There is no space at all – I mean, there is not even parking space there [to] encroach into ...*

Female worker A: *Sometimes I would use it, but it depends where it was, 'cause ... if it was in the middle of town, [then] no – but if it was in a big wide rural [road], or residential streets, then there is a big difference, isn't there?*

Female recreational B: *... I would be happy to cycle on that road, but ... I would avoid times when there was heavy traffic, because you're basically travelling in the same path as the vehicles ... and I would feel some level of nervousness around doing that ... you'd be much more aware of everything that's going on around you.*

6.6.1.2 Marked cycle lane (A1)

One of the most common cycling facilities in New Zealand is the marked cycle lane, often indicated by a solid white line and painted cycle symbols along the lane. Generally, people made few comments on these, or noted that they were standard around Christchurch and they would be reasonably comfortable with cycling along the lane. However, the ongoing concern was that vehicles would not respect the lane or the cyclists' space.

Female worker C: *Yeah, that's ... not too bad ...*

Female worker A: *Usually I don't cycle so I don't know – it looks good, but it's no guarantee that cars won't swerve and hit you, is it – unlike a cycle path ...*

Female recreational A: *To me, that's fine. For me, that won't be a problem.*

Female recreational B: *Yeah, you've got a designated space to cycle in – not to say that vehicles won't ... cross that space ...*

Female recreational A: *You've got to look out for parked cars ...*

Female recreational B: *Yeah, I would feel more confident ...*

Female recreational C: ... *you've just got to be careful when you go down the lane there that people are not popping out of cars, opening doors – that would cause me some anxiety. At the moment, I would not ride into town at busy times, but I'd do it at not-busy times.*

Male recreational D: *Parking lane on the left – I'm not sure that that's the best way to go, if there was an option. It adds to the complexity, even if you are a motorist, with the doors swinging open.*

6.6.1.3 Cycle lane with extra highlighting (A6)

A variety of different methods of highlighting cycle lanes were shown to participants, including:

- full red- or green-coloured surfacing
- intermittent colour or coloured squares
- wider white lines
- hatching.

Some people preferred the use of extra highlighting along the lane, especially colour. There was a concern that paint could result in slippery lanes, although there were also comments that the new surfacing being used in Christchurch had grit in it, and this was less of a problem. One European example of infrastructure that had a red-coloured cycle lane with wide white hatching along the edge of the lane was quite popular with several of the focus groups.

Female student B: ... *good – better for awareness, as well ...*

Male worker B: ... *the fact that I don't like painted roads doesn't matter ... but I like the width of the painted lines there ...*

Male worker C: *Too much paint around is actually quite difficult for bikes and tyres ...*

Male worker B: ... *yeah, too slick ...*

Male worker C: *Some of them are made of that gritty stuff ...*

Male worker B: ... *but putting some on the white line too, you know ...*

Female worker K: ... *I'm not sure about the colours and the effect on the cars, I wouldn't feel confident ...*

Female worker I: ... *it's halfway there ...*

Female community B: *Yes, I love it.*

Female community C: *It needs to be red.*

Female community B: *Red.*

Female community C: ... *or green ...*

Male community B: *What I'd love to see is if somebody does pull into that space, instead of us being told off for not wearing [a] helmet, the police officer can [tell the motorist that] the cycle lane is for cyclists, not the cars.*

Female community A: *I like that flashed lane thing in the previous slide. Hatching. It just gives you a little buffer.*

Female community B: *Yes, I like that too.*

Male community B: *Compared to the green, I like that one more because it feels like a physical space that ... is a no-go time, whereas in the top picture [it] is just literally cycle lane road.*

Female community C: *I think it should be the colour and the hatching.*

All: *Yes.*

Male community B: *That box on the left of the picture – you’ve got that thick, bold dashing ... physically emphasising it more ...*

6.6.1.4 Kerbed cycle lane (A7)

Participants were shown a picture of a kerbed cycle lane between the traffic lane and the motor vehicle parking, or the edge of the road. The kerb had a very low profile, but it provided the cycle lane with a physical barrier. Generally, participants liked this cycling infrastructure and preferred it over the normal type of cycle lane, because they felt the kerbing provided a visual and/or audible barrier and drivers were more likely to recognise the cycle lane and not enter this space. The issues that were discussed included the width of the lane, concern about how to cycle over the kerb, and the fact that vehicles still had to cross the lane to reach vehicle parking spaces.

Male worker B: *This is just a bit narrow – you can’t get two people cycling side by side, having a chat ...*

Male worker D: *I think that’s 10 times better than the previous way. There’s an audio/tactile kind of thing going on for every driver that goes over those bumps, and there’s visual ...*

Female student D: *... drivers just inherently don’t go over kerbs – it’s like the edge of the road – whereas a cycle lane’s just like part of the road that’s been blocked off but you can still drive over it, but you shouldn’t ... this way it’s really designated ...*

Male worker D: *Yeah, I think I’d feel comfortable with that ...*

Male worker F: *That’s good ... I think that’s a good example. It really differentiates between the lane and the road ... there’s actually something physical ... a lot of people ... [will go] ‘I shouldn’t be driving on this’ ...*

Female recreational A: *To me it kind of creates ... a bit of a hazard for cyclists, actually ... although it’s a designated space ... because there’s less flexibility and you’ve got to be more conscious of the surface that you’re riding on if you’re going ... in and out of that cycle lane.*

Female recreational B: *... for me, it wouldn’t be a problem, I’d be fine ...*

6.6.1.5 Cycleway directly behind parking (A5)

While the kerbed lane was popular, a lane located behind the road’s parking area was seen by some to provide greater safety, although concerns were raised relating to passenger doors opening into the lane, and visibility (although passenger doors were seen as less of a problem than driver doors, as many vehicles are single occupancy). Participants raised the concern that a cyclist in the kerbed lane at an

intersection might not be noticed because they would be obscured by the parked vehicles on the approach to the intersection. They concluded that this type of infrastructure along the mid-block area would be safe, as long as the larger issue of intersections was appropriately addressed. They also said that it would be safer if this type of cycling facility was used consistently across a city than if it appeared intermittently.

Female student A: *Yeah, it kind of feels more like a footpath that I'm used to, but it's a cyclists' footpath ...*

Female worker B: *It makes more sense because the cars don't have to cross the cycle lane to park.*

Female worker G: *... you've then got passengers opening their doors ...*

Female worker I: *... well, a percentage of most car journeys have only one person – really high ...*

Female worker F: *I think I'd feel safer there.*

Female worker I: *... the only trouble is crossing that side road, though, and cars turning into it ... wouldn't have seen you because you're actually off the road a bit ...*

Female recreational A: *Oh, no ... It's potential for an accident, I think.*

Female recreational B: *Yeah, in my mind that would really only work if that was everywhere ... consistently everywhere, because otherwise, with the other versions you are essentially on the road, so if the cycle lane stopped at some point you just naturally move into the traffic lane ... whereas something like this you are quite removed ...*

Female recreational A: *Coming to that corner ... looks a bit dangerous, if they're going to go straight across ...*

Female recreational B: *... parked cars could actually hide you ...*

Female recreational A: *Yeah, I think it's just an accident waiting to happen, personally ...*

Female community C: *I thought this was going to be the best idea ever, but since I've been here, the danger there is children opening the door, or rushing to get in the car. So I've done a complete turn-about on this one.*

6.6.1.6 Cycleway behind parking with separation (A3)

As with the cycle lane behind parking, this facility was perceived as safe by the majority of participants, particularly as it removed the issue of passenger doors opening into the cycle lane. There were still concerns about side roads, however, although no side roads were shown in the images. Participants thought this facility offered better visibility of cyclists on the approach to intersections than a cycleway behind parking without separation. One issue raised was the practicality of the facility because of the increased space needed for the total transport infrastructure.

Female worker I: *Oh, beautiful ... because it's just more concrete, there's even more separation from moving cars, and there's an area for passengers to open their doors ...*

Interviewer: *Do you have any concerns?*

Female worker I: *Yeah, crossing the side road you'd have to be quite defensive if you're going straight ahead – but, you know, it's your life you're being defensive of, so you could do that easily ...*

Male worker A: *... it's interesting, it's a pretty bland cycle track – it's not very attractive ...*

Male worker B: *... absolutely, yeah, [that doesn't matter so much] if you've got your handlebars down and you're a road cyclist speeding along there – but if you're a commuter cyclist, it's actually quite pleasant to have a look around.*

Female worker B: *Look at the cycle lane, its huge ...*

Female worker A: *I don't know, I mean that extra is great, but I don't know if [it] ... compared to the one before ... has any advantages.*

Female worker C: *Well, it takes up more space but I don't know if it actually adds heaps to it – the kerbing might just be sufficient without that extra barrier ...*

Male worker D: *That's even safer than the last one, because there's less risk of a door being opened out into the cycle lane ...*

Female worker D: *... that's right, that gives the door room to open and it's not an issue ...*

Female recreational A: *Yeah, that's a bit safer ...*

Female recreational B: *Well, I guess because of opening the cars doors ... if a passenger opened their door ... you've got the barrier, so it's unlikely to affect the cyclists ...*

Female recreational A: *Ah ... the side road too ... lack of visibility from the parked cars ...*

6.6.1.7 Shared path (A2)

Shared roadside pathways are off-road areas where the pedestrian and cyclist spaces are adjacent or intermingled. Often, the only signage to differentiate pedestrian space from cyclist space is painted symbols on the ground, or signposts. While many participants felt the safety level of this type of infrastructure was high, as it was away from the road space, they were concerned about sharing the space with pedestrians. Several people said they would have to cycle a lot slower, but noted that some commuters would cycle at higher speeds and this could cause cyclist-pedestrian conflicts. Some people thought that pedestrians might not obey the signage, and take up more space on the pathway than they had been allocated. There was also concern about the places where driveways crossed the shared pathway, as cyclists move faster than pedestrians and therefore drivers might not see cyclists in sufficient time to react.

Male worker B: *... but in some situations that's probably quite acceptable ... in [places with] high pedestrian volumes it's not acceptable, but [where there are] low pedestrian volumes it would be – I can't remember what the rule is now, whether you can bike on the footpath here or not ...*

Female student C: *No.*

Male worker A: *... for that to work it requires the discipline of the pedestrians, and ... if there's five teenage schoolboys that are spread all across there ...*

Female worker A: *I guess it's good, isn't it, because it gets you off the road ...*

Female worker B: *I think if you wanted to get somewhere at speed it would be difficult, though, because there'd always be pedestrians wandering ...*

Female worker A: *Particularly if there were kids, they might step out ...*

Female worker B: *You'd have to cycle very slowly, one assumes ...*

Female worker A: *And then there's driveways as well – people pulling out of driveways – at least on the road you've got that footpath space before they hit you.*

Female worker C: *Yeah, they'd have to [have] speed limits for bikes there – I mean ... you couldn't go 30[km/h].*

Female worker B: *A serious cyclist wouldn't like that; would they just go on the road [instead]? Or would they be expected to go on the road in a cycle lane rather than [use the] cycle path?*

Female student D: *I do [have reservations] ... from a pedestrian's point of view ... they could end up having to step out of the way, or there could be an accident. I mean, that's a really wide example, but ... that one you showed just before – that one on the first slide – was quite narrow ... it was like a normal footpath, and ... you'd see a cyclist coming and you'd just step out of the way to let them past ...*

Female worker K: *Yeah, you need to have a dividing line.*

Female worker F: *Yeah, you do.*

Female worker K: *... especially for the bikes ...*

Female worker G: *Yeah.*

Female worker N: *It's quite good for family biking around, but again, not really for a hard-core cyclist, because there's a lot of pedestrians that use that as well, you have to weave your way through them.*

6.6.2 Signalised intersections – straight-through manoeuvres

A major concern for planners is that intersections are more difficult and dangerous to navigate on a bicycle than straight pieces of road (Davies et al 1996). This theory was backed up by the numerous comments and concerns about intersections that were raised by participants in the focus groups.

The following sections outline the various infrastructure types that were presented – first, for straight-through or left-hand-turn manoeuvres, and then for right-hand turns. For consistency, the intersections shown or implied were controlled by traffic signals, and commonly had two lanes of traffic entering and leaving the intersection.

6.6.2.1 No specific cycling provision – straight-through manoeuvre (B1)

Although some people said they would be prepared to cycle through this intersection, the majority said they would avoid it either through taking a different route, or by walking their bicycle along the footpath and crossing at the pedestrian lights. The emphasis of this example was to consider busy signalised intersections, as most people have to cross at least one of these on their journey to work and participants had indicated that one bad intersection could be a significant barrier to cycling. Participants were mainly concerned about finding space to get across this intersection, particularly if they had to weave their way

through traffic. Note that one of the photo examples, which also had other design deficiencies, was a fairly local site familiar to many, and this may have influenced their reactions.

Female student B: *Okay, that is the worst intersection in the whole world, I'm sure of it (laughs). Every time I go there, there's like someone definitely dodgy ...*

Female student A: *Yeah, I just avoid it ...*

Female student B: *Yeah, same. I never try to turn right from Ilam Road ... it freaks me out.*

Female student A: *Yep.*

Female student C: *Yuck. Dangerous.*

Male worker A: *... dangerous – I mean, would you let small children cycle through there? No.*

Female student C: *No.*

Male student B: *... in terms of volume of traffic in both those examples, something needs to be done ...*

Female worker B: *Nightmare material ...*

Female worker A: *... I'd be a pedestrian at that stage ...*

Interviewer: *Would you go out of your way to avoid this intersection?*

Female worker A: *No, I wouldn't – I'd get off my bike and go on the footpath and be a pedestrian.*

Female worker C: *You would avoid it if there was an alternative ... instead of going through the intersection.*

Female recreational A: *I would [cycle], but I'd be feeling pretty nervous ... and really kind of aware of people, I think ...*

Female recreational B: *... especially that bottom right ...*

Female recreational A: *... because where do you go – if you're going straight through, you've got to squeeze through on the left there ... I'd rarely use it ...*

Female recreational B: *Yeah, that's exactly the type of thing that we practised on that cycle [course], and so I would feel confident to cycle in that situation – but I would be feeling very nervous ...*

6.6.2.2 Cycle lane – straight-through manoeuvre (B4)

For the straight-through manoeuvre, the majority of participants commented that they would be happy to cycle through the intersection with cycle lanes. Some people said they would prefer more protection, and that the manoeuvre would not be enjoyable. One major concern was that left-turning traffic had to cross over the cycle lane when approaching the junction and many participants said they would feel unsafe in this situation. Another issue raised by some participants was that the cycle lanes did not have arrow markings the way the vehicle lanes did, which made them unsure about which lane they should be utilising. As well as having some uncertainty about how to use cycling facilities, participants were also not confident that motor vehicle drivers could be trusted to respect the cycling facilities and the people using them.

Male worker B: *You've got to use it, but it's not appealing ...*

Male worker A: *Yeah, when you're out in the middle ... it's like you're actually putting the cyclists out in the traffic so they can get run over ...*

Female worker M: *No [I wouldn't use it].*

Interviewer: *You would still be walking?*

Female worker M: *Mmm, yup.*

Female worker N: *I'd be much happier with this because there is a clear path to the front ... but again, I would still be pretty careful about it because you could potentially be knocked by a car turning left, and I would be very watchful [for] that, because if you are up at the front, the likelihood of traffic turning left is pretty high.*

Male worker F: *They actually work ... I've been in the ones where you're absolutely in the middle - as long as you don't then try and do something stupid like turn right or turn left ... I've seen people do that - if you're in the middle one, you're going straight ahead ...*

Female worker L: *Yeah, that's fine, I still just don't get how you'd get over to the other side ... [it] would be fine to go straight ahead, but getting out of that lane ...*

Male worker F: *... if I had to turn right there, I'd be a pedestrian - it's a busy intersection, so I'm ... not going to take chances ...*

6.6.2.3 Cycle path going with general traffic signals - straight-through manoeuvre (B3)

Although this facility removes cyclists from the traffic flow along the mid-block, participants thought it would be very unhelpful for navigating intersections. The main concern was that drivers who were intending to turn would not notice cyclists approaching the intersection along the footpath - a cyclist who was going straight ahead could be run into by a left-turning vehicle. The other concern was the issue of mixing pedestrians and cyclists, which was considered safe but not ideal for mid-block situations.

In general, most focus group participants agreed that they would prefer to have an on-road cycle lane, rather than this facility. It should also be noted that there was quite a lot of confusion about this type of infrastructure, and this confusion may have had an impact on how people perceived the facility. It is important that people can understand the facility in advance, and it seems that an off-road path that is directed by the general traffic signals might be too confusing for the majority of potential cyclists.

Female student A: *... so long as the car sees you ... that's the other thing - the [drivers] quite often don't see ...*

Female student D: *... that looks like it belongs to the pedestrians ...*

Female worker D: *... it does, doesn't it? I'm trying to get my head around that one ...*

Male recreational E: *I don't like that. I would prefer to cycle on the road.*

Male recreational P: *... I would worry that motorists didn't know I was there, because I am on the footpath ...*

6.6.2.4 Cycle path going with cycle or pedestrian signals – straight-through manoeuvre (B2)

A separate path with its own signals (or signals that are shared with pedestrians) was preferred over the off-road path going with the general traffic signals, but focus group participants still had a number of reservations about this option. Participants were generally happy to be directed by a separate cycle-signal facility, but were not convinced that this option presented a safer option than the on-road cycle lane. Partly because of some of the photo choices, they may have been confused about whether the motor traffic was stopped during the cyclist phase (as was intended).

Female student B: ... *yeah, I see heaps of ... problems.*

Female student A: ... *unless it is employed city-wide – country-wide – in every intersection and [in] identical ways ... but we are not at this stage ...*

Female worker A: *Yeah, that's fine.*

Interviewer: *So that is better than going with the general traffic signals?*

Female worker A: *Yeah, you can trust the cars more ... Because they are on a red light, you would presume it's all coordinated so that if you are going, they are not – mind you, they are all going in this example ...*

Female student D: *What if you're travelling with kids, man I'd be too scared, I'd think 'oh my god' what if a car turns ...*

Female worker N: *Yeah, it's great.*

Female worker M: *I'd be more comfortable because I'd feel I'd got the right of way signalled by lights ...*

Female worker O: *It is quite good because that's almost creating your own separate light – treating you like a separate category – and is more reassuring in a way.*

Overall, it was difficult to get a consensus regarding the cycling facilities that participants preferred for negotiating intersections when going straight ahead. It was relatively clear, however, that they perceived an intersection with no cycling provision as extremely unsafe.

6.6.3 Traffic signals – right-turn manoeuvre

The next set of pictures considered the right-turn manoeuvre through a signalised intersection.

6.6.3.1 No specific traffic provision – right-turn manoeuvre (C1)

For an intersection with two traffic lanes only, both for going straight and for turning, the majority of participants were extremely wary about cycling through the intersection – although in general, the recreational cyclists said they would be prepared to attempt the turn, depending on traffic. However, the majority of participants said they would walk their bicycles across two sets of lights as pedestrians, or avoid such an intersection by taking a different route.

Female student A: *I hate it ...*

Female student B: *Okay, I'm freaked out turning right in a car, so (laughs) turning right as a cyclist is just not even ...*

Female student A: *I hop off the bike, [and] go on the pedestrian crossing.*

Female worker B: *Oh, scary ...*

Female worker C: *... accident waiting to happen ...*

Female worker A: *Yup.*

Female worker C: *Yeah, I'd do that one ... only if there wasn't an alternative ...*

Female worker M: *Well, if I won't even go straight ahead, I surely won't go right ...*

Male recreational E: *I would do it, but it depends how traffic is ... if it was during normal off-peak hours [then I would do it] ...*

6.6.3.2 Right-turning traffic lane – right-turn manoeuvre (C6)

More people said they would be prepared to attempt to cycle across an intersection that had a traffic lane dedicated solely to right-hand traffic. However, many participants said they would still avoid such an intersection because of concerns about cycling in a lane that had traffic both going straight ahead and turning right, and especially because of having to cross one or two lanes of traffic in order to reach the right-turn lane.

Female worker A: *How does the bike get across there, though?*

Female worker B: *You go across two lanes of traffic, you see ...*

Female worker B: *You plan it 300 metres back up the road ...*

Female worker C: *Oh no no ...*

Female worker A: *Especially at 8 o'clock in the morning ...*

Female worker C: *[I'd] probably [walk the bike around] ...*

Interviewer: *So would you still avoid the intersection?*

Male worker D: *Mmm, probably ...*

Female student D: *I would, because I still don't know where you're supposed to ... do you go on the left of that right-turning lane and go around, or ...? Because the other people turning right would be out a bit more.*

Female worker N: *I'd be much happier with that. Although you've not got a dedicated cycling place, the fact that you are out of the way of the traffic as it's trying to go through ... makes a difference, if you kind of park yourself there and wait. The risk is, though, that you will sit there and wait – you will wait for the lights to turn orange and try and get through there at the last minute ... it is a risk.*

Interviewer: *You are not comfortable – you'd attempt it, but you are not happy ...*

Female worker N: *Yip, and particularly because you are going across [the traffic] ...*

6.6.3.3 Right-turning cycle lane – right-turn manoeuvre (C5)

Participants who had had some experience cycling often mentioned right-turning cycle lanes before they were presented to the groups. Most participants were happy with this level of infrastructure, as it provided a specific cycling space on the road. The major concern about this facility again related to the issue of having to cross traffic to enter the cycle lane, and several people said they would still entirely avoid the intersection.

Female student A: *... again, you still have to cross ... a tiny little bit. It depends on how busy the road is though – if it's a busy road, it just doesn't seem to matter ...*

Female worker L: *Oh, but how do you ... get into that cycle lane?*

Female worker C: *That's good.*

Female worker A: *That's nice.*

Female worker B: *You still have to get across there ...*

Female worker A: *You still have to move into it, but at least there is room for you ...*

6.6.3.4 Advanced stop box – right-turn manoeuvre (C3)

The advanced stop box is an additional painted space on the road that stretches in front of the traffic lane at the intersection. When the light is red, cyclists can use this area to move from the left-hand side of the road to the edge of the right-turning lane, meaning they don't have to cycle across the traffic flow. Many participants had either not seen this facility before or did not know how to use it, and were sceptical of its usefulness even once it had been explained. They pointed out that if the light was green, cyclists would still have to navigate the intersection on their own; a barrier to its use. They were also concerned about vehicles blocking the space, and that the cyclist might get in the way of drivers (this can be linked to the issues of confidence discussed earlier). On the other hand, some people saw this facility as providing cyclists with priority over vehicles, and perceived this as a benefit to cycling.

Female student A: *... the drivers in the cars behind, you know ... it's really awkward because they are impatient ... that can scare you a little bit ...*

Female student B: *... the issue would also be [that the cyclist] would actually be blocking the car going straight, and people get quite antsy to go on green, and you kind of feel that they're creeping up behind you, which is not very nice ...*

Female student A: *... and they don't necessarily respect ... the left-turning traffic at the corner there – they don't necessarily get more aware of the cyclists either ...*

Female worker B: *Okay, I just never knew what those were for – so the cyclists get in the way of the cars and go first ...*

Female worker J: *... you're just setting off and all the traffic's waiting – you'd have to get your arse into gear (laughs) to go around ...*

Female worker I: *Sometimes I think I must need a circular line painted on [the road] because I think I'm going to be cycling out to the middle of the intersection, sitting there until I can actually turn right, but you don't actually know where the other cars are going to be going ...*

Female worker H: *Well, you're acting like a car there, aren't you - you're kind of thinking like a car to turn right, aren't you?*

6.6.3.5 Hook turn – right-turn manoeuvre (C4)

Although the focus group participants did not understand the hook-turn facility at first, they thought it would be useful for performing a right-hand turn in safety. One reason this facility was popular was that the majority of participants who were inexperienced cyclists thought they would take two phases of traffic signals to navigate a major intersection, and the hook-turn boxes would allow them to do this while remaining on their bicycle, rather than having to join the pedestrians. This facility was also perceived as being relatively safe for children and potential cyclists. On the other hand, confident cyclists, especially those from the groups drawn from the recreational and community questionnaires, felt the facility would waste time. Some people said they would prefer to not be on the road, and some were concerned about the issue of everyone understanding how the facility worked.

Overall, the hook turn was seen as a good compromise between bicycle safety and vehicle priority, when compared with the head-start lights discussed in the next section. This form of infrastructure drew the greatest divergence in opinions – non-cyclists thought it would be useful, and experienced cyclists did not like it.

Female student A: *... that's kind of what I do already ...*

Female worker A: *So that would be similar to some of the pedestrian things we've got around the area ...*

Female worker A: *I guess it's pretty slow, but it's easier than getting off your bike, I suppose.*

Male worker D: *A lot of this comes down to being familiar with [it]. If I was familiar [with this facility] I'd probably do it, but if I just got there, I'd think 'what the heck goes on here?'*

Female worker L: *If you were on a busy road ... waiting, you'd be waiting for a long time to get across that road if you're having to stop at two [lights] ...*

Male worker F: *... at a really busy intersection ... one of the worst things that happens [is] people go 'Yeah, lights changed - oh, the right-turners are still going', so you can't get across sometimes until well into your phase ... but that [facility] would actually work ...*

Female worker L: *Oh, I wouldn't be worried about [the time], but I just thought that it would [take] longer than those other options ...*

Male worker F: *Yeah, [it's consistency of rules] and ... it's just actually knowing that there are ... a lot of people who are ignorant and driving, and a lot of people ... [who would] stop and think 'What's that?'*

Female recreational A: *... at least it makes it safe, doesn't it ...*

Female recreational B: *I think it's a great idea for those really busy intersections. I wouldn't want them on every intersection though, because presumably if that facility is there, then you would have to use it ...*

Female recreational A: *... if it wasn't at ... a busy time of day, then I'd rather actually just be out in the main lane with the traffic – but at ... intersections which are busy the majority of the time, [then] yep ...*

Female student E: *You may as well be a pedestrian. You might as well walk your cycle across.*

6.6.3.6 Head-start signal lights for cyclists – right-turn manoeuvre (C2)

While all the participants appreciated the idea of having a cycle signal that allows cyclists to take a right-hand turn across an intersection on their own phasing of lights, many were concerned about this facility's practicality. There was some concern about whether there would be enough time for cyclists to navigate the facility, but more importantly, they were concerned about the additional time it would add to vehicle signalling regimes, thus disrupting motor vehicle drivers. Some of the participants felt that although the hook turn was less attractive to cyclists, it might be a more acceptable facility in general.

Female student B: *I like the concept ... the hook turn just seems like a compromise – this phase [is] not a compromise for everyone else on the road.*

Female student A: *... when you're going ... across, I find that sometimes some cars seem to keep driving – they don't seem to notice the red light and they go straight past ...*

Female worker A: *Cars might not like that, especially if the cyclists come in dribs and drabs [occasionally]. I'm thinking of it as a driver; especially [on] a busy morning on your way to work ...*

Female worker C: *It would be like a pedestrian crossing, wouldn't it ... they'd still have to wait a certain amount of time before they'd be allowed to go again ...*

Female worker D: *You certainly get the feeling that someone has actually thought it through, rather than just sort of picking some random [idea] ...*

6.6.4 Roundabouts

When they were shown the roundabout options, many participants said they would rather cycle through a four-way intersection than through a roundabout. However, they felt that this might be partly because there were so few local roundabouts with cycling infrastructure.

Also, although the specifically stated focus of these discussions was low-speed, single-lane roundabouts, the comments showed that some participants clearly had multi-lane roundabouts in mind, and some of our photos featured multi-lane roundabouts.

6.6.4.1 No specific cycling provision at roundabouts (D2)

Most participants disliked roundabouts in general, and most of them said they would only cycle through a roundabout with no cycling facilities if there was little traffic – they would usually try to avoid them.

However, they made fewer comments about walking their bicycle across the roundabout than they did about the signalised intersection options. They were asked to consider a roundabout in a 50km/h zone that was correctly engineered to slow the traffic down to 30km/h. Despite this, many still said that roundabouts failed to slow traffic down.

Female worker C: *Oh, I was knocked off at a roundabout, so I don't like them very much ...*

Female worker A: *Roundabouts are bad enough for people in cars, let alone on a bike ...*

Female worker C: *They are worse if they have lanes though – if there are two lanes like the Sockburn one, it's a nightmare even for cars ...*

Male worker D: *I try to get through roundabouts as quickly as possible, which ... could be a dangerous thing as well, because you're not as visible – so if you go quickly through a roundabout, a car might just come through ...*

Female student D: *Yeah, that's the thing with roundabouts ... the drivers are distracted by what they need to do to steer around the roundabout, and sometimes [the space] can be quite narrow ...*

Male worker D: *... and the other thing is indicating as well ... that's a big thing on bikes ... strictly speaking, I'm supposed to indicate when I turn left – sorry, when I exit the roundabout – so if I was this car here, and wanting to go straight ahead, I'm supposed to indicate left ... Correct? So, I'm on my bike, perhaps changing gears, and I'm doing this as well making at sure people know I'm turning ... (laughs) can you all see this?*

Female worker D: *... this would be another of the ones where I would keep to the footpath and cheat (laughs), and cross over roads to get to where I'm going ...*

Male recreational E: *I'd go through there, but I'm less happy about that than the basic traffic-lights scenario ... mainly because ... you don't get a solid spot. If you are that cyclist at the bottom where all the cars are going, you don't know if the car coming up on the right-hand side will slow down. They might actually just go straight through, so there is greater risk involved in that than at an intersection [with lights]. At least you know when the lights are right, you go.*

6.6.4.2 Cycle lane within roundabout (D5)

Although having an on-road cycle lane within a roundabout did not appease most participants' concerns, they did agree that this type of infrastructure at least gave cyclists some space. In particular, participants preferred coloured lanes over white lines. There were still concerns about the potential for drivers to cut cyclists off as they circled the roundabout, especially on two-lane roundabouts. Another concern was the need to signal at the same time as steering a bicycle around a corner – if cyclists failed to signal, they could cause problems with other road users. Participants noted that vehicle drivers often failed to indicate accurately, causing problems for cyclists and vehicles alike.

Female student A: *... colour is included – okay, I like that ... yeah, I like that [on-road lane] very much ...*

Female worker C: *Looks okay ...*

Female worker A: ... *you've got your designated space, but I still wouldn't think it would solve any of those issues with [motor vehicles] behind you ...*

Female worker B: *or knowing where people were going because they hadn't indicated ...*

Female worker I: ... *token gesture ...*

Female worker J: *I think as a motorist, you've just got too many lines going around ...*

Female worker H: ... *[motorists] still have to cross the line ...*

6.6.4.3 Directional cycle lanes within roundabout (D6)

Photographs of directional cycle lanes within a roundabout were shown using an example from York, UK. In this example, the cycle lane going around the edge of the traffic lanes has advance slipways off the roundabout at each intersection. This type of infrastructure gives drivers a visual indication of where the cyclist intends to exit the roundabout, removing the need for the cyclist to make hand signals. One of the major concerns about this facility was that it was very confusing, although this could be because none of the participants had ever seen such infrastructure. Participants did recognise another major benefit – having sufficient space for cyclists. As with several of the other types of infrastructure shown, the discussion included gaining an understanding of how to use the facility, and the need for adequate signage and education to explain these types of facilities to cyclists and drivers.

Female student A: *I like that one if it's big intersections, especially the double lane ...*

Female student A: *I would be quite prepared to do it, yeah. Anything with this sort of red line, it's good ...*

Female student B: *It's quite good because it separates bikes as well ...*

Female student C: *It's a bit confusing ...*

Female student C: *Yeah, too much, and you've got to be watching that and everything else as well ...*

Male worker B: ... *although most British intersections would have a lot more signage ... all over the place, to add to the fun ...*

Male worker C: ... *for all the money ... they could have put the underpass underneath ...*

Female worker F: ... *better than the other ones ...*

Interviewer: *How many people are still avoiding the intersection?*

Female worker K: *I would ...*

Female worker J: *I'd give it a whirl, but probably not ...*

Female worker F: *I'd give it a try ...*

Female worker I: ... *not at this stage – I wouldn't feel safe, no ...*

Female recreational C: *Okay, yeah, that's a good idea ...*

6.6.4.4 Cycle path without cyclist priority around roundabout (D4)

Generally, most participants appreciated that this type of facility provided excellent safety and separation from the traffic, although there was concern that at peak periods it could take a significant time for the cyclist to navigate the roundabout, particularly when there were multiple lanes of traffic. While several participants agreed that they may use such a facility, the general view was that the time it could take to navigate around the intersection could be more detrimental than the safety benefits it provided.

Female student A: *Mmm, I don't like that as much ...*

Female student A: *[I prefer cycle lanes] At Sockburn roundabout, it has islands that kind of work in a similar way, but I noticed that the cars just bowl up at you ...*

Male worker B: *Who thought of that?*

Male worker C: *... very unmarked ...*

Male worker B: *Yeah, the cars should have to stop for the cyclists.*

Female worker A: *For cyclists on a busy day, you'd have to stop at each point to get the pedal ready again.*

Female student D: *It would be probably the safest option – I'd be happy with it ... but it would be a bit of a pain in the butt to be waiting ...*

Male worker D: *Still, it seems to be a bit better than the other two ...*

Female student D: *Yeah, for me, I'd use that over the other two ...*

Male worker D: *... because you're coming off a designated ... off-road cycle lane, aren't you?*

Male recreational E: *No, I don't like this one.*

Interviewer: *[You] don't like that? So you prefer the on-road cycle lanes?*

Male recreational E: *Yip. It's the same issue that we were talking about before with the separation – also, the fact that you are then having to try and cross the road as a pedestrian is a significant issue – with cars that have a right of way, you could get stranded there ...*

Female worker N: *Yeah, I agree, [you] could be there for ages ...*

6.6.4.5 Cycle path with cyclist priority around roundabout (D3)

In the example of this type of cycling facility from the Netherlands, the cyclist had priority over vehicles at each entry and exit point of the roundabout. While focus group participants agreed that this would be safe, they were concerned about the effect of this infrastructure on vehicles, and possible traffic congestion from vehicles giving way to cyclists. This idea seemed to come from the overall view that cyclists should not be given priority over motor vehicles. There were also concerns that this type of facility would not be respected by drivers, particularly if it was inconsistently used in New Zealand. Recreational cyclists, and those with the most cycling experience, were more supportive of this type of facility and the higher priority it gives to cyclists, than those with little cycling experience.

Female student B: *Sometimes you hear people say 'Oh, cyclists just do what they want – they're on the road, they're on the footpath, they're anywhere' ... and that red car ... [would be a problem] ...*

Female student B: *I think it's investing in the future ... as petrol gets more expensive, it's a cost thing, and [an] environmental thing ... and a lot of these options would also be infrastructure for pedestrians as well, to a certain extent, making them safer ... I know that [at the] roundabout near my house ... there's ... no pedestrian crossings, traffic light things – [pedestrians] just walk out into the road, or they have to wait for cars ... to zoom past them. This would help them, also.*

Female student A: *... in Christchurch, I'm interested that most cyclists are the racing bike cyclists ... those [cyclists] may not like that [option].*

Male worker B: *When I first saw this in Holland, with all the lanes and lines and things ... initially I was confused, but as soon as I got used to using it, very easy ...*

Female worker A: *For a cyclist, it looks pretty good ... commenting as car drivers, we are thinking, 'Oh, this looks a bit ...'*

Female worker B: *Yup, you'd need a lot of room to make it work well; you'd need a lot of space ...*

Female worker H: *... the roundabout would just get absolutely gridlocked ...*

Female worker J: *Yeah, when you're on a roundabout you put your foot down, sometimes, as a motorist, to get in and out ...*

Participants were also asked whether they thought that the cyclist crossing needed to be raised, as shown in the picture, or whether a coloured surface was sufficient. It was generally concluded that it would usually be sufficient to colour the crossing and have good signage, and some participants expressed negative views about raised crossings.

Female student B: *... they're visible, but I don't know how much [use they'd be] – once the car hits the bump, it's sort of a bit late if they haven't noticed that it's [there].*

Female student D: *... raised up is more, um ...*

Female worker D: *... a bit more visible ...*

Male worker D: *There's a visual cue for the motorist, too, because that section where the painting is just before the raised bit – this section here – you can see that from a distance, so it's a signal to slow down anyway, because there's a hump ...*

Female student D: *... and it's not just a piece of painted road that doesn't have much impact on you, so it's more clear ...*

6.6.4.6 Underpasses at roundabout (D1)

The final type of infrastructure shown was the underpass. This facility was only shown as an option for use at roundabouts, but the principles could be applied to intersections as well. Generally, everyone felt that

underpasses were a good idea, although this changed somewhat when they considered personal safety issues and possible conflicts with pedestrians. The concerns that were raised were darkness, tagging, litter, being unable to see traffic on the other side of the underpass, and narrow passageways. Everyone agreed that if the underpasses were properly designed, they would probably use them during daylight hours, but would have serious concerns about using them after dark. This concern links to the general concerns about night cycling that were discussed previously, and may also reflect some of the relatively poor existing examples of underpasses in New Zealand.

Female student A: *It does actually create spaces for taggers, you know, more people hanging about. It doesn't feel like a safe place ...*

Female student B: *Yeah, they always turn into kind of seedy [places].*

Male worker A: *Yeah, we'll have that ...*

Female student C: *We'll have that, yep ...*

Male worker B: *... build four bridges ...*

Male worker A: *... people don't like going into a dark tunnel though - you know, what's in there ...*

Male worker B: *... there's a whole lot of issues - it depends where it is, depends on whether there are homeless people sleeping in there or urinating in there, or broken bottles in there, or ... near a school - but if you get all the other things out of the way, [if] all those other problems have gone, then yeah, essentially you want to be away from the traffic as much as possible.*

Male worker C: *It's a pretty expensive way of doing it, but if you're starting from scratch ...*

Female student D: *... pretty good, as long as you don't run over pedestrians ...*

6.6.5 Preferred infrastructure overall

Before the in-depth discussion of each type of cycling facility, focus group participants were asked how frequently they would cycle on each facility, assuming that all other (non-infrastructure) barriers were removed (see appendix D for the questionnaire). The results from this questionnaire are shown in figures 6.2-6.5.

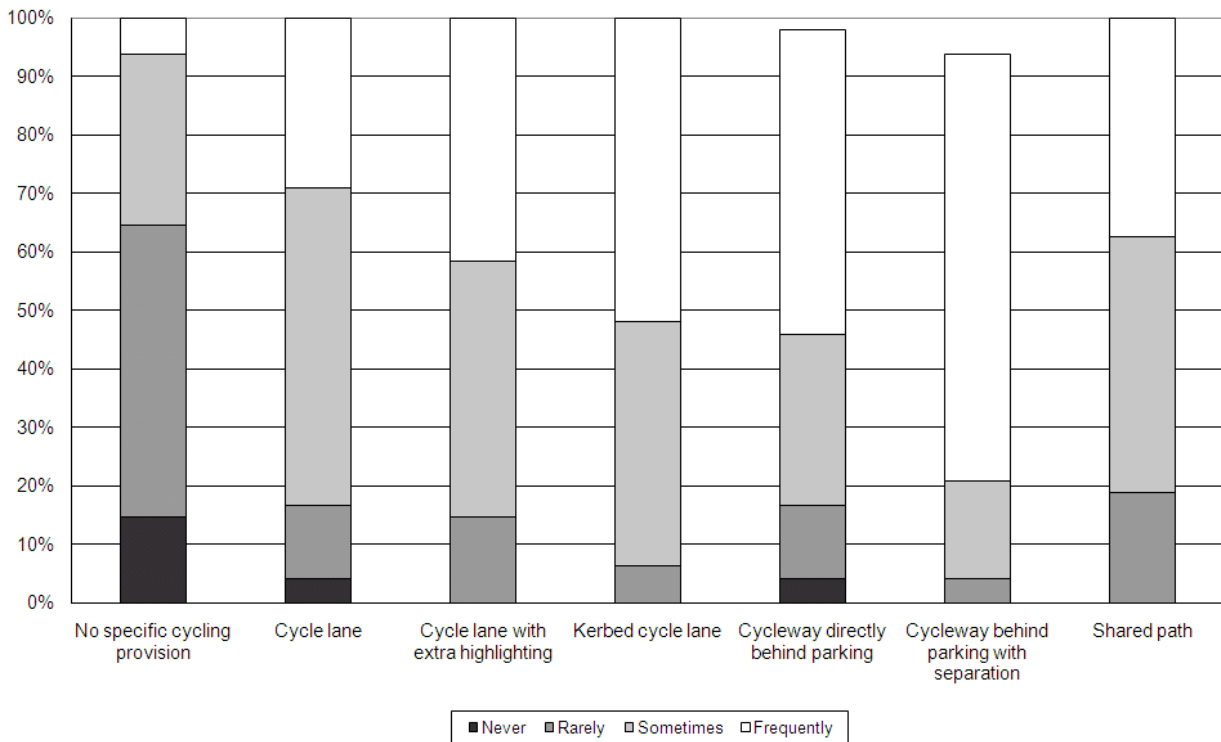
6.6.5.1 Mid-block facilities

Figure 6.2, which presents the data on mid-block facilities, shows a significant preference for cycle paths with separation - more than 70% of respondents indicated they would cycle 'frequently' on such a facility, which could lead to a significant increase in cycling levels. A number of people also indicated they would frequently cycle on other facilities, such as cycle lanes, but the projected increases in cyclists would be lower with these.

The next most popular option was the kerbed cycle lane, which provides a bigger barrier than a standard lane between motorised traffic and cyclists.

It is notable that on-road cycle lanes, especially with extra highlighting, rated at least as well as shared pedestrian/cycle paths. If both the ‘frequently’ and ‘sometimes’ ratings are considered, then all the cycling facility options that were presented rated well with more than 80% of the respondents – a promising sign for enticing people to at least try out a new facility. However, it should be remembered that the focus groups already included some people who cycled infrequently, so the ‘frequently’ rating was really a strong marker of intention to regularly use such a facility.

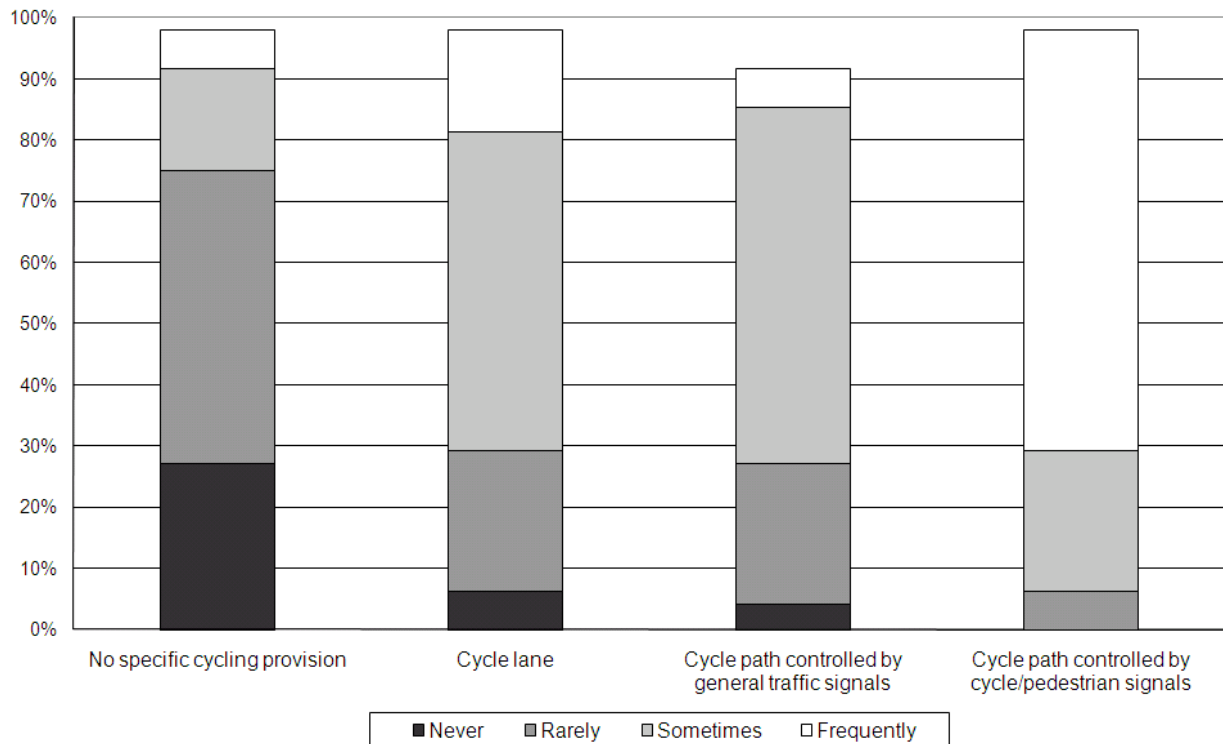
Figure 6.2 Infrastructure questionnaire – mid-block options



6.6.5.2 Straight-through manoeuvre at signalised intersection

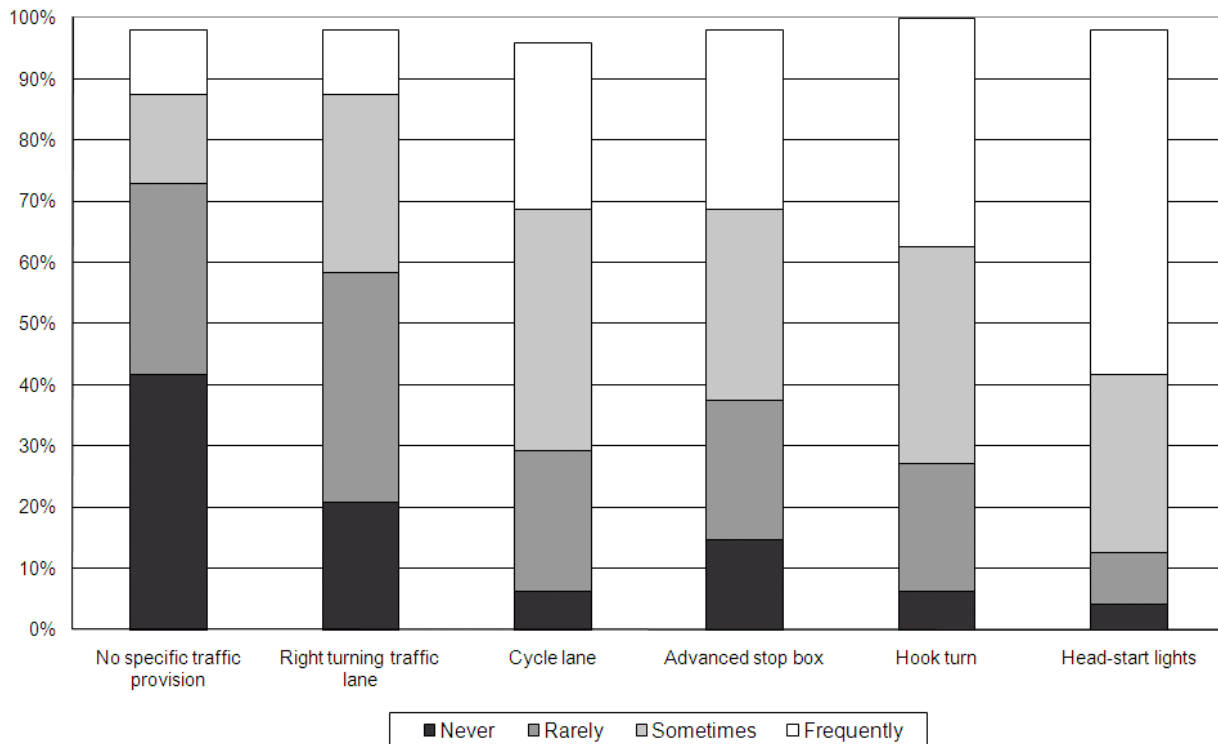
The next set of examples (refer to appendix E) referred to signalised intersections where people were undertaking a straight-ahead manoeuvre. The questionnaires, which were completed before participants modified their opinions through the focus group discussions, identified a preference for cycle paths directed by dedicated cycle/pedestrian signals. This was also the only facility that no one said they would never use, and had a higher proportion of positive responses than the second-best option (cycle lanes).

Figure 6.3 Infrastructure questionnaire – straight-ahead manoeuvres at intersections controlled by traffic lights



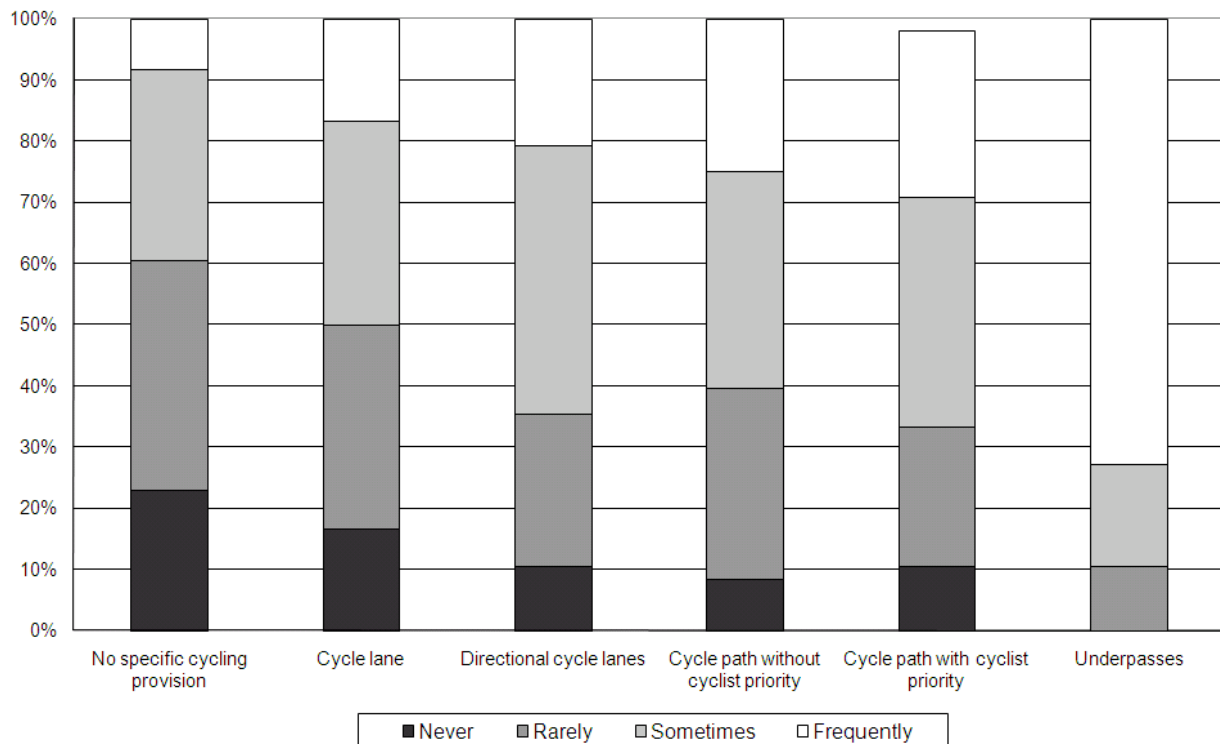
The only facility for performing a right-hand turn at a signalised intersection that drew a ‘frequently’ response from more than 50% of the respondents was the ‘head-start’ signal. In the discussions, concerns were raised about this facility delaying traffic overall, but on the other hand there was a preference for this type of facility at busy intersections. Hook turns were the next choice, but experienced cyclists said they would join the traffic lane rather than use this facility, as it would slow them down significantly.

Figure 6.4 Infrastructure questionnaire - right-hand turns at intersections controlled by traffic lights



6.6.5.3 Roundabouts

Roundabouts were generally disliked, and the preference was to replace them with signalised intersections. However, underpasses at roundabouts were the favourite type of facility. Some of the other options at roundabouts, including 'path with cycle priority', were not understood because there were no examples of them in Christchurch - but people who had experienced them in Europe were extremely positive about them.

Figure 6.5 Infrastructure questionnaire - roundabouts

6.6.5.4 Summary of cycle infrastructure ratings

Although all of the facilities that were suggested had reasonably good approval ratings, the results for both the questionnaire and the discussion comments showed that for mid-block situations (figure 6.2), a cycleway behind the parking space, with separation, was by far the most favoured option. Separation can include kerbed cycle lanes (which keep the cyclist in the view of vehicles) or a lane or path between the parking area and the footpath.

For signalised intersections where cyclists were performing a straight-ahead manoeuvre (figure 6.3), the favoured infrastructure was a cycle path with its own signals. For right-turning manoeuvres (figure 6.4), head-start signals were the most preferred option, with hook turns also favoured, especially by non-cyclists. Roundabouts (figure 6.5) were unpopular, with most participants saying they would prefer signalised intersections. Underpasses were considered extremely safe in one sense, but there were concerns about social safety, particularly after dark.

This research sought stated preferences from participants; in this respect, it is subject to the limitation of how well these preferences might translate into actual behaviour. While reasonable attempts were made to ensure that participants were aware of some of the key practical issues associated with the infrastructure options shown (eg the effect of side roads and driveways along mid-block sections), their actual experience of some of these facilities might be different from their initial perceptions. In time, this could mean that their preferences for different facilities might change.

Another issue that was not considered explicitly (although some participants may have factored it in) was the relative cost or practicality of constructing different options; as mentioned in section 3.6, there can be quite significant differences in this regard. A valid point for discussion, therefore, would be whether the

support for some of the options favoured in this research could justify the additional expenditure of creating them. For example, if cycleway funding is limited, a cycle lane with extra highlighting might be deemed to be a sufficiently acceptable investment compared with a (probably more expensive) kerbed cycle lane option.

However, improvements to the status quo in the community's level of cycling are still desired. The fact that generally *all* of the cycling facility options that were presented rated much higher than the no-provision options means that simply continuing to invest in more of *any* type of cycling facility should increase the uptake of cycling. However, some types of facility clearly could result in greater increases.

The practicality and safety of different cycling facilities also largely depends on the road-user environment in which they are constructed. Conflicts at driveways, for example, are partly a consequence of the crossing design (eg sight distances, use of colour, markings, raised paths, etc) and partly a consequence of the need for crossing motorists to slow down and check for cyclists. Similarly, issues at side roads could potentially be addressed somewhat by changing our current legislation, which gives priority to side-road traffic over main-road paths. The purpose of this research was not to resolve all of these technical, legislative and cultural issues; rather, it was to highlight people's infrastructure preferences so that other agencies could consider how to successfully support their introduction to our road networks.

6.7 Quality of the route compared to distance/time

One of the issues discussed in the focus groups was how people negotiated intersections. Several participants said they adjusted their route, even if it meant travelling further, to avoid a particular intersection. There was some discussion around how much longer people would be willing to cycle to avoid a particular spot, and there was agreement that 5 to 10 minutes was definitely feasible on a one-way journey, but that 15 minutes was pushing the boundaries – although this, of course, depended on the total length of the journey. This issue may be important when planners are considering intersection treatments that involve slightly increasing the delay, such as waiting for a separate cycle-crossing phase, or pathways around a roundabout; provided that it didn't create a significant time difference, there seemed to be some support for such a delay if it meant having a safer and more enjoyable route.

Male recreational A: Often you find a safer route [is] faster, I suspect because you have to take more care through a busier, more complex [situation] – often it has more traffic lights, or has a greater volume of traffic that you kind of have to get yourself through. And it's the kind of stressing angle about having to do that that compensates for a slightly ... longer route. I guess it depends on how much longer it would be. If it was an extra half an hour, probably not, but if you are talking five minutes ...

Female worker N: It would probably depend on where you go – sometimes five minutes longer is enough to put you off using that form of transport, and you'd take something else.

Female worker N: Yeah, I think you are right – five minutes isn't enough to have an impact, but maybe I was thinking 15 minutes might start to get a bit long ...

Male recreational A: Particularly if you are talking then about an extra 15 minutes of getting there and coming home – I mean, you are talking about adding an extra half hour of travel, and that's where it starts to mount up. It's the combined component ...

Male worker D: *... cycling through parks is great, and there's nice little lanes there ... it's much more relaxed – the stress levels in cycling are much higher than [in] driving ...*

6.8 Continuity

One important issue raised by participants was the continuity of the entire route, and the problem that cycling infrastructure is not provided for in a consistent manner across the city. They also said that while a variety of infrastructure was put forward in the focus groups, they would want a standard level of infrastructure across the entire city.

Female worker C: *There's ... several places where cycle lanes run out in the middle of the road somewhere – there's just all sorts of really obvious places where you think, 'Why did they do that?'*

Female worker A: *I guess the problem is that a lot of it is sort of retroactive, isn't it ... they've started putting cycle lanes in but the road isn't necessarily prepared for it, and then they run out of space and stop – something silly like that ...*

Female worker G: *... and there's not cycle lanes everywhere. Part of the route I would go – if I had more confidence ... and I could cycle on the road – hasn't got a cycle lane ... [Also,] I watch people [in vehicles] drive up cycle lanes to get into other lanes ...*

6.9 Two-way paths

Opinions about two-way paths on one side of the road (as opposed to the directional paths on each side of the road that were investigated earlier) were divided, but in general, the feeling was that as long as they were well signposted, they could work for mid-block sections. The following issues were raised:

- How would cyclists arriving on a two-way path at an intersection be provided for?
- The space provided could encourage people to cycle two or more abreast.
- Users do not always cycle on the correct side.

There was also some acknowledgement of the problem of cyclists riding in the opposite direction to what crossing motorists may expect, which, if not well addressed, may result in safety issues.

Female worker N: *Maybe it encourages teenagers to ride more than one abreast and have a conversation, and then they block the cycle lane for people coming the other way – they think 'The cycle lane is this wide, so we can keep doing what we're doing and chat while we're slowly biking along', and not really care about the fact that cyclists are coming in the other direction and they are going to be annoyed by them ...*

Female student F: *I would feel very strange going in the opposite direction to the traffic. I would feel very uncomfortable.*

Male recreational C: *I don't see a problem with it. It would depend on the congestion on the road, off the cycleway. I cycle through Hagley Park and there's walkers, runners, trailers, cyclists and segways. It doesn't seem to be too much of an issue. If [the path is] really congested, then people just stick to their side.*

Male community A: *I'd say it's another example of a 'roadway cycleway', and yes, I've come across someone who felt nervous going the other way ... The other night [this person] got off the bike and let [me] go through. Yes, [the cycleway's] pretty narrow in some places [for] handlebars [to fit past each other].*

Male recreational B: *I think they need to be clearly marked ... not a barrier, but a line down the middle.*

Male community A: *But in Matai St, there's very few times of the day when there's a ... lot [of people] going in both directions. It seems to be in pulses, largely going in one direction, occasionally going in two directions.*

6.10 Colour

Four colours were put forward for discussion – red, green, yellow and blue. Although there was no clear consensus, red and green were popular. Yellow was also liked because it was vivid, but was ruled out because it was used for other road markings. Blue was seen as standing out because it was different from other colours used in road markings, but it was not the favourite surfacing colour. Because red is often associated with 'danger' or 'stop', it could be interpreted as reminding vehicles to stay out of the lane – but it could put cyclists off for the same reason. On the other hand, green is often associated with 'environmental friendly' and 'go', and could enhance cycling's image as being eco-friendly – but motorised traffic could interpret this as indicating useable road space.

Overall, the consensus was that one colour needed to be chosen to be the standard across the country (in fact, this is now the case in New Zealand, with green the specified choice).

A further issue that was frequently brought up was which colours would work best for colour-blind people.

6.11 Traffic calming and 30km/h speed zones

The value of traffic-calming measures was discussed in the focus groups. Many participants disliked some of the local examples (which did not take cyclists into account) that had been implemented, but they did appreciate some better international examples.

Limiting speeds to 30km/h in certain areas was not favoured, for the following three reasons:

- The lower speed limit would not be policed, and therefore would not be kept – this, of course, would depend on the physical calming measures that were also implemented.
- Cyclists could get ticketed for speeding – perhaps a lack of understanding of the speed at which utilitarian cyclists generally travel might explain this unexpected response.
- Reduced speeds and traffic-calming measures could impede the movement of car drivers and delay them – ie, even though participants were asked to think of how these measures would affect them as potential cyclists, they actually responded from the perspective of themselves as car drivers.

Female worker Q: *If it's a quieter suburban road where they purposely made it quieter ... it would be quite tempting to cycle on the footpath, then you [wouldn't] have to go over the judderbars.*

Female student F: *I don't like [reduced speed limits] too much as a driver.*

Female student E: *Kiwis don't like slowing down. I've been through a lot of roadworks lately, and people don't slow down.*

Male worker C: *We might be done for speeding.*

Female worker N: *It would be very hard to police the traffic down a quiet suburban street, 'cos if you lived there, you'd just go 'Oh, no one ever sees the police ...'*

7 Conclusions

This research investigated the motivations and barriers associated with utilitarian cycling in Christchurch, New Zealand. The international literature review sought to identify the characteristics of people who currently cycle, their motivations and barriers regarding utilitarian cycling, and the types of cycling facilities that are available. These findings were then used to inform the survey methodology.

The information about the characteristics of current cyclists was used to identify people who may be 'potential cyclists' – ie, people who are interested in cycling (or cycling more often) as a mode of transport, who currently do not cycle (or cycle infrequently). Surveys revealed some of the barriers against utilitarian cycling, and then 'potential cyclists' were recruited into focus groups to discuss all the motivations and barriers that were the key issues for New Zealand cyclists, and to identify the most significant issues. The focus groups also evaluated a range of cycling facilities.

Overall, the survey questionnaires and focus groups showed that safety was the most significant issue for potential cyclists, particularly in relation to vehicle driver behaviour and traffic volume. However, other issues were also significant, including:

- having facilities at the destination for showering and changing
- enjoyment (which is linked to safety)
- the perception that vehicle drivers are not courteous (also linked to perceived safety).

The solutions most likely to effect a significant change in numbers of people cycling as a mode of transport related to the nature and consistency of infrastructure, and education for motor vehicle drivers and cyclists on how to best and safely use it. The preferred cycling facility was a comprehensive, consistent network of cycle-only paths with separation from motor vehicles. This result supported the findings of other international research (Dill 2009). It was apparent throughout the research that cyclists perceived that some level of separation from other traffic was safer than no separation. In that respect, even well-delineated cycle lanes (eg those with wide separation lines) seemed to provide a reasonable degree of comfort for many potential cyclists.

It should also be noted that the *perceived* safety of potential cyclists in relation to types of infrastructure was more significant in effecting a shift in modal choice than *actual* safety. This is significant, because a greater modal shift in favour of cycling, leading to health benefits such as reduced obesity, could outweigh any health disbenefits that might result from increased accident rates from a 'less safe' form of infrastructure. There is clear evidence that cycle accident rates decrease as the number of cyclists increases, which gives rise to even greater health benefits (Jacobsen 2003, Robinson 2005). However, it is acknowledged that the most appropriate cycling facility option for each location should be determined on a case-by-case basis.

The suitability of some commuting trips as a ride for fitness or training purposes was another interesting factor, and requires further thought. Whilst respondents were asked if they considered their main utility trips to be a suitable distance for cycling, this question was based on the assumption that some trips might be too long for cycling. However, for some experienced recreational cyclists, a limiting factor was that their trip length was too *short* to get any useful fitness/training benefit out of it. This could, of course, be resolved by taking a longer, more circuitous route to/from their destination, but time constraints, especially in relation to working hours, could prevent that option.

8 Recommendations

Based on our findings, the following recommendations are suggested for New Zealand:

- Investment in cycling facilities of all kinds should be encouraged throughout the country, with the choice of facility subject, where necessary, to practical considerations and best-practice guidance.
- The uptake of cycling infrastructure that allows cyclists further separation from traffic (including behind parking and kerblines) should be encouraged, whilst providing adequate safe-design details at intersections and driveways.
- A wide variety of cycling infrastructure types should be trialled throughout the country (particularly those that were well supported by the participants in this study) and their actual safety records should be monitored, as well as road-user understanding and acceptance of them.
- Consistent infrastructure for cyclists at junctions, such as hook-turn facilities and dedicated cycle signals, should be implemented.
- On-site signage and markings should be improved, along with education for all road users on how to interact with and use various cycling facilities.
- More low-speed (30/40km/h) zones and cycle-friendly traffic management should be implemented throughout the country, so that people become more familiar with the concepts.
- The continuity and understanding of existing cycling facilities, both in terms of physical road/path features and signage/markings guidance, should be improved.
- Further investigation of the effect of access to company vehicles on the uptake of utilitarian cycling should be carried out, both in terms of vehicles provided for travel to/from home, and vehicles available for private use during the day.
- Those involved in the planning and design of cycling infrastructure should be encouraged to consider the broader health benefits associated with increased cycle use, in addition to the safety implications of infrastructure design.

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Appendix A University of Canterbury Travel Survey 2008

UNIVERSITY OF CANTERBURY TRANSPORT SURVEY 2008 - STAFF

The University is looking at how staff and students travel to University and is assessing views about transport issues. We would be grateful if you would take a few minutes to fill in this questionnaire. **All information given will be in confidence. Please complete this questionnaire and return it via internal mail to the Department of Geography.** All questionnaires returned will be entered into a prize draw – please write your name and department in the box at the end if you wish to be entered. Thank you for your time

1. What is your **usual** (most frequent) form of transport to the University? (Please tick **one** box only.)
- Car / van (driver) Car / van (passenger)
 Bus Bicycle
 Walking Motorbike/Moped
 Skateboard/Blades/Scooter Other
2. How long does it normally take you to travel from where you live to the University on your **usual** form of transport?
 minutes
3. Which of the following do you use to travel to the University when not using your usual form? (Please tick **all** that apply.)
- Car / van (driver) Car / van (passenger)
 Bus Bicycle
 Walking Motorbike/Moped
 Skateboard/Blades/Scooter I use no other form of transport
4. **Car, bus, motorbike users only:** When travelling to the University how often do you experience traffic congestion?
- Most days Some days Rarely/never
5. How often do you travel between the main Ilam and Dovedale (College of Education) parts of the campus? (tick **one** box only and state your usual form of transport)
- Most days - I travel by: _____
 At least once a week - I travel by: _____
 At least once a month - I travel by: _____
 Rarely or never - I travel by: _____
- 6a. What are your main reasons for using your **usual** form of transport to University? (Please tick **all** that apply.)
- To visit shops etc. on way to / from University
 Used during day to perform job
 Used during day for non-work purposes (e.g. visit to doctor)
 Personal security during journey
 Because it is quicker
 Because it is healthier
 Dropping off and collecting children
 Lack of a viable alternative form of transport
 Because it is cheaper
 For environmental reasons
 Because it is more comfortable
 Other (please state)
- 6b. Now circle the **most important** reason in 6a (circle **one** only.)
7. Do you have a disability or long-term medical condition that restricts how you travel to University?
- No Yes (Please state how).....
- If you NEVER use a car/van to get to/from the University, go to question 11. Otherwise continue with question 7.**
8. Do you have a UC \$92 annual parking permit?
- Yes No
- 9a. What would encourage you to car pool (share a ride with other adults) or carpool more (or with more people) to the University? (Please tick **all** that apply.)
- Nothing would make me carpool to University
 Greater carparking opportunities for carpoolers
 Help in finding carpool partners with similar university hours and home locations.
 Guaranteed ride home if let down by driver
 More flexible work / study schedule
 Free UC vehicle or taxi for personal emergency trips
 Free UC shuttle to shops at lunchtime
 Cheaper car parking for car pool travellers
 A large increase in fuel costs
 Other (please state).....
- 9b. Now circle the **most important** incentive in 9a (circle **one** only.)
10. If the annual UC carpark permit was abolished and a daily charge of \$1 was introduced, what would you do? (Please tick **one** only.)
- I would park in the University as often as I do now
 I would park in the University but travel less often by car
 I would park in the University but travel more often by car
 I would park outside the University and walk in
 I would no longer drive a car to University
11. Do you own a Metro (bus) card?
- Yes No
12. Is there a bus stop within 10 minutes' walk of your home address?
- Yes No Don't know
13. Is there a direct (no need to change) bus service from your home to within 10 minutes' walk of the University?
- Yes No Don't know
- 14a. What changes would most encourage you to use the bus (or use it more often) to travel to and from the University? (Please tick **all** those that apply.)
- Nothing would make me use the bus
 More frequent services
 Improved security / lighting at bus stops
 Cleaner / more comfortable buses
 More reliable services
 More information on bus services
 More convenient bus stops
 Free UC vehicle or taxi for personal emergency trips
 A more direct route or better connections
 Discount tickets / passes
 A large increase in fuel costs
 Other (please state)
- 14b. Now circle the **most important** change in 14a (circle **one** only.)
15. Do you own or have access to a bicycle?
- Yes No

16. Do you cycle for recreation?

- Regularly Occasionally Rarely/never

17. Do you consider you live within a reasonable distance for cycling to the University?

- Yes No

18a. What would encourage you to cycle (or cycle more frequently) to the University? (Please tick **all** that apply.)

- Nothing would make me cycle to University
- Improved cycle routes to University
- More lockers at the University
- More easily accessible shower/changing facilities at the University
- Help with improving my biking skills and confidence
- Improved security for cycles at the University
- Less traffic on roads
- More courteous vehicle drivers
- More traffic congestion making cycling a relatively quicker option
- A large increase in fuel costs
- Having the opportunity to cycle to University with other people
- Discount to buy a bicycle
- Other (please specify).....

18b. Now circle the **most important** change in 18a (circle **one** only.)

19a. What would encourage you to walk (or walk more frequently) to the University? (Please tick **all** that apply.)

- Nothing would make me walk (more) to University
- Improved crossing facilities on routes to University
- Improved / new pathway connections to University
- Better security along walking routes (lighting, visibility)
- More easily accessible shower/changing facilities at the University
- A shuttle bus service when returning home at night
- More lockers at University
- Free UC vehicle or taxi for personal emergency trips
- A large increase in fuel costs
- Other (please specify).....

19b. Now circle the **most important** change in 19a (circle **one** only.)

Questions 20-22 relate only to your journey **TO** the UC on Tuesday 22nd July. If you did not travel to UC on July 22nd go to question 23.

20. How long did the journey take from door to door (including walking, parking etc)? minutes

21. What was your mode of transport (Please tick **one** box only.)

- Car / van (driver) – go to question 22 and then to question 23
- Car / van (passenger) – go to question 22 and then to question 23
- Motorbike/moped – go to question 23
- Bus – go to question 23
- Bicycle – go to question 23
- Walking – go to question 23
- Skate/blade/scooter – go to question 23

22. Where was the vehicle parked? (Please tick **one** box only.)

- In a University car park using an *annual permit*
- In a University car park using a *daily coupon*
- In a University car park using a *2 hour coupon*
- In a *UC Rideshare* University car park
- On the streets around the University (name street.....)
- Not at or near the University (i.e. I was dropped off)

23. Please complete the box below about your travel to the University of Canterbury this week. Indicate your mode of travel, and time of arrival and departure. If unsure how you will travel during the days ahead, please guess. If you did/will not travel on those days, leave blank.

Day	Form of travel TO UC	Time of arrival TO UC	Form of travel FROM UC	Time of departure FROM UC
Mon July 21 st				
Tues July 22 nd				
Weds July 23 rd				
Thurs July 24 th				
Fri July 25 th				

24. Staff only: How often do you travel for work purposes....

By:	At least once/week	At least once/month	Occasionally	Never
Vehicle from central UC pool				
Other UC vehicle				
Own private vehicle				
Own bicycle				
Bus				
Taxi (Christchurch use only)				

About you (for statistical purposes only):

25. What is your gender?

- Male Female

26. Please state your age.

27. What best describes your staff group (Please tick **one** only.?)

- Academic staff
- Technical staff
- Admin/Clerical staff
- Library staff
- Other (please state).....

Information from the next question will be used solely for mapping analysis. No attempt will be made to identify or contact individuals.

28. Please give your term-time address (hall or street and number)?

.....

If you do not wish to give your address, please give nearest street intersection (eg Creyke/Clyde).

29. Would you be willing to be part of a focus group in the future related to transport issues?

- Yes No

If yes, please give your email address and/or cell phone number (so we can contact you)

30. Do you have any other comments about your travel to University or desirable transport features of the University campus in the future (please continue on separate sheet if necessary)?

.....

Thank you for your co-operation. Please send this completed questionnaire to the Dept of Geography. Your answers will be stored on an electronic database but will remain anonymous.

Please enter your name & email address and/or phone no. here if you wish to be entered into the prize draw.

.....

Appendix B Focus group information

Focus groups information sheet

Department of Geography

When completing a recent workplace travel survey you indicated interest in participating in further research. Consequently I would like to invite you to participate in research investigating issues for attracting new commuter cyclists in Christchurch as part of a Masters thesis and research project funded by the LTNZ.

The aim of this stage of the research project is to discuss the motivations and barriers associated with commuter cycling in Christchurch.

Your involvement in this research is to participate in a focus group of up to six people lasting one to two hours (refreshments will be provided). Participation is voluntary and you may choose not to participate at any stage.

The results of the research may be published, but you may be assured of the complete confidentiality of data gathered in this investigation: the identity of participants will not be made public without their consent. To ensure anonymity and confidentiality, all quotes used in research will be anonymous.

If you are interested in participating in the research, please contact Katherine Taylor to arrange a time and location. If you are unable or would prefer not to participate, we would appreciate you letting us know your decision.

We will be pleased to discuss any concerns or questions you may have about participation in the project and may be contacted via the following methods:

Katherine Taylor
kjt54@student.canterbury.ac.nz
366 7001 ext. 7957

Assoc. Prof. Simon Kingham
simon.kingham@canterbury.ac.nz
364 2987 ext. 7936

Glen Koorey
glen.koorey@canterbury.ac.nz
364 2951 ext. 6951

Department of Geography
University of Canterbury
Private Bag 4800, Christchurch

This project has been reviewed and approved by the Department of Geography and the Human Ethics Committee of the University of Canterbury.

Appendix C Focus group topics

Introduction

- Names
- Normal transport mode

Current transport mode

- What is convenient about that mode
- Why they use that particular mode

Transport in general

- Attitudes to cars/environment/congestion/public transport
- Cost of car travel
 - What they perceive as the cost of travel (have AA figures on hand and get reaction)
 - Petrol prices
- What modes they perceive as the most dangerous
- What sort of transport should money be spent on

Cycling

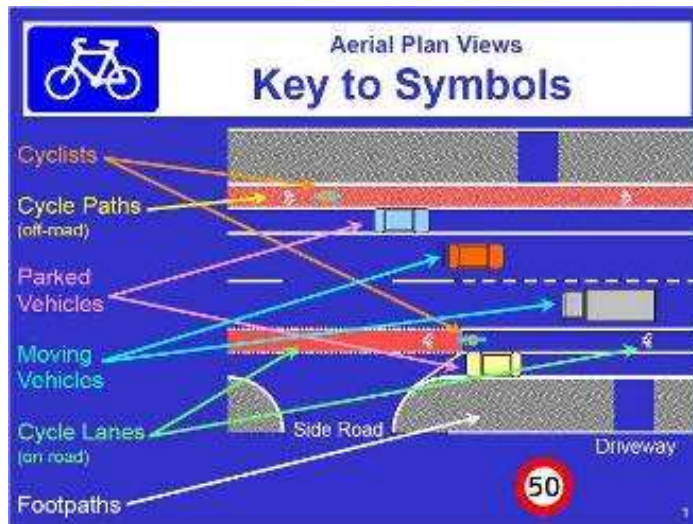
- General perception of cycling
- Motivations for cycling
- Barriers to utilitarian cycling
- Gender - why there is a disparity between females and males
- People with children
 - how they get to school
 - perceptions of child safety
- Fear of cycling and cycling culture
- What could be done to increase the level of cycling
- Safety - photos of different levels of service (LOS) and get them to rate them
 - discuss each LOS - what they like/dislike
 - the relative importance of the quality and nature of cycling infrastructure at links and intersections (eg required crossings)
 - the relative importance of the whole route or network being deemed appropriate for cycling, relative to single parts of the route or network
 - the importance of the experience of the route or the time taken to travel on the route (ie how attractive are indirect but 'better quality' routes?)
 - the importance of safety versus the directness of routes.

Appendix D Short questionnaire on infrastructure

If the cycle network from your house to workplace was consistently like this (with reference to each picture), where it needed to be, would it encourage you to cycle?

Number	Response				ID
1	Frequently	Sometimes	Rarely	Never	A4
2	Frequently	Sometimes	Rarely	Never	A1
3	Frequently	Sometimes	Rarely	Never	A7
4	Frequently	Sometimes	Rarely	Never	A6
5	Frequently	Sometimes	Rarely	Never	A5
6	Frequently	Sometimes	Rarely	Never	A2
7	Frequently	Sometimes	Rarely	Never	A3
8	Frequently	Sometimes	Rarely	Never	B1
9	Frequently	Sometimes	Rarely	Never	B3
10	Frequently	Sometimes	Rarely	Never	B4
11	Frequently	Sometimes	Rarely	Never	B2
12	Frequently	Sometimes	Rarely	Never	C1
13	Frequently	Sometimes	Rarely	Never	C2
14	Frequently	Sometimes	Rarely	Never	C3
15	Frequently	Sometimes	Rarely	Never	C4
16	Frequently	Sometimes	Rarely	Never	C5
17	Frequently	Sometimes	Rarely	Never	C6
18	Frequently	Sometimes	Rarely	Never	D2
19	Frequently	Sometimes	Rarely	Never	D4
20	Frequently	Sometimes	Rarely	Never	D5
21	Frequently	Sometimes	Rarely	Never	D3
22	Frequently	Sometimes	Rarely	Never	D6
23	Frequently	Sometimes	Rarely	Never	D1

Appendix E Types of cycling infrastructure shown to focus groups



A: Mid-Block Facilities

🚲 Cycle facilities along roads, not including major intersections

🚲 For each example:

- Show aerial plan view
- Show mock-up example
- Show examples of real-life facilities

A1 - Marked Cycle Lane

50

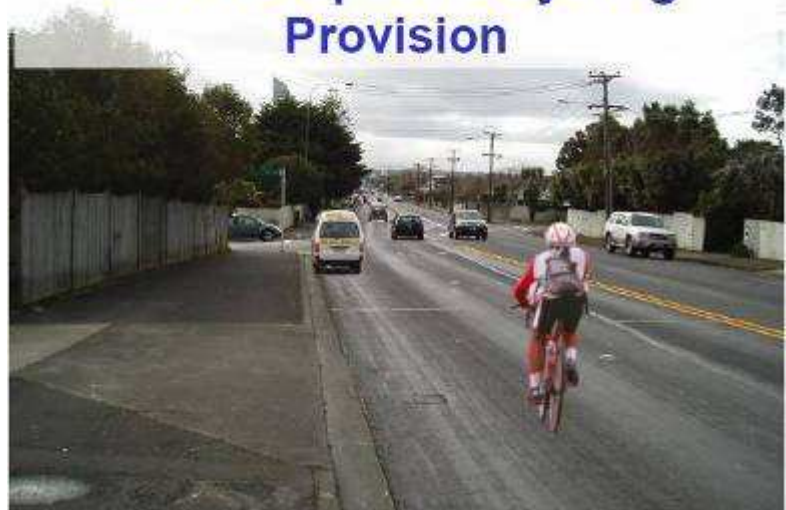


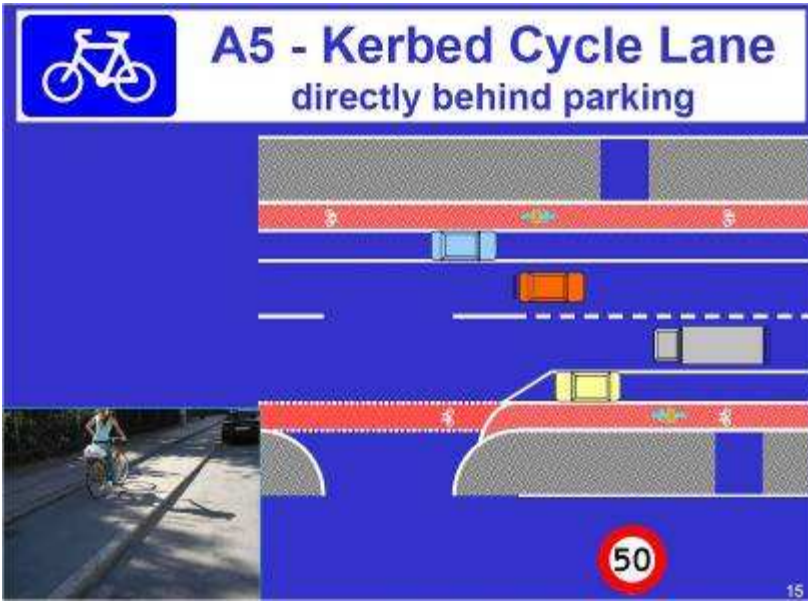




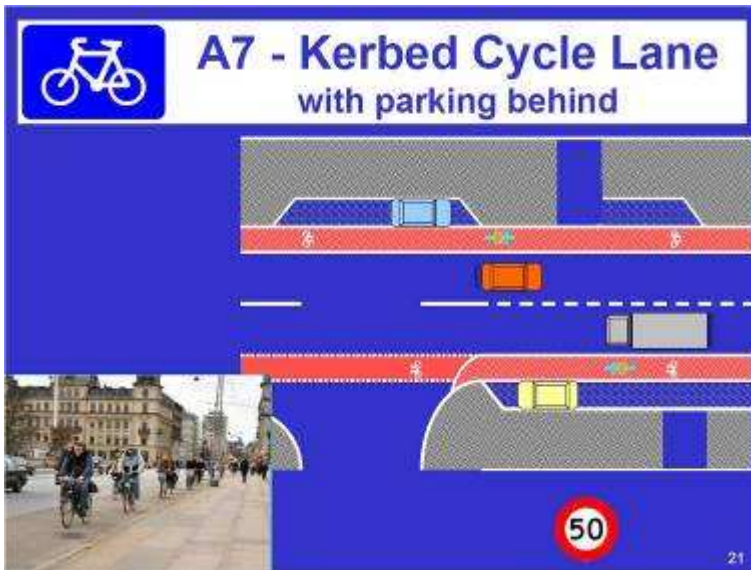


A4 - No Specific Cycling Provision









 Discussion Point:
Two-Way Cycle Paths



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 Discussion Point:
Cyclist Priority at Sideroads



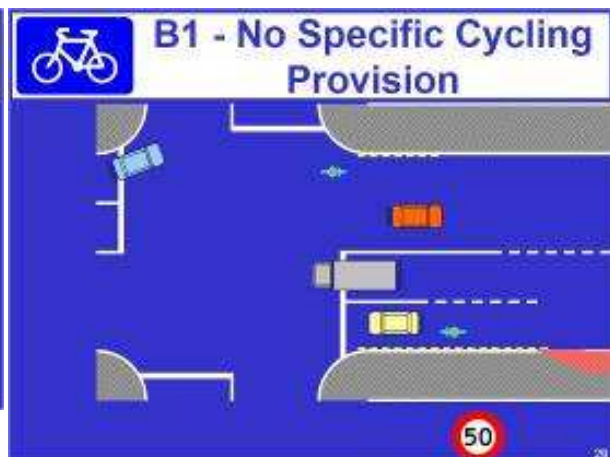
 Discussion Point:
Colour Options





 **B – Intersection Facilities**
Straight Through Movement

- Traffic Signal Facilities at intersections including Four-way and T-intersections
 - Focus on Straight-Through Movement only
- For each example:
 - Show aerial plan view
 - Show examples of real-life facilities





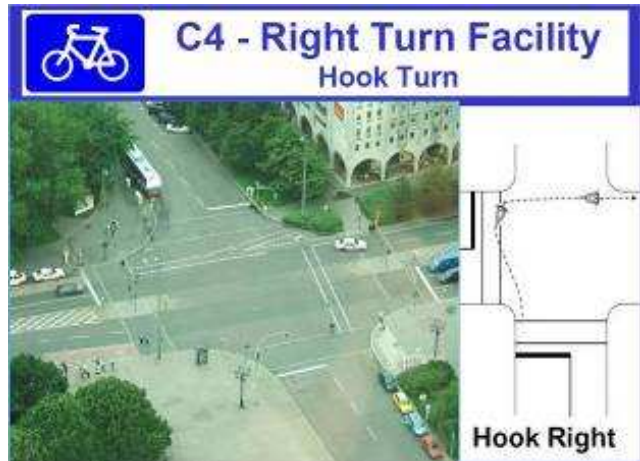
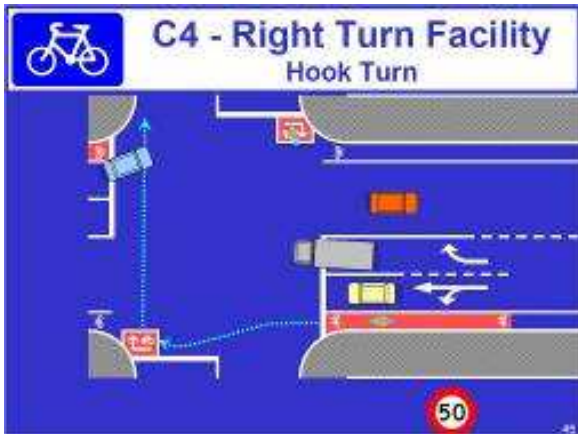


C – Intersection Facilities
Right Turn Movement

- Traffic Signal Facilities at intersections including four way and t-intersections
 - Focus on Right-Turn Movement only
- For each example:
 - Show aerial plan view
 - Show examples of real-life facilities









D - Roundabout Facilities

- Cycle Facilities at Roundabouts
 - Generally assume single lane roundabouts with good low-speed (30km/h) design
- For each example:
 - Show aerial plan view
 - Show examples of real-life facilities



