



BARRIERS TO ACTIVE TRANSPORT IN PALMERSTON NORTH

CHRISTINE CHEYNE
MUHAMMAD IMRAN
MICHAEL SCOTT
CALEB TIEN
2015

living_lab



CITATION

Cheyne, C., Imran, M., Scott, M. and Tien, C. (2015).
Barriers to active transport in Palmerston North.
Massey University Living Labs, Palmerston North.

ISBN 978-0-473-32666-1

PUBLISHED BY

School of People, Environment and Planning
Massey University
Private Bag 11-222
Palmerston North 4442
NEW ZEALAND

AVAILABLE ONLINE AT

www.massey.ac.nz/livinglabs

September 2015



TABLE OF CONTENTS

Acknowledgements.....	iii
Abbreviations.....	iii
List of figures and tables.....	iii
Executive Summary.....	iv
1.0 Background and Context.....	1
2.0 Literature Review.....	4
2.1 Introduction.....	4
2.2 Physical aspects.....	4
2.2.1 Distance and time.....	4
2.2.2 Secondary tasks.....	5
2.2.3 Climate/weather.....	5
2.2.4 Topography.....	5
2.3 Safety.....	6
2.3.1 Traffic movement.....	6
2.3.2 Crime.....	7
2.3.3 Safety in numbers.....	7
2.3.4 Legislative protection.....	7
2.4 Infrastructure.....	8
2.4.1 Cycle Lanes.....	8
2.4.2 Cycle Paths.....	8
2.4.3 Intersection Design.....	9
2.4.4 Urban Planning and Urban Form.....	9
2.5 End-of-trip facilities.....	10
2.6 Personal factors.....	10
2.6.1 Health.....	10
2.6.2 Socio-economic status.....	11
2.6.3 Numbers of cars/bicycles in the household.....	11
2.6.4 Affective influences.....	11
2.7 Interpersonal barriers.....	12
2.7.1 Peer attitudes.....	12
2.7.2 Status and identity.....	12
2.7.3 Dependence on others to ensure safety.....	13
2.8 Conclusion.....	13
3.0 Research Design and Methods.....	15
3.1 Survey methodology.....	15
3.2 Ethical considerations.....	16
4.0 Results.....	18
4.1 Demographic characteristics.....	18
4.3 Barriers to active transport in Palmerston North.....	26
4.4 Summary.....	32
5.0 Discussion.....	34
5.1 Physical aspects.....	34
5.2 Safety.....	34
5.3 Infrastructure.....	35
5.4 End-of-trip facilities.....	35
5.5 Personal and interpersonal factors.....	36
5.6 Summary.....	36
6.0 Conclusions and Recommendations.....	38
REFERENCES.....	40
APPENDIX.....	44
Appendix 1: Questionnaire.....	44
Appendix 2: Geographic distribution of respondents (Qualtrics heatmap).....	49
Appendix 3: Student survey executive summary.....	50

ACKNOWLEDGEMENTS

We wish to acknowledge the valuable help and guidance offered by the reference group members (Sarah Brooks, Jennifer Esterman, Pat Cronin, Stephen FitzHerbert, Julie Ireland, Kerry-Lee Probert, and Jane Richardson) and by many Massey academic staff members (in particular, Paul Perry, Rachel Summers, Harvey Jones, Matt Henry and Juliana Mansvelt).

ABBREVIATIONS

NZTA	New Zealand Transport Agency
PNCC	Palmerston North City Council
UCOL	Universal College of Learning
UK	United Kingdom

LIST OF FIGURES AND TABLES

Table 1 Summary of survey response rate	16
Figure 1 Gender of respondents	18
Figure 2 Age of respondents	19
Figure 3 Geographic distribution of Palmerston North respondents	20
Figure 4 Respondents' use of different transport modes	21
Figure 5 Respondents' ranking of the quality of the city centre for walking	22
Figure 6 Respondents' ranking of the quality of the city's main roads for walking	22
Figure 7 Respondents' ranking of the quality of their neighbourhood for walking	23
Figure 8 Respondents' ranking of the quality of the city centre for cycling	24
Figure 9 Respondents' ranking of the quality of the city's main roads for cycling	25
Figure 10 Respondents' ranking of their neighbourhood for cycling	25
Figure 11 Barriers to walking in Palmerston North	27
Figure 12 Respondents' views about barriers to cycling	29
Figure 13 Respondents' ranking for barriers to cycling	30

EXECUTIVE SUMMARY

1. Active transport encompasses modes of transport that require the expenditure of human energy, such as walking, cycling, jogging, scootering and skateboarding. Active transport is an important element of a liveable city.
2. This research is part of a wider project on active transport in Palmerston North undertaken as part of the Massey University-Palmerston North City Council Living Lab. The aim of this research is to identify barriers to participation in active transport in Palmerston North. The research involved a literature review and a survey of staff employed at Palmerston North City Council and Massey University's Manawatu Campus in Palmerston North. The purpose of the survey was to find out about people's use of different transport modes, and their impressions of the suitability of the built environment in Palmerston North for walking and cycling for short trips.
3. The survey was administered primarily via an on-line instrument but paper copies were made available to staff at Palmerston North City Council who worked away from the Civic Administration Building and did not have email addresses. The response rate was 42.5% which is considered very high for a survey of this kind.
4. Survey respondents noted there had been improvements recently to infrastructure for walking and cycling especially recreational walking and cycling. However, most respondents still drive for short trips that could relatively easily be done on foot or by bike.
5. Several groups of factors were identified as presenting barriers to active transport: physical aspects (related to the distance and time, weather, capacity to undertake other tasks such as carrying a load of shopping), safety, infrastructure, end-of-trip facilities, personal factors and (such as health, socio-economic status, household access to cars and bikes) and interpersonal factors (such as attitudes of peers, social status, and identity).
6. The survey focused on walking and cycling with respondents reporting some different barriers for each although also some common barriers such as weather and safety. The most significant barriers to walking were weather, the need to transport heavy/bulky items, the time involved, lack of enthusiasm/motivation, physical effort and the need to transport children. The most significant barriers to cycling were safety, infrastructure, time, convenience, and transporting heavy/bulky loads.
7. When giving feedback on different parts of the land transport system (their neighbourhood streets, main roads and city centre) respondents also ranked these differently according to each mode. This means that efforts to address barriers need to be tailored towards each mode. The survey also highlighted unevenness across the city in terms of the quality of infrastructure.
8. It is clear from the research that barriers that exist in some other places do not feature in Palmerston North which is endowed with a flat topography, relatively compact urban form and medium size. Weather was a frequently mentioned concern but there was also strong evidence that people appreciated the recent expansion of some high-quality infrastructure (the riverside and city perimeter shared paths) which was encouraging them to walk and bike not just for recreation but for commuting.
9. This research contributes to a large and growing body of literature on barriers but also points the way to reducing and removing barriers. Key recommendations are for high quality walking and cycling infrastructure integrated with public transport which can provide safe and connected routes, offering people the opportunity to combine walking and biking with the use of urban bus services (for example, to shorten the distance/reduce effort and offer an alternative in case of adverse weather). In addition, learning from other cities that have a high and/or growing rate of walking and cycling should be a priority as many other places are achieving increased participation in active transport. In these places and in the guidance that has been published, there is a strong emphasis on integrated transport planning and on social marketing and other strategies associated with travel behaviour change.
10. Walking and cycling (and other active modes) are central to a multi-modal transport system. They also foster a healthy community through their less adverse effect on the environment and their contribution to physical and mental well-being. It is intended that both the literature review and survey data will assist transport planners and other professionals and decision-makers in Palmerston North to better understand the reasons for the current rates of walking and cycling for short trips and where efforts might be focused in order to address barriers to active transport in the city.



1.0 BACKGROUND AND CONTEXT

Transport planners and other professionals and decision-makers in local and central government are increasingly seeking to harness the benefits of active transport. Collectively known as active transport, walking, cycling and a number of other non-motorised modes of transport involving human activity have significant health benefits for the individual and for the wider community. As well, there are economic benefits associated with these relatively inexpensive modes of transport, and wide-ranging environmental benefits of reduced use of fossil fuels for transport (e.g. reduced greenhouse gases, reduced storm water runoff, improved air quality). Walking and cycling and other active transport modes are also potentially important for expanding the use of public transport, which is a key factor in reducing congestion. In addition, increased walking and cycling and increased use of public transport, can contribute to reducing costs associated with land transport infrastructure as there is reduced wear and tear on roading and less need to build new roads. In the language of transport planners, walking and cycling and public transport are key mechanisms for travel demand management.

In Palmerston North as in many parts of New Zealand, there is anecdotal evidence of increased walking and cycling for recreation. However, Palmerston North City Council, like many other local authorities in New Zealand and elsewhere, is keen to see increased walking and cycling not just for recreation but for transport.

Between 1996 and 2006 there was a significant decline in the percentage of people biking to work from 10.5% to 5.9%. While there has not been a further decline between 2006 and 2013 in numbers biking to work in Palmerston North City, and while Palmerston North has a higher number of people biking to work than the average nationally, there has been no increase at a time when biking to work has increased significantly in some places. Nationally, there has been an increase in the number of New Zealanders cycling to work up from 2.5% in 2006 to 2.9% in 2013.

Nationally, the percentage walking to work has been stable since 2001. Around 7% of New Zealanders (106,119 people) walked to work in 2013 (Statistics New Zealand, 2015, p. 9). This has been consistent since the 2001 Census. However, in Palmerston North the percentage walking or jogging to work decreased from 9.5% in 2006 to 8.9% in 2013.

Although the scope to increase walking may be somewhat more limited than the scope to increase cycling because of the time and distances involved as commuters are likely to have a limit on the time they can spend on their journey to work (the greater the distance people live from their workplace the less likely they will be to walk), it is a concern that Palmerston North has not followed the national trend of no decline.

National-level trends are skewed by the trend in the centres with the largest population - in particular, Auckland. As well, and more importantly, they blur differences at the sub-national level. For example, there are some local authorities where there were increases in active transport for commuting much

greater than the national average. In 2013, Nelson city had the highest percentage of people who travelled to work by bicycle, at 8.7%. This was up from 7.2% in 2006. Christchurch city was next highest, at 7% – up from 6.5% in 2006 (Statistics New Zealand, 2015, p. 15). Both of these are much higher than the national rate of use of active transport for commuting (2.9%).

Nelson and Christchurch for some years have been widely regarded as bike-friendly cities so perhaps the overall percentage and the rate of increase in cycling to work is not unexpected. However, it is also clear that cities that are not perceived as bike-friendly have also had an increase in the numbers cycling even if the overall percentage in 2013 is similar to the current national rate. In Auckland, which is not regarded as bike-friendly (as seen in media coverage of cycle fatalities and road rage involving motorists and cyclists), the main means of travel to work has been relatively stable since 1996, although there have been increases in public transport use and active transport. The rate of use of active transport modes (walking, jogging and cycling) in Auckland was 2013 was 6.5% (Statistics New Zealand, 2014, p. 26). Cycling's share had increased from 1% in 2006 to 1.2% in 2013.

In Palmerston North approximately 80% of people drive to work with just under 9% walking or jogging to work in 2013 and 5.9% cycling to work. As with other urban areas where there is residential development in the peri-urban area, and an ageing population, it is likely that the percentage walking to work will decline.

Active modes can be used in conjunction with public transport but may be replaced by public transport where there are high-quality, affordable services. In Palmerston North City, urban bus services are free for many staff and students of the city's two largest tertiary education institutions, Massey University and UCOL. Between 2006 and 2013 there was an increase from 1.7% to 2.2% in the number of people using public transport for commuting in Palmerston North. It has been suggested that some of the increase in urban bus patronage may be people who might otherwise cycle. While this may assist in reducing congestion, the full range of health benefits of active transport may not be experienced. Without active participation in active transport the city does not have a genuinely multi-modal transport system.

There is a large body of international evidence that identifies and examines barriers to use of active transport, as well as some NZ-based studies. These studies have often been undertaken in cities with much larger populations than Palmerston North. While many of the barriers to active transport are likely to be generic to most western industrialised countries like New Zealand, it is also important to recognise that barriers may also be specific to an area reflecting local demographic characteristics, culture, history, the particular land transport system, topography and even weather. Understanding these features of the locality can ensure that transport planning and especially any interventions designed to increase use of active transport modes can be tailored towards the local situation.

The purpose of the first phase of the project is to review literature on barriers to active transport in Palmerston North and to find out about the views of users of the land transport system about barriers to active transport in Palmerston North. A second phase of research involved utilising the questionnaire for a paper-based survey of Massey University students. This was conducted by students in 132.314 Transport and Urban Planning. The survey took place on 22nd April 2015. Students worked in groups to analyse the data and produced four group projects. Appendix 3 contains an executive summary of the student research projects. Future phases will focus on designing interventions.

Following this introduction, Chapter 2 reviews the literature on barriers to active transport. Chapter 3 outlines the survey method used. Chapter 4 presents results from a survey of staff of two large workplaces in Palmerston North (Palmerston North City Council and Massey University). Chapter 5 discusses the survey data and the final chapter contains conclusions and recommendations.





2.0 LITERATURE REVIEW

2.1 INTRODUCTION

There is a growing body of literature emphasising the value of active transport modes (cycling and walking), and the diverse range of co-benefits derived from a societal reduction in private car commuting, including a reduction in preventable disease, lower accident rates, less impact on roading infrastructure and benefits to the local economy. However, despite these studies, rates of walking and cycling in many cities in the developed world have remained persistently low.

There exists a large body of literature exploring reasons why people choose not to engage in active transport. Many different strands of the issue have been investigated, many of which focus on safety and infrastructure, but there are also a number of studies investigating other physical barriers as well as aesthetic, personal and interpersonal factors. The details of these barriers are as follows.

2.2 PHYSICAL ASPECTS

Physical aspects are characteristics related directly to the capabilities of the transport mode. For example, private vehicles have a capacity to travel large distances, sometimes quickly, potentially transporting a large quantity of material. Insofar as they are required to meet people's travel needs, these features make it difficult to simply substitute a motorised journey with a form of active transport.

2.2.1 DISTANCE AND TIME

Data from a telephone survey by Thomson (2009) of 2,000 residents of North Shore, Auckland revealed a strong negative correlation between distance and transport-related physical activity. Despite 56% of respondents living between two and five kilometres from their workplace reporting that they could access their workplace by active transport, only 9% actually chose one of those modes. In contrast, more than 30% of respondents living between one and two kilometres used active transport to get to work, and almost half of those who lived within one kilometre. Similarly, a report by the Illawarra Active Transport Taskforce (2007), using a well-promoted online survey found that the most significant barrier to active transport was distance. However, this was done in an area of New South Wales where the rates of cycling to work were significantly higher than the state average (26% and 2.1% respectively). Timperio et al. (2006) also found that distance was a significant factor in parents' decision to allow their children to use active modes to travel to school.

Related to distance is the greater time it takes to cover a given distance, since both cycling and walking are often substantially slower modes than private transport. In two qualitative studies (Kent, 2014; Mann & Abraham, 2006) investigating reasons why motorists were resistant to changing modes (compared to public transport in these articles), a perceived lack of time was frequently cited by respondents. In the Illawarra study cited above (Illawarra Active Transport Taskforce, 2007), time was the third most common reason cited for not commuting to work by active transport, and the second most often cited for not using active transport for the “third main trip” (i.e. trips other than work and shopping. In the study by de Geus et al. (2008), a perceived lack of time was the factor most highly correlated to use of a motor vehicle.

2.2.2 SECONDARY TASKS

Another commonly cited reason for taking motorised transport was the perceived need for the motor vehicle for secondary tasks. Mann and Abraham (2006) reported that participants often cited utilitarian purposes for needing the car (such as dropping children to school), although when alternative methods were pointed out to them, respondents revealed a strong affective attachment to driving (see section 2.6 below). Pooley et al. (2011) found that almost 40% of respondents chose not to walk a short distance for everyday travel because they needed to travel at least part of the journey with a child, and more than 30% in the same survey chose not to cycle for the same reason. Another theme of the same study found was that active transport trips required specialised equipment (e.g. wet-weather gear, helmets, etc.) and had a much lower load-carrying capacity than a motor vehicle.

2.2.3 CLIMATE/WEATHER

Climatological changes, both short-term (weather) and long-term seasonal changes (climate) have been cited in many articles (including Pooley et al., 2011; Taylor, 2009; Walton & Sunseri, 2010) as barriers to active transport modes. A NZTA cycle demand modelling study (McDonald et al., 2007) estimated that rain reduces the likely number of cyclists to 64% of normal levels. In an internet-based survey, Stinson & Bhat (2004) found that unpleasant weather and reduced daylight hours in the winter as deterrents to cycle commuting, the former response being given more frequently by cyclists than non-cyclists.

Findings regarding the importance of climatological factors in the literature can be somewhat contradictory. In their study into decision-making about whether to drive or walk to nearby park-and-ride facilities in Auckland and Wellington, Walton & Sunseri (2010) found that rain or the chance of rain were the events which most closely correlated with respondents decision not to walk. In contrast however, a study by Pucher et al. (2011) into rates of cycle commuting in ninety American cities revealed no statistically significant relationship between cycling rates and climatological factors such as rain and cold or hot days.

2.2.4 TOPOGRAPHY

Rietveld & Daneil (2004), in a study of municipal differences in the Netherlands, observed that topography was the most highly correlated factor to bicycle use, with cities on hilly terrain showing much lower cycle participation rates than flatter cities. Further studies (Ministry of Transport, 2005; Taylor, 2009; Timperio et al. 2006) support the negative influence of hilly terrain and slopes on cycling participation rates.

2.3 SAFETY

There are several aspects of safety in relation to the decision whether or not to use active transport. Common to all of them is the belief that the car offers a greater level of personal security and that aspects of walking or cycling make them relatively “unsafe” as a means of travel. Safety concerns have been found in several studies (see, for example, Bean, Kearns & Collins, 2008; Pucher, Dill & Handy, 2010) to be one of the principal barriers to people participating in active transport. Closely related to the safety concerns is the cycling and pedestrian infrastructure which help to mitigate them. The absence of that infrastructure constitutes a closely related barrier and is dealt with separately in section 2.4 below.



2.3.1 TRAFFIC MOVEMENT

The volume, speed and proximity of motorised traffic has been shown in many studies (see, for example, Mackie, 2009; McKenna & Whatling, 2007; Ministry of Transport, 2005, 2008; Pucher et al., 2010) to have strong associations with people's sense of safety in the traffic environment, and consequently in their decision to engage in active transport. In a survey by Taylor (2009), University of Canterbury students reported lower traffic volume as the second most significant factor in encouraging them to shift transport mode to cycling. A Ministry of Transport (2008) guide for local authorities on promoting walking and cycling points out that walking and cycling are not dangerous activities in and of themselves, but that they usually take place adjacent to large volumes of fast moving traffic, something which parents are particularly conscious of. The location of busy roads has been shown in a number of other studies to have a strong influence on parents' decision to allow their children to walk or cycle to school (see, for example, Badland, Schofield & Garrett, 2008; Badland et al., 2009; Garrard, 2010; Lorenc et al., 2009).

Cycle commuters interviewed in the study by McKenna & Whatling (2007) also reported that a physical lack of space on the roads, and particularly cars passing too closely, as factors which increase their anxiety when they commute by cycle. According to the national walking and cycling strategy, *Getting There ... on Foot, by Cycle* (Ministry of Transport, 2005), roads which do not have designated cycle lanes, and thus do not allow for defined separation between cyclists and motorists, pose a barrier to using a bicycle as transport mode.

Other authors (see, for example, Tight et al., 2011; Wegman, Zhang & Dijkstra, 2012) have highlighted the vulnerability of both walkers and cyclists in the transport corridor. These conditions, and elements of risk presented to pedestrians and cyclists along travel routes from traffic, pose a significant barrier for active transport to be adopted for day-to-day use (Jacobsen, Racioppi & Rutter, 2009; Loukaitou-Sideris, 2006).

For pedestrians in particular, crossing busy roads without appropriate crossings increases the risk to personal safety and has been identified as a deterrent to walking (Taylor, 2009). The group identified by Killoran et al. (2006) to be most at risk are children and the elderly. Injuries are most likely to occur where pedestrians are crossing lanes of traffic (Cambon de Lavalette et al., 2009) and can be caused by both motorist and pedestrian error (Guo et al., 2012). Even when traffic does not need to be crossed, the presence of traffic nearby 'crowds' the area, and reduces the walkability of an area (Haklay et al., 2001), likely related to safety concerns.

2.3.2 CRIME

Crime, both as a risk to personal safety and personal property, is often recognised as a barrier to active transport use (Ministry of Transport, 2005). Crime, in terms of anti-social behaviour and fear for one's personal safety, has shown to be a more significant barrier to active transport in low-income areas (Killoran et al., 2006). It was also identified to be of particular concern for women, the elderly, and those with disabilities (Killoran et al., 2006; Ministry of Transport, 2005). In addition to this, children's preference to use active transport is often over-ridden by parents who are concerned about 'stranger danger' (Ministry of Transport, 2005). These safety concerns are stronger at night due to reduced visibility. Poor design of the urban environment, such as a lack of surveillance, poor lighting, overgrown vegetation, and disrepair, adds to the fearful attitude some may have towards walking or cycling (Ministry of Transport, 2005). In addition to concerns regarding personal safety and security, fear of bicycle theft is also a common barrier to participation in cycling (Cavill & Watkins, 2007).

2.3.3 SAFETY IN NUMBERS

The notion of 'safety in numbers' refers to the idea that the more people who are around or involved in an activity the safer it is. This is often associated with both walking and cycling. For example, Jacobsen (2003) found that it is less likely for a motorist to collide with pedestrians or cyclists if there are more people walking and cycling. This was the case in Australian research by Robinson (2005) which concluded that motorists drive more cautiously when they frequently encountered cyclists and pedestrians. However, due to the recent decline in people walking and cycling, the opposite is occurring in New Zealand, as was highlighted by the Ministry of Transport (2005). This strategy also points out that it is a vicious cycle, whereby "having fewer people 'out and about' adds to people's feelings of insecurity, leading to still fewer people walking or cycling (Ministry of Transport, 2005, p.48).

2.3.4 LEGISLATIVE PROTECTION

A lack of legislative protection for cyclists has been indicated by some authors (Cycling Safety Panel, 2014; Pucher & Buehler, 2008) to add to cyclists feeling of insecurity on the roads. In comparing Anglo-Saxon countries with Denmark, Netherlands and Germany (countries with a high rate of participation in cycling), Pucher & Buehler (2008) point out that the latter group have special legal protection for children and the elderly, and motorists are prima facie assumed to be responsible for collisions with cyclists. The relative lack of legal protections for cyclists and the lax enforcement of existing laws constitutes a barrier to cycling, according to (Pucher & Buehler, 2008).

Interestingly, some studies have also shown that existing legislation, purportedly to protect cyclists, actually reduces cyclist safety. Mandatory helmet laws, established to make cycling safer, have instead had the effect of lowering participation rates and led to behaviour likely to further reduce cyclist safety (Robinson, 2007; Walker, 2007). In addition to the high cost of helmet laws in New Zealand (Robinson, 2007), the mandatory use of a helmet when cycling in New Zealand has acted as a barrier to cycling due to the negative influence on convenience, comfort, and appearance (Pucher & Buehler, 2008; Taylor, 2009). In addition to reducing cyclists' safety in numbers, Walker (2007) showed that helmet use can change drivers' perceptions of cyclists' level of safety. This has been shown to result in reduced passing distances, thus effectively raising the likelihood of potential collision (Walker, 2007), and cyclists' risk to safety.

2.4 INFRASTRUCTURE

Inter-related with safety concerns, a perceived lack of infrastructure has posed a significant barrier to potential users of active transport modes (Taylor, 2009; Tin Tin et al., 2009). This infrastructure includes: cycle lanes, cycle paths, street design, intersection design and urban form.

2.4.1 CYCLE LANES

Cycle lanes are typically provided through "roadway markings on the outside of the lane, painted cycle signs inside the lane and occasionally cyclist signs on posts or coloured paint" (Taylor, 2009, p.42). They provide cyclists with demarcated areas of the road space to travel on, and importantly, keep cars separated and allow them to pass at a safe distance (Parkin & Meyers, 2010). The lack of cycle lanes on roads requires cyclists to share the same road space with cars, and the lack of demarcation introduces increased risk to the safety of cyclists. In a study undertaken by Tin Tin et al. (2010), 88% of respondents reported that the provision of cycle lanes would be an important factor in encouraging them to cycle, constituting the most significant of the five factors that they assessed.

2.4.2 CYCLE PATHS

Cycle paths, unlike cycle lanes, are completely separated from roads (Tin Tin et al., 2009). This complete removal from traffic further increases the safety of cyclists, and enables those with less cycling experience to feel more secure in undertaking this mode of active transport (Taylor, 2009). Pucher & Buehler (2008) also emphasise the network of completely separated bike paths in many German, Dutch and Danish cities, and intimate that the absence of such infrastructure is effectively a barrier to higher levels of participation in cycling.

2.4.3 INTERSECTION DESIGN

Intersections are areas where cyclists and motorists come into conflict (Dill, Monsere & McNeil, 2012), posing a risk to safety and often resulting in accidents (Pucher & Buehler, 2008). This includes any intersection where two or more roads meet, and include signalled intersections, roundabouts, and non-signalled intersections (e.g. T-intersections). Intersections are dangerous, especially for cyclists, because cycle lanes tend to end before an intersection, resulting in cyclists being merged with motorised traffic (Krizek & Roland, 2005). Accidents are often caused by misunderstandings between motorists and cyclists, where the path of one crosses the path of another, or there is a lack of visibility (Møller & Hels, 2008; Vandenbulcke et al., 2009; Wood et al., 2009). It is these safety concerns which can act as a barrier to using active transport.

2.4.4 URBAN PLANNING AND URBAN FORM

Urban planning and urban form shape transport choices. This occurs through land use practices and policies which shape place (Heath et al., 2006). Such practice and policies influence how areas look and feel which affects people's perception of those places. Urban planning influences housing density, compactness, street connectivity and the extent to which land use is mixed (Badland et al., 2009). Safety concerns can also arise due to poor urban form (Foster, Giles-Corti & Knuiaman, 2014; Loukaitou-Sideris, 2006), presenting a barrier to active transport use.

2.4.4.1 DENSITY

There are a number of density measures including population, employment, land-use density and mix. Killoran et al. argue that these are positively correlated with walking or cycling for travel. With increasing density of population, employment, stores and mix of land uses, there is increased walking and other non-motorised trips (Killoran et al., 2006).

Pucher & Buehler (2008) noted that areas of low-density developments are less conducive to cycling as a method of transportation. The same can also be said for walking, which is typically popular in denser, mixed-use neighbourhoods. In contrast, low density areas are commonly the result of single land use zoning (Ewing et al., 2014).

Cycling and walking have been shown to be very sensitive to distance and time. Low-density residential zones typically result in increased distances, and therefore times, between destinations (Killoran et al., 2006). However, low density does not necessarily mean poor connectivity.

2.4.4.2 CONNECTIVITY

Another aspect of urban form which can act as a barrier to active transport use is connectivity. Connectivity refers to “the directness of path between two points related to the characteristics of street design” (Grow et al., 2008, p.2073), and good connectivity has been shown to be highly correlated with walkability (Schlossberg et al., 2006). There is often poor connectivity in areas with many cul-de-sacs, and high connectivity in areas with grid-patterned road intersections (Badland et al., 2008). Poor connectivity results in increased travel distances, and can be a significant barrier to cycling (Taylor, 2009).

2.5 END-OF-TRIP FACILITIES

Another factor in the lack of participation in active transport, and particularly cycling, is the lack of end-of-trip facilities (Bonham & Koth, 2010). The two main facilities identified are showers and secure, sheltered bicycle parking (Pucher et al., 2010; Tin Tin et al., 2009). One of the main reasons why people choose not to cycle is because of a lack of secure bicycle storage at the destination, due to fear of crime in the form of bicycle theft (Pucher et al., 2010) (see also 2.3.2 above). The absence of showers is another end-trip facility which influences peoples’ decision to cycle (Tin Tin et al., 2009). As shown in a study by Twaddle et al. (2010), showers, along with secure bicycle storage facilities, were identified as the most common barriers to cycling to their destination. Those who have access to shower facilities at their destination are 1.7 times more likely to cycle to work than those without the same facilities (Buehler, 2012).

2.6 PERSONAL FACTORS

Along with the concrete, external conditions that encourage or discourage people from using active transport, there are a number of personal factors which have been found to have a strong relationship to people’s decision whether or not to use active transport. These are issues related to particular individuals and elements of their personal circumstances which affect their decision or ability to use active transport.

2.6.1 HEALTH

Stinson & Bhat (2004) found that injury and illness was the factor most likely to stop people from cycling, though a high proportion of those respondents were cycle commuters. Aldred & Woodcock (2008) pointed out that physical disability can be a barrier to active transport, but more serious physical disability may prevent the use of a car, becoming, in a car dependent environment, a barrier to participation in the wider community. Geus et al. (2008) found that perceived lack of skills and health were barriers to cycling. Criteria for the study included “having no injury or illness affecting the person’s ability to be physically active” (De Geus et al., 2008, p698).

2.6.2 SOCIO-ECONOMIC STATUS

Some studies (see, for example, Timperio et al., 2006; Timperio et al., 2004) have found correlations between socio-economic status and active commuting, although in different ways. Children (particularly boys) of high socio-economic backgrounds were more likely to cycle or walk to parks, playgrounds and to school than children of medium socio-economic status. However walking or cycling to friends’ houses was highest among boys of low socio-economic status compared to the other groups. Sehatzadeh et al. (2011), after controlling for car ownership, found a strong correlation between income and walking. Furthermore, several studies (see, for example, Rietveld & Daniel, 2004; Shannon et al., 2006) assert that increased parking costs can have a positive effect on uptake of cycling.

2.6.3 NUMBERS OF CARS/BICYCLES IN THE HOUSEHOLD

Pucher et al. (2010), citing a study by Cerveno et al. (2009), reported that cycle ownership was the single highest predictor of participation. However, the Cerveno et al. (2009) study took place in Bogota, Colombia, where people may have less disposable income. Another point of difference from New Zealand cities is that motorised traffic is periodically blocked on many main roads in Bogota, the absence of traffic making cycling for pleasure much more appealing (see 2.3.1 above). Pucher et al. (2010) also refer to a number of studies which claim to have shown that the introduction of a shared bike system has led to an increase in number of cyclists in France, Spain and England. Furthermore, the implementation of these programmes was reportedly done in conjunction with improvement in cycling infrastructure, confounding the evidence that the shared bike system was responsible for the increased numbers.

On the other hand, a survey by Carse et al. (2013) showed a correlation between access to a car and travelling by car to work, leisure and shopping. Likewise, Sehatzadeh et al. (2011) showed a strong negative correlation between car ownership and walking in general. Similarly, Stinson & Bhat (2004) also showed a negative correlation between car ownership and cycling. However, it has been pointed out that those living in lower density areas further from their workplace are more likely to feel the necessity for more cars per person in the household. Killoran et al. (2006) also point out that lack of access to a car often necessitates an increase in walking, including walking to public transport.

2.6.4 AFFECTIVE INFLUENCES

As important as the health and financial state of the individual commuters, a factor that has been shown to have a strong effect on the decision to use active transport is the individuals' attitudes and emotional response to the different travel modes. Following qualitative interviews with commuters in Sydney, Kent (2014) identified five reasons people preferred to drive, even when alternative modes could be shown to take an equal time: (i) the comfort of the car, (ii) the extension of private space that it allows, (iii) the sense of autonomy, (iv) the flexibility, and (v) the reliability that the car allows, in terms of not having to coordinate with bus timetables. In a similar study, Mann & Abraham (2006), in a UK study, also identified personal space, sense of autonomy, driving pleasure and perceived greater utility of private cars as the reason for non-participation in active travel.

In the New Zealand context, Rose et al. (2009) found that many people see car ownership and use as an imperative, and the key to mobility generally, even to the point of driving unwarranted and unregistered vehicles. This study should be understood as pointing to the perceived centrality of the motor vehicle in the lives of New Zealanders, which is then reflected in an unwillingness to adopt more active modes.

2.7 INTERPERSONAL BARRIERS

Beyond the personal factors affecting the decision to take alternate modes of transport, several social or interpersonal barriers to active transport have been identified. These are barriers which arise from the individuals' sense of place in society as well as their sense of others' expectations of them.

2.7.1 PEER ATTITUDES

Several studies (De Geus et al., 2008; Heinen, Maat & Wee, 2013; Taylor, 2009; Thomson, 2009) have suggested that people are more likely to cycle when they sense a positive and encouraging attitude from their peers, or there is a sense that they are using an appropriate mode of transport. Thomson (2009) reported that parental conformity was a strong factor in allowing children to use active transport. Heinen et al. (2013) found that the expressed opinion of colleagues regarding the appropriate mode of travel to work was strongly correlated with rates of car and bicycle commuting. Furthermore, the study by De Geus et al. (2008) revealed that in particular, the rates of participation within the organisation affected the likelihood of participation in cycle commuting, suggesting that the social acceptable mode of transport may become part of the culture of an organisation.

In contrast, many of the respondents in the study by Rose et al. (2009) reported a sense of social exclusion in their workplace through not having access to a motor vehicle. Some of this exclusion was based on feeling dependent on workmates for a lift, when necessary. Kent (2014) also reported that respondents cited the ready availability of a private car as necessary in both their home and work life, some reporting that the lack of flexibility in leaving work to catch public transport at a particular time would damage their job standing.

2.7.2 STATUS AND IDENTITY

Closely related to that is the individual's impression of different status afforded to cyclists and pedestrians relative to motorists. An element in the social exclusion felt by participants in the research by Rose et al. (2009) was the sense of social status afforded by car use. One respondent in the study reported the feeling of cyclists and pedestrians being "lower on the pecking order" (p169). Mann & Abraham (2006, p169) went further, claiming that "the cultural norm of car ownership engenders the view that ownership is a sign of adulthood or financial status". To some respondents in the study, financial imitation was the only explanation for a person not having a car, such was the feeling that the absence of car ownership was unthinkable, and that people would take risks, including driving unwarranted, unregistered vehicles without a license, in order to maintain the status afforded by the car.

Linked to that is car ownership as an element of people's sense of identity, some people being strongly resistant to adopting the identity of pedestrian, cyclist, or public transport user. Mann & Abraham (2006) showed that, for many people, their sense of self and the image they wish to portray to others is intimately linked to their private transport, including the car model as well as aspects like interior cleanliness and off-road capabilities.

2.7.3 DEPENDENCE ON OTHERS TO ENSURE SAFETY

The final barrier, which is closely linked to the safety element (see section 2.3 above), is that due to the greater vulnerability of pedestrians and cyclists, transport users must rely on others to ensure their safety. McKenna & Whatling (2007) pointed out that cycle commuters are aware of being "invisible" to motorists and adopt strategies to check that they have been seen, including lights, reflective clothing and making eye contact. That notwithstanding many of the experienced cycle-commuters still voiced concerns about motorists noticing them and giving them appropriate consideration as road users. Similarly, Wooliscroft & Ganglmair-Wooliscroft (2014), citing a UK Department of Planning and Transportation document (Rees, 2005), remarked that drivers' attitudes and behaviour towards cyclists can be a major deterrent to cycling. They also point out that, among those who do cycle, motorists' behaviour is often the most discussed topics on online forums.

2.8 CONCLUSION

A wide range of barriers to active transport have been identified in the literature, from infrastructure provision to socio-cultural barriers. One theme was the different physical capabilities of the different travel modes. The perceived exertion and discomfort of active transport relative to motorised travel has been identified as a potential barrier, with the bulk of the literature focused on the potential of active transport to integrate physical activity with daily routines. Distance, time, carrying capacity and trip-chaining activities are all reasons given for the perceived need to use a motor vehicle rather than active transport. Safety concerns also stand out in the literature as another very significant factor in mode choice. In particular, the speed and proximity of motorised traffic, and the infrastructure necessary to engender a feeling of safety in potential participants has been a focus of many studies. Socio-cultural factors were more often exposed in qualitative research and included peer attitudes and a perceived higher social status of motorists relative to cyclists and pedestrians.

It is important to note that although much of the literature focuses on cities significantly larger than Palmerston North, the majority of the factors examined purport to be universal. Elements such as weather, terrain, density and connectivity describe the physical landscape and inform the perceived compatibility of active transport modes. However, distance and time are often greater in larger cities. According to the literature, the relative shorter distance and travel time in Palmerston North implies that they should be relatively less important as barriers to active transport, though the findings regarding low density urban development, cycle infrastructure, and personal and interpersonal factors are as applicable to Palmerston North as to any larger city. Likewise, safety concerns are often related to traffic volumes and street design regardless of the overall size of the city. Finally, the literature also contains evidence of the successful transformation of car-oriented cities into places where walking and cycling are no longer marginalised.



Research

3.0 RESEARCH DESIGN AND METHODS

3.1 SURVEY METHODOLOGY

As outlined in chapter one, a survey was conducted of Massey University Manawatu campus staff and Palmerston North City Council staff using the Qualtrics online survey tool. The purpose of the survey was not to research *travel behaviour* per se but to find out about people's *perceptions* of the nature of the land transport system for active modes. The survey was online for two work weeks beginning Tuesday 20 January 2015 (because Monday was a public holiday) and finishing on Friday 30 January 2015.

At PNCC the survey was distributed to all full-time and part-time staff with email addresses. A further 152 paper-based surveys were distributed to staff who did not have email addresses. At Massey University the survey was distributed to the current list of Massey staff with emails on permanent or fixed-term contracts as at the end of December 2014, including staff whose contract had not been rolled over in the New Year, and Emeritus Professors, who did not appear on the list since they were not on the payroll.

One major challenge faced by all online surveys is low response rates. To assist with ensuring a satisfactory response rate (ideally 25-30%), the following strategies were used:

- **Short, simple-to-use questionnaire** with mainly closed-ended questions covering basic demographic characteristics, respondents' views about barriers to the use of active transport and respondents' views about current provision for active transport;
- **Follow-up/reminder** sent out one week prior to the closing date of the survey;
- **Incentives** for participants who returned their survey by Friday 23rd January the opportunity to go in a draw to win one of two café vouchers each worth \$100. Those who returned their survey in the second week were offered the opportunity to go in a draw to win one of four \$25 café vouchers; and
- **Prior notification** provided in staff newsletters at both PNCC and at Massey University, as well as through local media.

The total number of surveys distributed (excluding ones sent to email addresses that generated out-of-office replies or undeliverable emails and seven sent in error to Massey staff not based at the Manawatu campus) was 2540, 595 of which were sent to PNCC staff and 1945 were sent to Massey Manawatu campus staff. Table 1 provides a breakdown of the response rate for each organisation.

Table 1 Summary of survey response rate

Organisation	Initial survey population	Excluded ¹	Final survey population	Returns analysed	Response rate
PNCC	595 ²	3	592	209	35.3%
Massey Manawatu	1945	81	1864	826	44.3%
Not stated				10	
TOTAL	2540	84	2456	1045	42.5%

NOTES

1. Includes 152 paper questionnaires
2. Email addresses generating out-of-office responses or undelivered emails

A significant number of PNCC staff do not have access to a staff email account, so paper copies of the survey were distributed to those units of the council where staff did not have a work email account and/or access to a computer (Esplanade, Awapuni and Albert St Depot). Forty seven paper responses were collected, from a total of 152 staff who were invited to participate.

A total of 49 permanent or fixed-term Massey staff without staff emails were identified from the list, but they were widely distributed around the campus, making it logistically very difficult to get information posters and paper surveys to them and back again in time. Because of the relatively small group and the difficulty of distribution and collection of paper questionnaires, it was decided not to include them in the survey.

Data from a total of 998 online questionnaires and 47 paper-based surveys were analysed giving an overall response rate of over 42%.

Several people who wanted an opportunity to answer the survey were excluded. As explained above, the survey population at Massey University's Manawatu Campus comprised the current list of Massey staff with emails on permanent or fixed-term contracts as at the end of December 2014, including staff whose contract had not been rolled over in the New Year, and Emeritus Professors, who did not appear on the list, since they were not on the payroll.

Feedback from staff indicated that many who returned to work after summer holidays earlier in January, especially those who did not return until January 25 which was the second week of the survey, were busy catching up with a backlog of emails and missed the deadline for participating.

3.2 ETHICAL CONSIDERATIONS

Massey University's *Code of Ethical Conduct for Research, Teaching and Evaluations involving Human Participants* provided the basis for an assessment of the ethical aspects of the research. Key ethical considerations were voluntary participation, informed consent, and freedom from harm. The research was assessed to be of low risk and notification of this was acknowledged by the Massey University Human Ethics Committee. Participation was entirely voluntary and information about the purpose of the study was provided in the covering email with the invitation to participate. Publicity (as described above) gave prospective participants additional information and any participant was also able to contact the academic staff involved in the research project. No identifying information was collated and the identity of participants was not known to researchers. Email addresses could be provided if participants wished to enter the draw for a prize but these were detached from the returned survey. These email addresses were removed from the initial list for the purposes of sending a reminder email at the end of the first week of the online survey but the reminder would inevitably have gone to some staff who had participated given there was no way of knowing precisely who had responded. This 'nuisance' effect was considered to be minor and hence there was no harm to participants.

The high response rate can be seen as an indication that participants were comfortable with the research procedures. Informal and unsolicited feedback from participants indicated the opportunity to participate was welcomed. There was also feedback from people who were not able to participate but who would have liked the opportunity to participate.

Given the very positive response to the invitation to participate, and the level of interest, we consider it important that further opportunities to be sought to provide feedback to participants and others in the two organisation and the wider community who are interested in barriers to active transport.



FOR

4.0 RESULTS

This chapter summarises the survey data. First, the demographic characteristics of the survey respondents are briefly outlined. Then we present data from the questionnaire about respondents' perceptions of the built environment in Palmerston North City for walking along with respondents' views about barriers to active transport. Following this, perceptions of the built environment in Palmerston North City for cycling along with respondents' views about barriers to active transport are reported.

4.1 DEMOGRAPHIC CHARACTERISTICS

As Figure 1 below shows, more women than men responded to the survey. It is not known whether this reflects a slight gender imbalance in the survey population or interest in active transport.

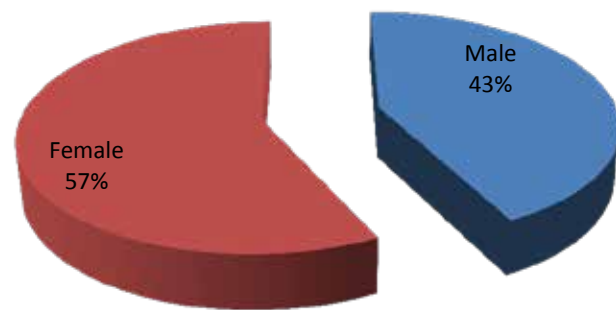


Figure 1 Gender of respondents.

The difference in the number of male and female respondents reflects the overall size and gender balance of the two organisations. Massey is a much larger organisation with 56% of the workforce female. Approximately 40% of the PNCC workforce is female.

Nearly 60% of respondents were aged 40-59. See Figure 2 below. The precise influence of this on views about barriers to walking and cycling is not clear because within this age range there is also a diversity of abilities and levels of experience and confidence. However, it is an age group which might be more motivated to use active transport for health reasons than a younger age group for whom economic factors might be more significant.

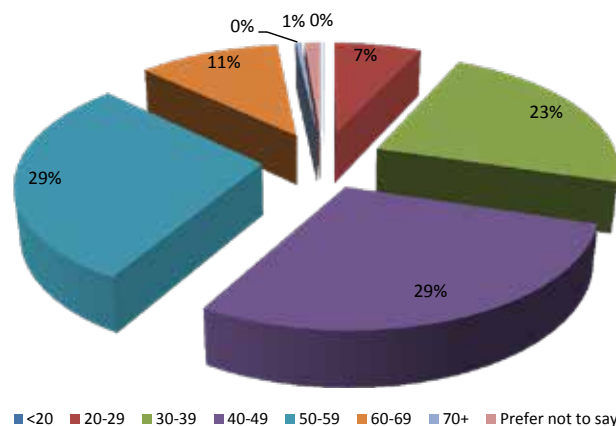


Figure 2 Age of respondents.

Respondents were asked to indicate whether they lived in Palmerston North and, if so, to indicate on a map the nearest intersection. Many selected a main intersection that was nearby and not necessarily the nearest intersection. Figure 3 below shows the geographic location of respondents who live in Palmerston North. See also Appendix 2. The geographic data show that a

majority of respondents live in the southern and eastern areas of Palmerston North, and there may therefore be an under-representation of perspectives from some suburbs (in particular Highbury, Westbrook and Roslyn). Along with these areas, 14.4% of respondents (151 out of 1045) live outside the boundaries of the map.

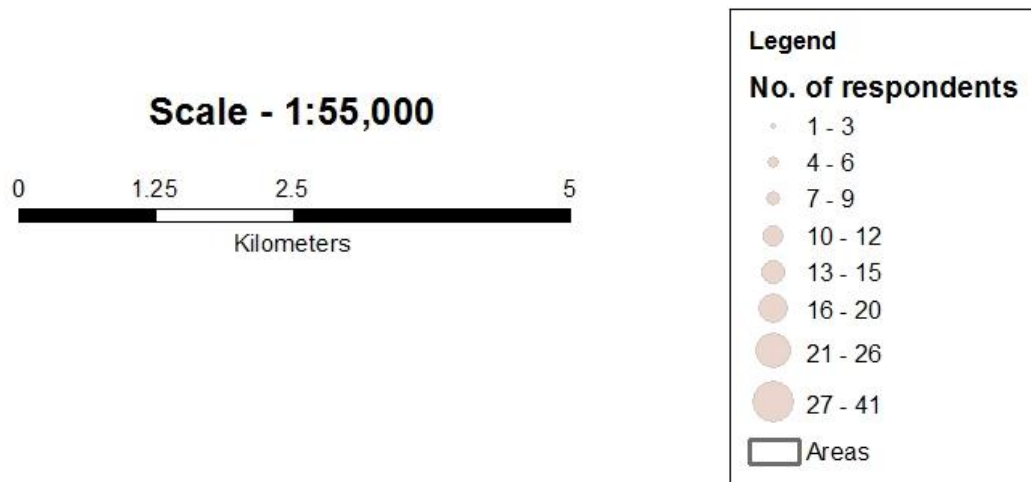
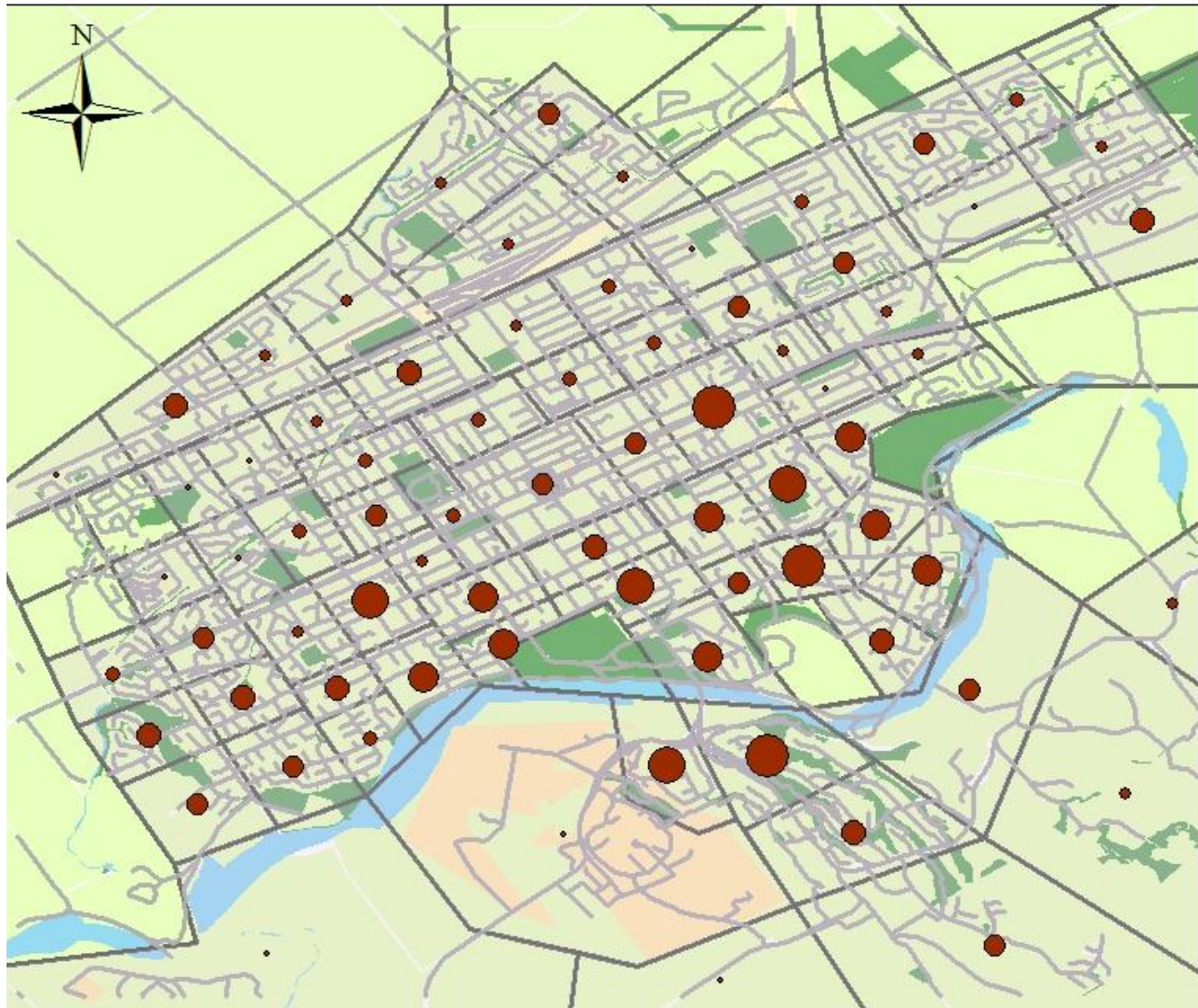


Figure 3 Geographic distribution of Palmerston North respondents.

As noted above, the size of the workforce of each organisation is different as is the gender balance. Similarly, the geographic distribution of the workforce is somewhat different. In particular, the geographic distribution of staff may be influenced by the geographic location of the organisation to the extent that staff prefer to live nearer their workplace. For example, PNCC is located in the Palmerston North CBD whereas Massey University is located some 5 kms from the CBD on the southern fringe of the city and separated from the city by the Manawatū River. It was not possible to get comparable data on the geographic location of the workforce of each organisation for staff living in Palmerston North. It is possible that more Massey staff live in the southern half of the city (south of Main Street West and East), with PNCC staff more evenly distributed. As well, the nature of the occupations and flexibility of

the work are likely to determine the extent to which staff of each organisation live outside of Palmerston North. Data obtained from Massey University’s People and Organisational Development section and PNCC’s Human Resources staff indicate the proportion and geographic distribution of Massey staff not living in Palmerston North is much greater than that of PNCC staff. This includes a range of geographic locations from places relatively near to Palmerston North urban area (such as Ashhurst and Feilding which are served by urban bus services) but also much more distant (such as the Wellington region).

Respondents were asked to indicate which modes of transport that had used in the past six months. Figure 4 shows the frequency of use of different modes. Similar numbers of respondents reported that they often walked as those reporting that they often drove. A relatively small number reported that they sometimes/often cycled.

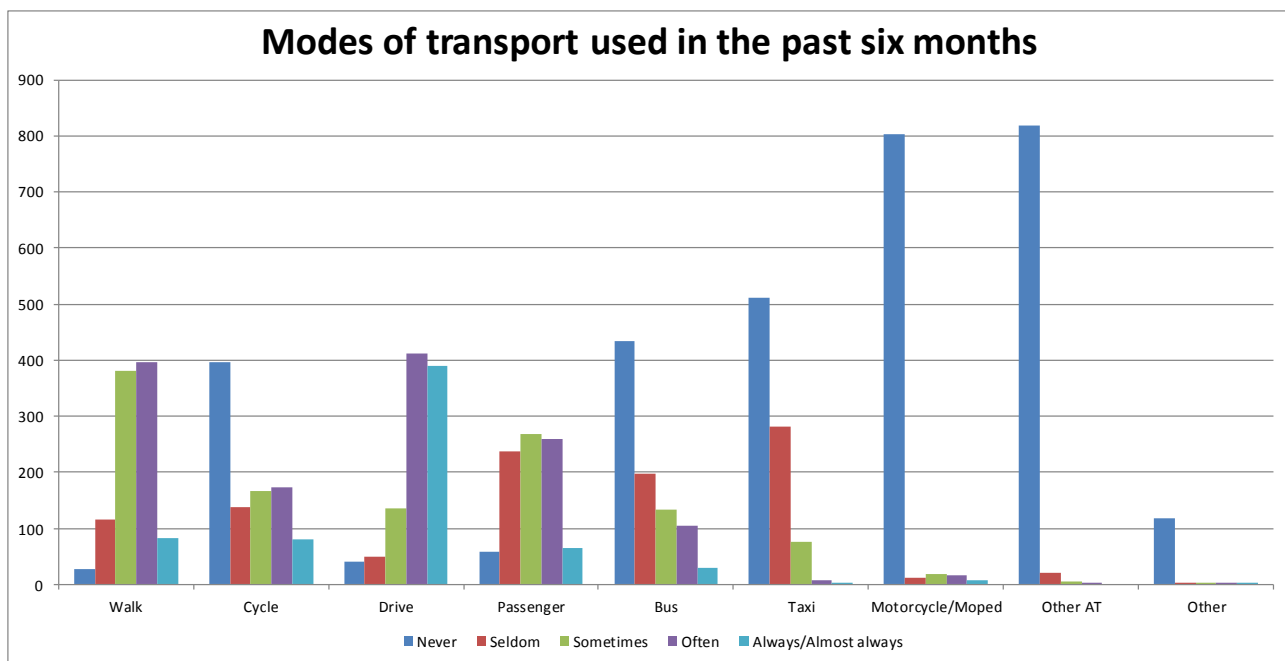


Figure 4 Respondents’ use of different transport modes.

Respondents were asked to indicate using a 5-point Likert scale (1. Very good, 2. Good, 3. Fair, 4. Poor, 5. Very poor) their perception of the quality of the built environment in Palmerston North for active transport. They were asked to comment on their neighbourhood, main roads and the city centre.

The graphs in Figures 5, 6 and 7 show respondents’ views about the quality of their neighbourhood and their views about the city’s main roads and city centre for walking.

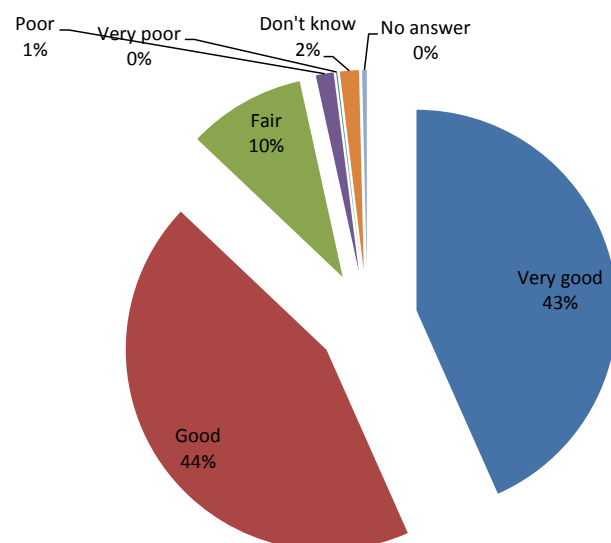


Figure 5 Respondents’ ranking of the quality of the city centre for walking.

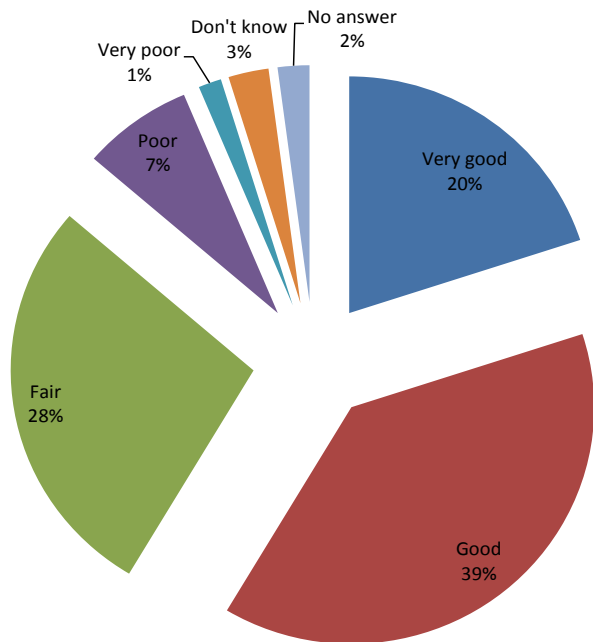


Figure 6 Respondents' ranking of the quality of the city's main roads for walking.

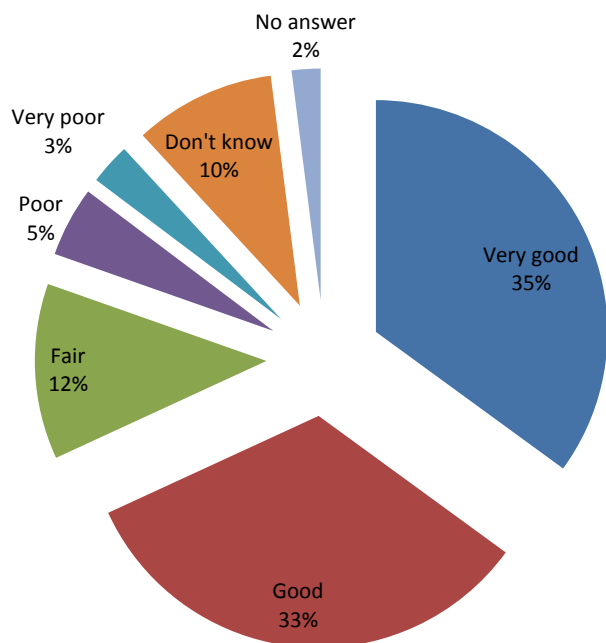


Figure 7 Respondents' ranking of the quality of their neighbourhood for walking.

More detailed statistical analysis shows that the area that respondents most highly rated for walking was the **city centre**, with a mean rating of 1.75. Furthermore, the variance was the lowest of the three areas at 0.79, suggesting that it was consistently rated highly. Of the 1023 respondents who rated the city centre, only 114 (just under 10%) gave it a rating of "Fair" or worse. The mean ratings of main roads and neighbourhoods was very similar (2.39 and 2.36 respectively), though the high degree of variance for neighbourhoods (2.44) suggests that some may be more amenable to pedestrian activity than others. The geographic data shows that average ratings for neighbourhoods tended to be higher in areas close to the river and around Massey and lowest in rural areas and in Milson.

The graphs in Figures 8, 9 and 10 show respondents' views about the quality of their neighbourhood and their views about the city's main roads and city centre for cycling

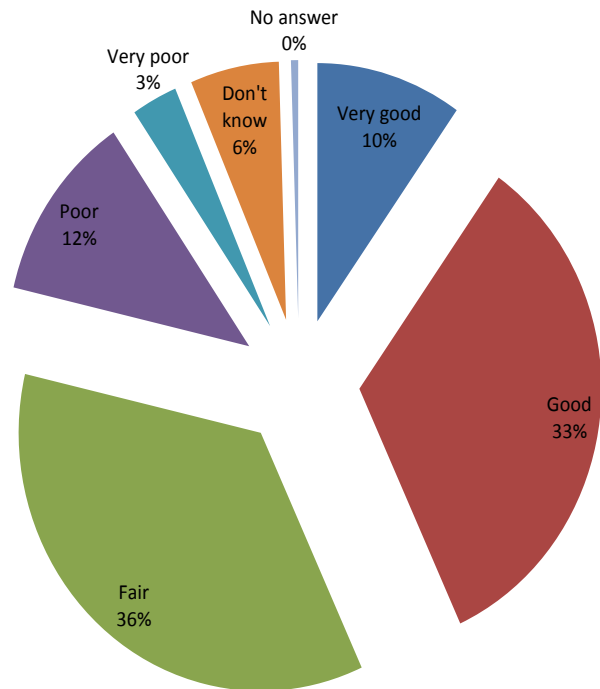


Figure 8 Respondents' ranking of the quality of the city centre for cycling.

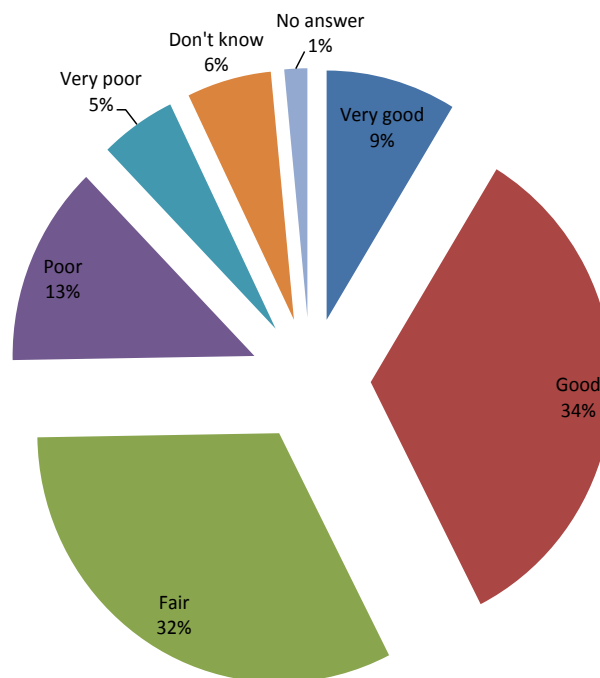


Figure 9 Respondents' ranking of the quality of the city's main roads for cycling.

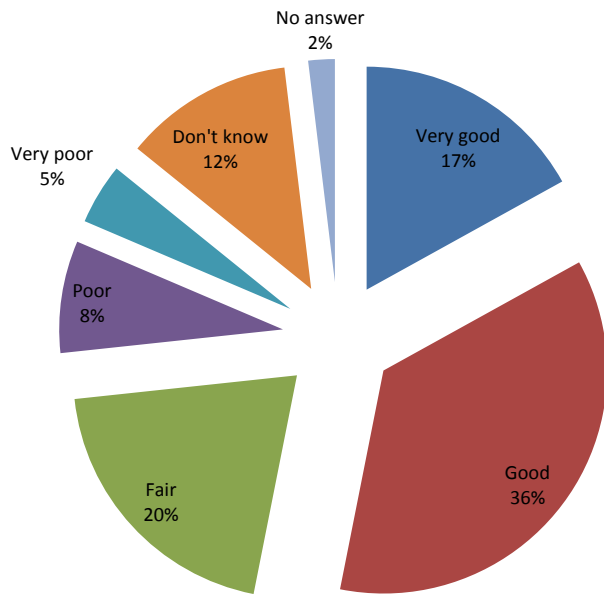


Figure 10 Respondents' ranking of their neighbourhood for cycling.

More detailed statistical analysis shows that the ratings of different areas of the city in terms of the quality of the built environment for **cycling** were almost equal, with means of 2.83 (city centre), 2.89 (main roads) and 2.84 (neighbourhoods). However, as with walking, the higher variance for neighbourhoods (2.42) suggests a degree of geographic difference. The geographic data for cycling also shows that areas close to the river, as well as the northwest of the city rated their neighbourhoods highly for cycling, and rural areas rated lowest.

4.3 BARRIERS TO ACTIVE TRANSPORT IN PALMERSTON NORTH

Survey respondents reported substantially different barriers to cycling from barriers to walking so the following discussion focuses on each mode separately.

Figure 11 shows respondents' views about barriers to walking. Of the reported barriers to **walking**, weather was the most commonly mentioned, with 62.5% of respondents reporting that it was a main factor. Also significant were the need to transport bulky or heavy loads (43.1%), needing to transport children (33.9%) and lack of motivation (33.4%). Significantly, those respondents who reported never walking for transport were much more likely to report that walking "took too long" (46.4%, compared to 32% of non-regular walkers and 28.1% for regular walkers). However, very few people (28) reported never walking for transport.

The geographic data suggests an association between walking activity and location, with higher rates of walking in areas close to the city centre.

Most frequently mentioned barriers were weather, the need to transport heavy/bulky items, the time involved, lack of enthusiasm/motivation, physical effort and the need to transport children. However, there is also interesting feedback that challenges perceptions of some factors.



- Weather
- Physical effort
- Low number of pedestrians
- Uncomfortable
- Makes you look messy
- Attitude of motorists
- End of trip facilities
- Transporting heavy/bulky items
- Transporting children
- Other
- Takes too long
- Amount of traffic
- Infrastructure
- Lack of enthusiasm/motivation
- None of the above

Figure 11 Barriers to walking in Palmerston North.

WEATHER

Weather seems to be a big issue for people. On reflection though I don't think the weather has been a huge issue for me. Over the last year I walked home about 3-4 days a week and I think the weather only proved to be a problem about 10% of the time. I walked to work maybe 10% of the time and I only turned up to work wet once in the past 2 years. Because we traditionally have cloudy weather, people seem to equate that with a high risk of rain. My experience seems to suggest otherwise.

TRANSPORTING CHILDREN / MULTIPLE TRIPS

I love walking (typically walk at least 7 hours/week for exercise) but it is the need to transport children to school/after school activities that limits my active transport at the moment.

If I'm travelling with others (e.g. wife and child), then it is more convenient to drive than to walk or cycle. However, we do walk more often now that we have a child.

As well as the main concerns (weather, the need to transport heavy/bulky items, the time involved, lack of enthusiasm/motivation, physical effort and the need to transport children), infrastructure and urban form featured in comments by respondents.

INFRASTRUCTURE

Many respondents commented positively about walking infrastructure in Palmerston North:

Palmerston North has good facilities to encourage walking and cycling. The river track is a great example - this is such an asset for the city and is well used by cyclists, runners and walkers. This is now a feature that makes Palmerston North special.

There are some fantastic facilities like the walkways around Summerhill and Massey. Keep building more of these away from the traffic (as much as possible), so that the walking experience is stress-free and enjoyable.

Respondents also gave suggestions about how to improve the quality of walking infrastructure. Below are just a few examples:

I find the green light that indicates 'go' for pedestrians is really very short. As I'm half way across the street it switches back to red and I find myself thinking about our senior citizens who might be unable to walk as swiftly. I think there is scope to add a couple of seconds which would give me a sense of security. As it stands now, wanting to cross a street in Palmy I feel I'm rather a nuisance and the short green period that indicates 'walk' is not necessarily made to ensure I can cross it safely.

Pedestrians need to have right of way at roundabouts, currently a walker must wait a significant amount of time for a break in the traffic to cross. ...during rush hour a pedestrian can spend a lot of time waiting to cross while vehicles from one direction continue to go through the roundabout.

I can notice the bad shape of pavements. This is potentially hazardous as well as it might deter users of wheelchairs.

There is very little shade/shelter and if you walk ... there are only toilets on the Esplanade.

Tree roots make the footpath hazardous at some places and many driveways do not have good visibility.

Around the Square is some pebbled footpaths, these are particular hard to walk on in heels or pushing a pram and I tend to avoid walking around these areas due to that.

URBAN FORM

Residential in-filling of the inner suburbs and urban apartment buildings could help [walking]. PN is very spread out.

Lots of potential especially if encouragement to walk and cycle is connected to use of public transport to make the trip quicker by combining with bus or to give option of avoiding rain/strong wind, etc. on one of the sections of a trip.

MOTORIST BEHAVIOUR

Since I've started walking in the evenings with my child, I've found that motorists can be very inconsiderate and distracted towards pedestrians. It doesn't discourage me from walking, but it does highlight for me the risks that many people take when they choose to walk, especially with children.

As Figure 12 next page shows, the most commonly mentioned barrier to **cycling** was weather (59.3%). However, the other common barriers were motorists' attitude towards cyclists (49.4%), current on-road provision for cycling (38.1%) and the amount of traffic on the roads (31.6%), suggesting that safety is a greater concern for people considering cycling. The need to transport heavy loads and to transport children were the next most significant factors (26% and 23% respectively), as well as the physical effort required (19.6%), end-of-trip facilities (17.5%) and lack of cycle availability (16.6%). Within the group that reported cycling "seldom" or "sometimes", transporting children was a more important factor than either regular cyclists or non-cyclists (28.9%, 20.2% and 20.3% respectively), perhaps indicating that some of those who might otherwise cycle felt that children needed to be taken to school in a car.



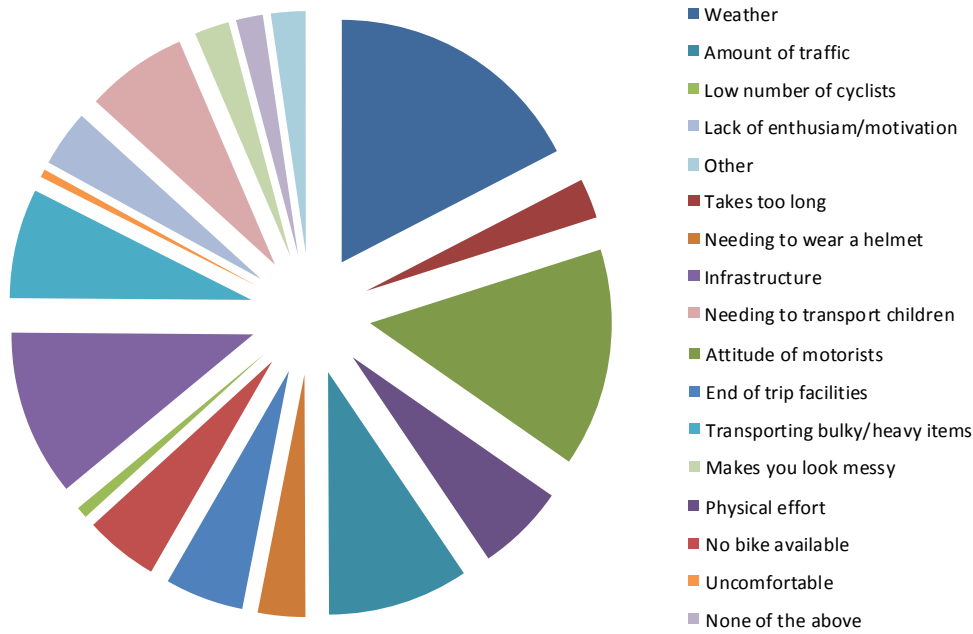


Figure 12 Respondents' views about barriers to cycling.

Figure 13 shows respondents' ranking of different barriers to cycling. Safety was mentioned by the greatest number of respondents as the most significant barrier.

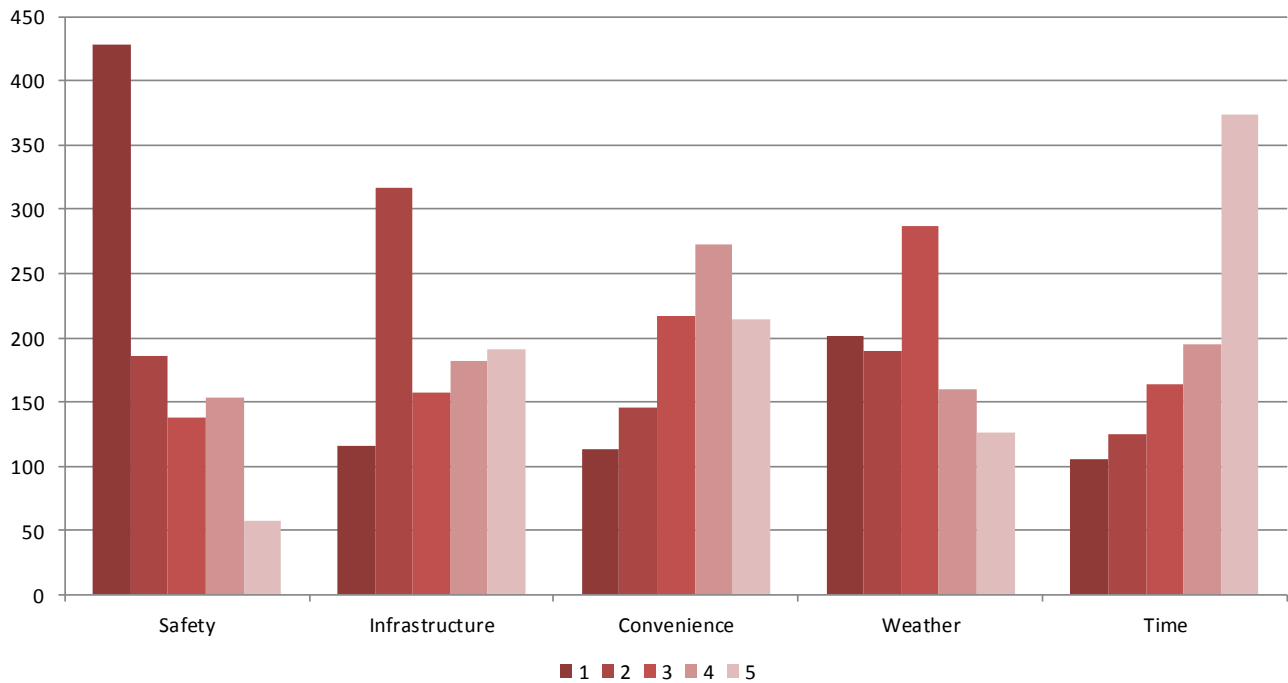


Figure 13 Respondents' ranking for barriers to cycling.

Comments provided by respondents offer further insights into the concerns about these different barriers. The following are just few that are reflective of the much larger set of comments (PTO).

SAFETY

There is a general feeling in the community that cycling is dangerous for children, particularly to school.

The primary hazard are cars backing out of angle car parks in the CBD into the cycle lane while they wait for clear traffic and vehicles double parking in the cycle lanes.

Summerhill traffic needs to be slowed further from 60 to 50 especially on Summerhill road due to high number of cyclists.

The main thing that puts me off biking more is just the danger associated with sharing the road with cars. This is an inherent danger, but is made worse by heavy traffic at certain times of day.

I think that you take your life in your hands cycling on Palmerston North roads. Let's really get committed to safe cycling - separate cycle lanes and really safely-designed roads etc. I think Palmerston North is appalling for safe cycling!

INFRASTRUCTURE

The bike/walking track along the river is FANTASTIC... I personally find that walkers and cyclists have no problems using this shared space.

I live near the river and completion of the Manawatu riverside cycle track has made my commuting much safer. The city needs more fully off road cycle tracks.

Can't wait for the cycle path along the river to connect through to Ashhurst (and Linton)!

I started cycling to work at Massey from my home at Awapuni two years ago. I had not been a cyclist since I was a kid. The new cycle paths along the river encouraged me to start biking as I was not confident to be on the roads amongst traffic. Now I bike everywhere and it has become a very enjoyable part of my life. The ability to bike away from road traffic allowed me to build up confidence on a bike. I would love to see more cycleways.

I cycle regularly and appreciate recent improvements to cycling lanes, particularly on Te Awe Awe Street.

Lack of cycle lanes in the main city centre and around the square is a large reason why I don't cycle in town.

Generally I have found that the pavement surface is worse within the cycle lane.

Cycle paths disappear just where they would be needed, they lead bikes into dangerous situations involving parked cars, etc., and there is not enough impetus on motorists to be respectful to cyclists.

Cycle lanes around town often run out for no apparent reason and there are frequently cars parked in them. There are very few in the central city, which is particularly odd.

The rough gravel which is often used on the roads (e.g. along College St from Pitama to Botanical) are horrid to cycle on and stones get flicked up from the cars going past, which discourages me from using that route.

I would be more encouraged to walk/cycle if we had 'pedestrian/cyclist only' roads/trails.

There is always broken glass on the roads. PNCC seems to have a reactive attitude - if you report it, they clean it up but they don't go out and sweep the roads. I have had more punctures here than anywhere else I've lived.

The cycle lanes disappear at roundabouts, cars park in cycle lanes or on the footpath and this goes unpoliced, and to sandwich cycle lanes between parked cars and the car lanes is plain ridiculous.

Many roundabouts: can be dangerous for cyclists if cars enter roundabout even if you entered first. Can be difficult to indicate where you want to go.

The recent addition of roundabouts at intersections around the city is a disaster for cycling. The marked cycle lanes "disappear" at the roundabout forcing cyclists into the traffic lanes. Lovely grass verges have replaced the cycle lanes. This seems completely illogical and designed to discourage cyclists and reduce safety. This needs to be fixed.

Buses in particular swerve in and out of cycle lanes when they are stopping to pick up passengers.

The roads along College Street and Long Melford Rd (which is my neighbourhood) are incredibly bumpy and not nice to cycle on - I am sure this is similar elsewhere.

Cycle and walk bridge e.g. Cook St to Massey, end of Albert St, would make a huge impact on cycling walking.

Lack of good lighting in winter.

Have problems with traffic lights which don't trigger for cyclists.

Cycle bridge from Awapuni to Massey would be an enormous help!

CONVENIENCE

Convenience is linked with the physical aspects of active transport. In particular, it is associated with the ease or lack of ease in moving around the city.

Cycling for fun and fitness has plenty of potential with a spin-off of encouraging more transport use as peoples fitness improves. But telling them they should cycle because of environmental reasons or to reduce car use because "cars are bad" is just wasting effort when you have kids, animals and goods to move.

As well as the factors reported in Figure 11 (page 21), other key barriers to cycling were the lack of adequate end-of-trip facilities and secure storage for bikes

I would definitely bike to work if there were showers available to staff in my workplace.

Current infrastructure and lack of shower/storage facilities at work make using active transport less appealing.

WEATHER

In Palmerston North you run a high risk of being rained on or travelling into strong head winds. You also arrive at work sweaty with nowhere to shower or freshen up.

4.4 SUMMARY

Survey respondents reported the same barriers that have been identified in previous New Zealand studies and in many overseas studies. Many of the factors that can work as barriers to, or can encourage walking and cycling are interconnected. For example, the quality of infrastructure impacts on people's safety and perceptions of safety and the attractiveness of active transport (including the pleasantness of the route, and its 'sociability').

The key thing is making it easier and more enjoyable to walk or bike down the roads and paths. We need to have a greener city and have places where we can stop for a coffee or drink at the end and sit outside... this includes having cafes or food trucks at key locations like beside the river and bridge on Fitzherbert... would be great to see a couple of cafes or coffee stalls on the walkway to really attract more reluctant walkers/cyclists

I think one facet of cycling that your survey does not cover is the sociable aspects, if cycle lanes were wide enough for two bikes to cycle side by side cycling would be more attractive.

Likewise, the deterrent effect of weather could be modified by end-of-trip facilities, shelter and cycle parking design. This interdependence of barriers and solutions means that a comprehensive approach rather than ad hoc interventions are needed to addressing barriers. The following chapter provides further discussion incorporating insights from the literature reviewed earlier in the report.



Findings

5.0 DISCUSSION

The findings gathered from the survey of staff of two large workplaces in Palmerston North reflect the findings of other studies. Both the Palmerston North survey and the literature reviewed in Chapter 2 have highlighted similar barriers related to physical aspects of these active transport modes, safety, infrastructure, and end-of-trip facilities. As well, survey responses indicate that there are personal and interpersonal factors. For example, transporting children, carrying heavy goods or groceries and a person lacking confidence about riding a bike in traffic or walking on their own is likely to be reluctant to walk or cycle. This section of the report discusses the survey data in relation to the themes in the literature discussed in Chapter 2.

5.1 PHYSICAL ASPECTS

As noted in Chapter 2 (section 2.2) physical aspects are characteristics related directly to the capabilities of the transport mode which can make it difficult to simply substitute a motorised journey with a form of active transport. Aspects of travel such as the distance and time, weather, secondary tasks, and carrying a heavy/bulky load may discourage people from walking and cycling. However, respondents who regularly walk or cycle were aware of strategies for minimising these barriers, the most obvious one being integration of active transport with public transport.

There is also extensive literature on how these barriers can be addressed. Key interventions include bike racks on urban bus services which have been trialled in New Zealand and are now successfully implemented in many larger and smaller urban centres, and sheltered and secure bike storage. End-of-trip facilities discussed below can reduce the challenge of storing wet-weather gear and allow people to change from commuting clothing to work dress.

5.2 SAFETY

Safety and the perception of safety are powerful deterrents to participation in active transport especially for night-time journeys and journeys in heavy and fast traffic. Palmerston North's topography while not a barrier is clearly an element where conventional street design is for wide, straight vehicle lanes that mean that vehicles do not need to slow down. A key focus should be reduced speeds on key walking and cycling routes. On- and off-road cycle lanes and generous provision for pedestrians is needed to ensure that the road user hierarchy which gives priority to vulnerable road users starts to be implemented. Share-the-road campaigns need to be vigorously supported over the long-term with more visible signage and other social marketing techniques.

Driver and cyclist education also needs to be considered in some cases and especially if other efforts to improve safety and perceptions of safety do not deliver results.

5.3 INFRASTRUCTURE

As indicated in the paragraph above, if pedestrian and cyclist safety is not prioritised in the land transport system, participation in active transport will, at best, not increase and, very likely, decline. Infrastructure is very diverse and must be of high quality. Recent New Zealand-based research on cycle lanes in Auckland has shown, for example, that developing poor quality infrastructure will discourage people from cycling. There are many tools to assist planners and decision-makers in designing good quality infrastructure. A key challenge for Palmerston North City Council is to develop a coherent set of cycle routes. It is important to ensure that on cycle routes there is a very visible commitment to the convenience and safety of cyclists. For both cycling and walking the city has some natural or existing positive features which should be harnessed. For example, The Square presents opportunities for encouraging active transport:

Having the square in the centre enables short cuts to be made both walking and cycling... I would also like more alleyways that cut between main roads to speed up walking and cycling times.

Much more can be made of this and other positive features such as the city's streams and green space. In any new urban subdivision, much greater coherence is needed in active transport connections within the suburb and between the new suburb and the wider urban area.

Respondents frequently referred to the need for better quality pavements; this is critical for older pedestrians and those with young children or a disability. As well, respondents highlighted the need for better provision for pedestrians and cyclists at signalised intersections and other crossings. Again, this is readily achievable and is a key aspect of implementing the road user hierarchy.

The high level of amenity of the Manawatu River shared path has been important to many respondents. This shows the importance of design and connectivity for attracting people to active transport infrastructure.



5.4 END-OF-TRIP FACILITIES

Respondents are aware that participating in active transport - especially cycling - is likely to create the need for certain facilities (storage for gear and possibly also showers) at the end of the trip, not just a bike park in the case of cyclists. The quality of end-of-trip facilities is becoming increasingly important. This includes sheltered, easy-to-use bike parking for cyclists but storage of other gear. The compulsory helmet legislation, the requirement to have bike lights for riding outside of daylight hours, and the strong encouragement to wear high-visibility gear mean that people using a bike for commuting and other short trips may need different or additional clothing. As well, people may need a place to change. These facilities should be at work places and key destinations in the city (for example, public places such as the library, hospital and other health facilities, i-Site) but also at transport hubs so that people can leave a bike in safe storage and use a long-distance or urban bus and at private businesses, in particular, supermarkets. There is considerable scope for improvement in the number and quality of end-of-trip facilities in Palmerston North.

Having secure bike storage facilities of a high standard in critical points at the central bus terminal (of both urban and long-distance buses), as well as mid-route (e.g. half-way along a key urban bus routes such as College Street, Botanical Road, Fitzherbert Avenue, Pioneer Highway, Main Street) and outer terminals would also contribute to reducing the concerns about weather as it would give people scope to ride a bike part-way or change to a bus in adverse weather.

5.5 PERSONAL AND INTERPERSONAL FACTORS

Respondents were aware that personal and interpersonal factors influenced their choice of transport. Again, research indicates connections between these and other factors but also recognises the need for sophisticated social marketing and travel behaviour change programmes to address these factors. A sustained approach is needed and marketing strategies - not just information - are required. The survey responses and the literature suggest it is important to have an honest assessment of the 'transport culture' of Palmerston North and also useful to learn from cities which have historically been car-dependent but which have seen gains in walking and/or cycling for transport. The culture of a place is as important, it seems from the literature on these factors, as the topography and infrastructure although infrastructure tends to reflect the culture. If the active transport culture is strong, for example, the quality of infrastructure improves but changing the culture can depend on improving the infrastructure.

5.6 SUMMARY

It is important to recognise that there are different concerns for the two active transport modes for which data has been obtained through the survey. However, there are also many common experiences for these modes that result from their historic and continuing marginalisation in transport planning. The literature we reviewed reveals a large body of research and policy and planning guidance (including in New Zealand) that tends to be in agreement about the strategies to remove barriers to active transport. The central government publication *Raising the Profile of Walking and Cycling in New Zealand: A Guide for Decision-Makers* (Ministry of Transport, 2008), reflects much of this and remains a very relevant and comprehensive guide to what needs to be done. More recently, there are resources developed drawing insights from the New Zealand's two model walking and cycling communities which are both medium-sized cities.

Over the years Palmerston North City Council has developed various plans and strategies that seek to promote active transport (including the 1998 Bike Plan, the 2007 Manawātū Active Transport Strategy and the 2011 Cycle Action Plan, but also other documents such as the Urban Design Strategy, the Street Design Manual, and the Sustainable City Strategy). As well, Horizons Regional Council has included policies to promote active transport in successive regional land transport strategies. The current draft Regional Land Transport Strategy 2015-2025 notes the new impetus being given to urban cycleways nationally through the Government Policy Statement 2015-

2025 and the Region's intention to include an on-going programme of infrastructure improvements over the life of the Plan to facilitate growth in numbers using active transport. Ten years ago Horizons Regional Council's Regional Land Transport Strategy 2006-2015 had policies to promote more active modes of transport and a target of 20% of journeys to work by active transport by 2016. The development of these plans and strategies involved consideration of research, planning guidance, and best practice. The goals, policies and actions of these strategies for reducing barriers to active transport are in many cases very appropriate. The key challenge appears to lie in the implementation of plans and strategies.

Successful implementation requires the development of indicators and targets, monitoring, reporting and regular reviews to ensure targets are achieved. This needs to involve relevant professionals across the council and other organisations but also independent experts and users. Some progress has been made in promoting walking cycling for sport and leisure but as respondents have highlighted, safety concerns and lack of attention of the needs of pedestrians and cyclists continue to prevent walking and cycling from being viable transport choices for most people in Palmerston North. This important first step of undertaking research into barriers to active transport in Palmerston North will hopefully ensure that the goal of increased active transport that has been so elusive in the past decade will be achieved in the next decade and, ideally, sooner.





6.0 CONCLUSIONS AND RECOMMENDATIONS

A shared commitment at national, regional and local levels is required that puts design of vibrant, liveable urban areas at the forefront of encouraging walking and cycling; integrates walking and cycling into regional and local transport planning; and has a comprehensive range of initiatives to encourage walking and cycling that are self-reinforcing, integrated and designed for local conditions (Ministry of Transport, 2008, page 2).

The purpose of this research is to contribute to a broader aim of gaining insights into barriers to active transport in Palmerston North. A large number of studies carried out in different countries were reviewed, as well as New Zealand research. Often such research has been undertaken in cities larger than Palmerston North but this is not always the case and it is not clear that there are significant differences between larger and smaller urban areas. Two key areas of difference can be traffic volumes with larger urban areas having heavier traffic. However, there can be congestion in medium-sized cities such as Palmerston North and, regardless of size, vehicle speed and attitude of motorists are widely recognised as potential barriers. Weather is also a factor that can be a deterrent regardless of the size of a city.

Topography and the relative compactness of a city are related to the barriers that are associated with “physical aspects” as they are directly related to the physical effort and time involved in active transport. Relatively speaking, Palmerston North has advantages over many cities in terms of its flat topography, young student population and relatively small size which reduces the physical effort and time involved. However, as new residential and industrial development occurs on the city’s existing periphery, there is a concern that residents and those travelling to work in suburbs on the periphery will find the distance they need to travel becomes a barrier to using active transport.

Key to addressing the barriers to active transport are the policies and practices of organisations. Palmerston North City Council is the organisation tasked with planning for and managing the built environment which includes the land transport system. It has a range of roles from urban design and integrated transport planning through to promoting safety and health of the community and maintenance of infrastructure. Its leadership is critical in these roles to ensure that the land transport system is genuinely multi-modal and provides a satisfactory ‘level of service’. Even small initiatives such as encouraging and responding to feedback are important for ensuring the vision of ‘Manawatu, the best place in New Zealand to ride a bike’ is achieved:

The new “fix it” app for PNCC to report issues around the city is a good addition to the method of reporting issues (e.g. potholes, glass in cycle lanes)

Massey talks about sustainability but I have had my bike ticketed by the traffic warden for not having it in an approved bike rack - the bike racks are out in the rain and my tyres don't fit into the racks. An SLT [Senior Leadership Team] member asked for the bike rack outside our office to be moved because it looked messy. The Massey physical activity draft policy doesn't even mention cycling - I have sent feedback but had no response.

This study, like all research, inevitably has limitations. One is that the survey population came from two public sector organisations and includes professionals who work in the fields of transport planning and engineering, urban design, health promotion, urban management and related fields. As well, some of these are directly responsible for the land transport network. It is to be expected that their position might have shaped those respondents' assessment of the barriers to active transport. In chapter 4 we noted the predominance of the 40-59 age group. What is also needed is more information from younger age groups (university/college and high school students). As well, more in-depth discussion with different categories of active transport user (those who are confident/experienced, those who are inexperienced, etc.) is required. A particular focus also should be the perspectives and needs of the city's ageing population which are different to those of the survey population (a working-age population).

The following recommendations seek to capture the key findings and discussion points.

1. Identify opportunities for integration of active and public transport, develop a list of priority opportunities and begin to implement a programme that encompasses end-of-trip facilities, mid-route facilities (see section 5.4) and social marketing. The priority here is to do a comprehensive audit of the current experiences of active transport users of the selected existing route(s)/facilities and identify the specific needs.
2. Review key active transport routes and progressively review suburban centres to ensure the road user hierarchy is adhered to and that the routes are consistent with official transport planning guidance (e.g. *Pedestrian Planning and Design Guide*, *Cycle Route Network and Planning Guide*) and also Model Communities Best Practice guidance.
3. Develop an active transport forum for liaison with user groups and to develop a programme of action around 'building a strong active transport culture'.
4. Ensure that findings of this report are circulated to participants and their organisations, to all involved in transport planning in Palmerston North (at central, regional and local levels) and other stakeholders in the community so that it may inform integrated transport planning and the development of a genuinely multi-modal transport system.
5. Ensure that all place-making initiatives in the city include an explicit consideration of active transport users' needs and promote active transport.
6. Identify other key sectors of the community where the survey about barriers to active transport can be administered to see a broader coverage of the population - in particular, secondary and tertiary students and senior citizens, and other large workplaces especially in different parts of the city.
7. Undertake more in-depth focus group research with specific groups (e.g. reluctant or discouraged active transport users, prospective new active transport users to identify concerns related to particular active transport routes in different areas of the city), as well as with recreational cyclists who are not active transport users.
8. Establish an expert advisory panel for active transport to undertake an audit of key council policies and strategies that can reduce barriers to active transport to ensure alignment and review progress on implementation.



REFERENCES

REFERENCES

- Aldred, R. & Woodcock, J. (2008). Transport: Challenging Disabling Environments. *Local Environment*, 13(6), 485-496.
- Badland, H. M., Schofield, G. M. & Garrett, N. (2008). Travel Behavior and Objectively Measured Urban Design Variables: Associations for Adults Traveling to Work. *Health & Place*, 14(1), 85-95.
- Badland, H. M., Schofield, G. M., Witten, K., Schluter, P. J., Mavoa, S., Kearns, R. A., McPhee, J. (2009). Understanding the Relationship between Activity and Neighbourhoods (Urban) Study: Research Design and Methodology. *BMC Public Health*, 9, 224-234.
- Bean, C. E., Kearns, R. & Collins, D. (2008). Exploring Social Mobilities: Narratives of Walking and Driving in Auckland, New Zealand. *Urban Studies* (13), 2829-2848.
- Bonham, J. & Koth, B. (2010). Universities and the Cycling Culture. *Transportation research part D: transport and environment*, 15(2), 94-102.
- Buehler, R. (2012). Determinants of Bicycle Commuting in the Washington, DC Region: The Role of Bicycle Parking, Cyclist Showers, and Free Car Parking at Work. *Transportation Research Part D* (7), 525-531.
- Cambon de Lavalette, B., Tijus, C., Poitrenaud, S., Leproux, C., Bergeron, J. & Thouez, J.-P. (2009). Pedestrian Crossing Decision-Making: A Situational and Behavioral Approach. *Safety Science*, 47, 1248-1253.
- Carse, A., Goodman, A., Mackett, R. L., Panter, J. & Ogilvie, D. (2013). The Factors Influencing Car Use in a Cycle-Friendly City: The Case of Cambridge. *Journal of Transport Geography*, 67-74.
- Cavill, N. & Watkins, F. (2007). Cycling and Health: An Exploratory Study of Views About Cycling in an Area of North Liverpool, UK. *Health Education*, 107(5), 404-420.
- Cervero, R., Sarmiento, O. L., Jacoby, E., Gomez, L. F. & Neiman, A. (2009). Influences of Built Environments on Walking and Cycling: Lessons from Bogota. *International Journal of Sustainable Transportation*, 3(4), 203-226.
- Cycling Safety Panel. (2014). Safer Journeys for People Who Cycle: Cycling Safety Panel Draft Report and Recommendations. Wellington: New Zealand Transport Agency.
- De Geus, B., De Bourdeaudhuij, I., Jannes, C. & Meeusen, R. (2008). Psychosocial and Environmental Factors Associated with Cycling for Transport among a Working Population. *Health Education Research*, 23(4), 697-708.
- Dill, J., Monsere, C. M. & McNeil, N. (2012). Evaluation of Bike Boxes at Signalized Intersections. *Accident Analysis and Prevention*, 44, 126-134.

- Ewing, R., Meakins, G., Hamidi, S. & Nelson, A. C. (2014). Relationship between Urban Sprawl and Physical Activity, Obesity, and Morbidity - Update and Refinement. *Health & Place*, 26, 118-126.
- Foster, S., Giles-Corti, B. & Knuiman, M. (2014). Does Fear of Crime Discourage Walkers? A Social-Ecological Exploration of Fear as a Deterrent to Walking. *Environment and Behavior*, 46(6), 698-717.
- Garrard, J. (2010). Active Transport: Adults, an Overview of Recent Evidence. Melbourne: VicHealth.
- Grow, H. M., Saelens, B. E., Kerr, J., Durant, N. H., Norman, G. J. & Sallis, J. F. (2008). Where Are Youth Active? Roles of Proximity, Active Transport, and Built Environment. *Medicine & Science in Sports & Exercise*, 40(12), 2071-2079.
- Guo, H., Wang, W., Guo, W., Jiang, X. & Bubb, H. (2012). Reliability Analysis of Pedestrian Safety Crossing in Urban Traffic Environment. *Safety Science*, 50, 968-973.
- Haklay, M., O'Sullivan, D., Thurstain-Goodwin, M. & Schelhorn, T. (2001). "So Go Downtown": Simulating Pedestrian Movement in Town Centres. *Environ Plann B*, 28(3), 343-359.
- Heath, G. W., Brownson, R. C., Kruger, J., Miles, R., Powell, K. E. & Ramsey, L. T. (2006). The Effectiveness of Urban Design and Land Use and Transport Policies and Practices to Increase Physical Activity: A Systematic Review. *Journal of Physical Activity & Health*, 3, S55-S76.
- Heinen, E., Maat, K. & Wee, B. (2013). The Effect of Work-Related Factors on the Bicycle Commute Mode Choice in the Netherlands. *Transportation*, 40(1), 23-43.
- Illawarra Active Transport Taskforce. (2007). The Barriers and Enhancers to Using Active Transport in the Illawarra (pp. 22). Woolongong, Australia: Healthy Cities Illawarra.
- Jacobsen, P. L. (2003). Safety in Numbers: More Walkers and Bicyclists, Safer Walking and Bicycling. *Injury Prevention*, 9(3), 205-209.
- Jacobsen, P. L., Racioppi, F. & Rutter, H. (2009). Who Owns the Roads? How Motorised Traffic Discourages Walking and Bicycling. *Injury Prevention*, 15(6), 369-374.
- Kent, J. L. (2014). Driving to Save Time or Saving Time to Drive? The Enduring Appeal of the Private Car. *Transportation Research: Part A: Policy and Practice*, 65, 103-115.
- Killoran, A., Doyle, N., Waller, S., Wohlgemuth, C. & Crombie, H. (2006). Transport Interventions Promoting Safe Cycling and Walking: Evidence Briefing. London, UK: National Institute for Health and Clinical Excellence.
- Krizek, K. J. & Roland, R. W. (2005). What Is at the End of the Road? Understanding Discontinuities of on-Street Bicycle Lanes in Urban Settings. *Transportation Research Part D*, 10, 55-68.
- Lorenc, T., Brunton, G., Oliver, S., Oliver, K. & Oakley, A. (2008). Attitudes to Walking and Cycling among Children, Young People and Parents: A Systematic Review. *Journal of Epidemiology and Community Health*, 62(10), 852-857.
- Loukaitou-Sideris, A. (2006). Is It Safe to Walk? Neighborhood Safety and Security Considerations and Their Effects on Walking. *Journal of Planning Literature*, 20(3), 219-232.
- Mackie, H. (2009). 'I Want to Ride My Bike': Overcoming Barriers to Cycling to Intermediate Schools (pp. 94). Wellington: NZ Transport Agency.
- Mann, E. & Abraham, C. (2006). The Role of Affect in UK Commuters' Travel Mode Choices: An Interpretative Phenomenological Analysis. *British Journal of Psychology*, 97(2), 155-176.
- McDonald, A., MacBeth, A., Ribeiro, K. & Mallett, D. (2007). Estimating Demand for New Cycling Facilities in New Zealand. Wellington: Land Transport NZ.
- McKenna, J. & Whatling, M. (2007). Qualitative Accounts of Urban Commuter Cycling. *Health Education*, 107(5), 448-462.
- Ministry of Transport. (2005). Getting There - on Foot, by Cycle: A Strategy to Advance Walking and Cycling in New Zealand Transport. Wellington, NZ: Ministry of Transport.
- Ministry of Transport. (2008). Raising the Profile of Walking and Cycling in New Zealand: A Guide for Decision-Makers. Wellington: Ministry of Transport.
- Møller, M. & Hels, T. (2008). Cyclists' Perception of Risk in Roundabouts. *Accident Analysis and Prevention*, 40, 1055-1062.
- Parkin, J. & Meyers, C. (2010). The Effect of Cycle Lanes on the Proximity between Motor Traffic and Cycle Traffic. *Accident Analysis and Prevention*, 42, 159-165.
- Pooley, C. G., Horton, D., Scheldeman, G., Tight, M., Jones, T., Chisholm, A., . . . Jopson, A. (2011). Household Decision-Making for Everyday Travel: A Case Study of Walking and Cycling in Lancaster (UK). *Journal of Transport Geography*, 19(6), 1601-1607.
- Pucher, J. & Buehler, R. (2008). Making Cycling Irresistible: Lessons from the Netherlands, Denmark and Germany. *Transport Reviews*, 28(4), 495-528.
- Pucher, J., Buehler, R. & Seinen, M. (2011). Bicycling Renaissance in North America? An Update and Re-Appraisal of Cycling Trends and Policies. [Report]. *Transportation Research Part A: Policy and Practice*, (6), 451.
- Pucher, J., Dill, J. & Handy, S. (2010). Infrastructure, Programs, and Policies to Increase Bicycling: An International Review. *Preventive Medicine: An International Journal Devoted to Practice and Theory*, 50 (Suppl), S106-S125.
- Rees, P. (2005). *Cycling Plan: Comprehensive Edition*. London.

- Rietveld, P. & Daniel, V. (2004). Determinants of Bicycle Use: Do Municipal Policies Matter? *Transportation Research Part A: Policy & Practice*, 38(7), 531-550.
- Robinson, D. (2005). Safety in Numbers in Australia: More Walkers and Bicyclists, Safer Walking and Bicycling. *Health Promotion Journal of Australia*, 16(1), 47-51.
- Robinson, D. (2007). Bicycle Helmet Legislation: Can We Reach a Consensus? *Accident Analysis and Prevention*, 39, 86-93.
- Rose, E., Witten, K. & McCreanor, T. (2009). Transport Related Social Exclusion in New Zealand: Evidence and Challenges. *Kotuitui: New Zealand Journal of Social Sciences*, 4(3), 191-203.
- Schlossberg, M., Greene, J., Phillips, P. P., Johnson, B. & Parker, B. (2006). School Trips: Effects of Urban Form and Distance on Travel Mode. *Journal of the American Planning Association*, 72(3), 337-346.
- Sehatzadeh, B., Noland, R. B. & Weiner, M. D. (2011). Walking Frequency, Cars, Dogs, and the Built Environment. *Transportation Research Part A: Policy & Practice*, 45(8), 741-754.
- Shannon, T., Giles-Corti, B., Pikora, T., Bulsara, M., Shilton, T. & Bull, F. (2006). Active Commuting in a University Setting: Assessing Commuting Habits and Potential for Modal Change. *Transport Policy*, (3), 240.
- Statistics New Zealand. (2014). *Commuting Patterns in Auckland: Trends from the Census of Population and Dwellings 2006-13*. Wellington: Statistics New Zealand Retrieved from <http://www.statistics.govt.nz/Census/2013-census/profile-and-summary-reports/commuting-patterns-auckland.aspx>.
- Statistics New Zealand. (2015). *2013 Census Quickstats About Transport and Communications*. Wellington: Statistics New Zealand Retrieved from <http://www.statistics.govt.nz/Census/2013-census/profile-and-summary-reports/quickstats-transport-comms.aspx>.
- Stinson, M. & Bhat, C. (2004). Frequency of Bicycle Commuting: Internet-Based Survey Analysis. *Transportation Research Record*, 1878, 122.
- Taylor, K. (2009). *Utilitarian Cycling: Investigating Latent Demand in Christchurch, New Zealand*. MSc, University of Canterbury.
- Thomson, L. (2009). "How Times Have Changed": Active Transport Literature Review (pp. 39). Melbourne.
- Tight, M., Timms, P., Banister, D., Bowmaker, J., Copas, J., Day, A., Drinkwater, D., Givoni, M., Guhnemann, A., Lawler, M., Macmillan, J., Miles, A., Moore, N., Newton, R., Ngoduy, D., Ormerod, M., O'Sullivan, M. & Watling, D. (2011). Visions for a Walking and Cycling Focussed Urban Transport System. *Journal of Transport Geography*, 19(6), 1580-1589.
- Timperio, A., Ball, K., Salmon, J., Roberts, R., Giles-Corti, B., Simmons, D., Baur, A. & Crawford, D. (2006). Personal, Family, Social, and Environmental Correlates of Active Commuting to School. *American Journal of Preventive Medicine*, 30(1), 45-51.
- Timperio, A., Crawford, D., Telford, A. & Salmon, J. (2004). Perceptions About the Local Neighborhood and Walking and Cycling among Children. *Preventive Medicine*, 38(1), 39-47.
- Tin Tin, S., Woodward, A., Thornley, S. & Ameratunga, S. (2009). Cycling and Walking to Work in New Zealand, 1991-2006: Regional and Individual Differences, and Pointers to Effective Interventions. *International Journal of Behavioral Nutrition & Physical Activity*, 6, 11.
- Tin Tin, S., Woodward, A., Thornley, S., Langley, J., Rodgers, A. & Ameratunga, S. (2010). Cyclists' Attitudes toward Policies Encouraging Bicycle Travel: Findings from the Taupo Bicycle Study in New Zealand. *Health Promotion International*, 25(1), 54-62.
- Twaddle, H., Hall, F. & Bracic, B. (2010). Latent Bicycle Commuting Demand and Effects of Gender on Commuter Cycling and Accident Rates. *Transportation Research Record: Journal of the Transportation Research Board*, 2190(1), 28-36.
- Vandenbulcke, G., Thomas, I., de Geus, B., Degraeuwe, B., Torfs, R., Meeusen, R. & Int Panis, L. (2009). Mapping Bicycle Use and the Risk of Accidents for Commuters Who Cycle to Work in Belgium. *Transport Policy*, 16, 77-87.
- Walker, I. (2007). Drivers Overtaking Bicyclists: Objective Data on the Effects of Riding Position, Helmet Use, Vehicle Type and Apparent Gender. *Accident Analysis and Prevention*, 39, 417-425.
- Walton, D. & Sunseri, S. (2010). Factors Influencing the Decision to Drive or Walk Short Distances to Public Transport Facilities. *International Journal of Sustainable Transportation*, 4(4), 212-226.
- Wegman, F., Zhang, F. & Dijkstra, A. (2012). How to Make More Cycling Good for Road Safety? *Accident Analysis & Prevention*, 44(1), 19-29.
- Wood, J. M., Lacherez, P. F., Marszalek, R. P. & King, M. J. (2009). Drivers' and Cyclists' Experiences of Sharing the Road: Incidents, Attitudes and Perceptions of Visibility. *Accident Analysis and Prevention*, 41, 772-776.
- Wooliscroft, B. & Ganglmair-Wooliscroft, A. (2014). Improving Conditions for Potential New Zealand Cyclists: An Application of Conjoint Analysis. *Transportation Research Part A: Policy & Practice*, 69, 11-19.

APPENDIX

APPENDIX 1 QUESTIONNAIRE

INTRODUCTION

The aim of this 3-minute survey is to find out about factors influencing walking and cycling for short trips in Palmerston North. Regardless of whether you walk, cycle or drive for short trips, we are interested in your assessment of Palmerston North for walking and cycling, based on your perspective. This survey is a Massey University - Palmerston North City Council Living Lab research project. The results will help inform future policy development for the city.

Thank you for helping with this study.

QUESTION 1

How would you rate Palmerston North for **walking**?

(Please tick the boxes)

	Very Good	Good	Fair	Poor	Very Poor	Don't know / Don't live in Palmerston North
City Centre	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Main Roads	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Your Neighbourhood	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

QUESTION 2

From your perspective, what are the main factors which discourage people from **walking** for short trips (up to 20 minutes) in Palmerston North?

(Select 3 options from the list below)

- Takes too long
- Attitude of motorists toward pedestrians
- Physical effort required
- Needing to transport children
- Needing to transport heavy/bulky loads
- Lack of enthusiasm/motivation
- The amount of traffic on the road
- Weather (e.g. rain, wind, temperature)
- Facilities at the end of the trip (e.g. showers)
- Low number of pedestrians in Palmerston North
- Pedestrian facilities, or lack of (e.g. safety and/or convenience of pedestrian crossings)
- Uncomfortable
- Makes you look messy
- None of the above
- Other (please describe)

QUESTION 3

Below are some important factors that can affect the decision to **walk** for short trips.

Please rank from 1 to 5, with 1 being the most important.

- Safety
- Infrastructure (e.g. footpaths, pedestrian crossings)
- Convenience
- Weather
- Time

QUESTION 4

How would you rate Palmerston North for **cycling**?

	Very Good	Good	Fair	Poor	Very Poor	Don't know / Don't live in Palmerston North
City Centre	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Main Roads	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Your Neighbourhood	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

QUESTION 5

From your perspective, what are the main factors which discourage people from **cycling** for short trips (up to 20 minutes) in Palmerston North?

(Select 3 options from the list below)

- | | |
|---|---|
| <input type="checkbox"/> No bicycle available | <input type="checkbox"/> Needing to transport heavy/bulky loads |
| <input type="checkbox"/> Low number of cyclists in Palmerston North | <input type="checkbox"/> Needing to transport children |
| <input type="checkbox"/> Takes too long | <input type="checkbox"/> Uncomfortable |
| <input type="checkbox"/> Attitude of motorists toward cyclists | <input type="checkbox"/> Makes you look messy |
| <input type="checkbox"/> Physical effort required | <input type="checkbox"/> Lack of enthusiasm/motivation |
| <input type="checkbox"/> Weather (e.g. rain, wind, temperature) | <input type="checkbox"/> None of the above |
| <input type="checkbox"/> The amount of traffic on the road | <input type="checkbox"/> Other (please describe) |
| <input type="checkbox"/> Needing to wear a helmet | |
| <input type="checkbox"/> Facilities at the end of a trip (e.g. shower, bicycle storage) | |
| <input type="checkbox"/> On-road facilities, or lack of (e.g. cycle lanes, cycle paths) | |

QUESTION 6

Below are some important factors that can affect the decision to **cycle** for short trips.
Please rank from 1 to 5, with 1 being the most important.

- Safety
- Infrastructure (e.g. footpaths, pedestrian crossings)
- Convenience
- Weather
- Time

QUESTION 7

Do you have any further comments or observations about walking and cycling in Palmerston North?

QUESTION 8

Which organisation do you work for?

- Palmerston North City Council
- Massey University

QUESTION 9

What is your current age?

- | | |
|--------------------------------|--|
| <input type="checkbox"/> <20 | <input type="checkbox"/> 50-59 |
| <input type="checkbox"/> 20-29 | <input type="checkbox"/> 60-69 |
| <input type="checkbox"/> 30-39 | <input type="checkbox"/> 70+ |
| <input type="checkbox"/> 40-49 | <input type="checkbox"/> Prefer not to say |

QUESTION 10

What is your gender?

- Male
- Female

QUESTION 13

If you did not mark the nearest intersection on the map, was this because you...

- Live outside the boundary of the map
- Were uncomfortable indicating

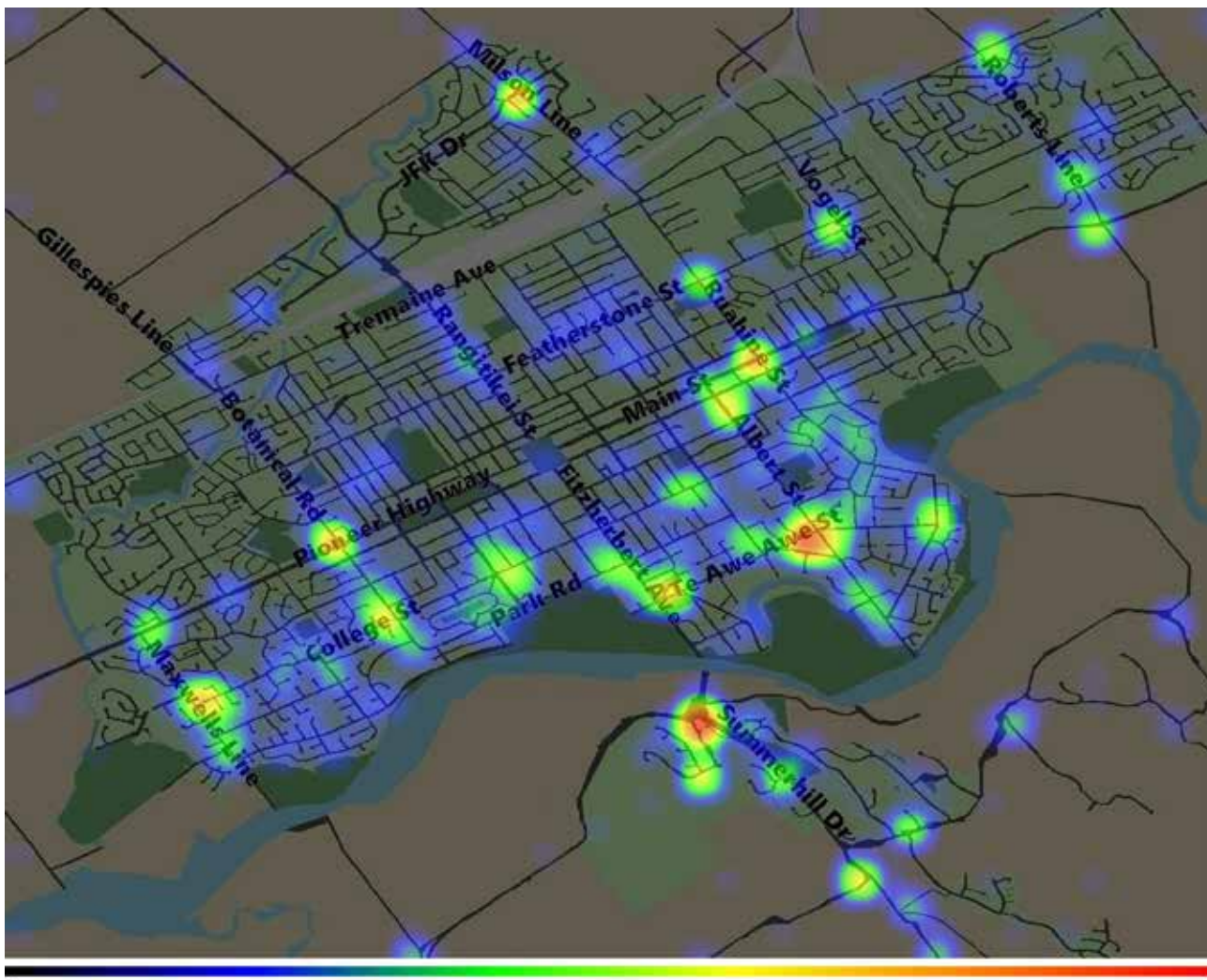
ETHICS

This project has been evaluated by peer review and judged to be low risk. Consequently, it has not been reviewed by one of the University's Human Ethics Committees. The researchers are responsible for the ethical conduct of this research.

If you have any concerns about the conduct of this research that you wish to raise with someone other than the researchers, please contact Professor John O'Neill, Director (Research Ethics), telephone 06 350 5249, e-mail humanethics@massey.ac.nz

Thank you for taking the time to complete this survey.

APPENDIX 2 GEOGRAPHIC DISTRIBUTION OF RESPONDENTS (QUALTRICS HEATMAP)



APPENDIX 3 STUDENT SURVEY EXECUTIVE SUMMARY

1. Four groups of students in the third year of a Bachelor of Resource Planning, each completed a report on university students' perceptions of barriers to active transport use in Palmerston North. The Group 1 include: Kate Chivers, Kerry Wynne, Ryan McAlister and Joy Francesca Seseve, Group 2 comprise: Lauren Ford, Marzuq Asgar and Megan Nunns, Group 3 involve: Harrison Burnard, Alana Mako, Rebecca Hare, and Morgan Laird, and Group 4 contain: James Adamson, Gemma Brennan, Milcah Xkenjik and Catherine West. The group projects were undertaken as part of 132.314 Transport and Urban Planning, coordinated by Dr Imran Muhammad, Roger Boulter and Waheed Ahmed.
2. Students utilised the same survey instrument (see Appendix 1) as that administered to Massey University and Palmerston North City Council staff in January 2015. The survey was administered face-to-face to students between 12:00 and 2:00pm on Wednesday 22nd April 2015 at the Massey University Manawatu Campus (Palmerston North). Student responses totalled 432 out of a possible 6076 – a response rate of 7%. Because it is unlikely all 6076 students would be on campus at any one time, the response rate was considered reasonably representative of Massey students. Each group analysed 108 completed surveys.
3. Each report found that students do use walking and cycling as a form of transport, with walking being more widely utilised.
4. Barriers to active transport identified by students were as follows:
 - Inability to transport bikes on buses
 - Weather
 - Distance and time factors associated with walking and biking
 - Cycle lane infrastructure
 - Perceptions of safety and personal security (including layout of road intersections, lighting at pedestrian crossing, fear of crime, proximity to motorists etc.)
 - Lack of end-of-trip facilities (e.g. showers, secure bike storage, water fountains, and clothing lockers)
 - Difficulty completing chores secondary to the commute
 - Personal barriers (access to bikes and helmets, mental and physical motivation, 'convenience')
 - Interpersonal barriers such as the attitude of motorists towards cyclists
 - Perceptions of safety and physical barriers were the two most significant barriers to active transport use amongst the sample population.
5. Key recommendations from the student research are as follows:
 - Provision of Information Maps with distance, pathways and estimated travel times to popular locations (i.e. Massey University, The Square, Memorial Park, The Library, Te Manawa etc.) may encourage greater active transport usage
 - Integration of public transport services such as buses with cycling-friendly attributes
 - Promotional campaign(s): de-stigmatise bike helmets; road-sharing; motorist education; health and environmental benefits; and, cycling as a primary mode of transport (rather than perceived as an alternative)
 - Infrastructure upgrades: special bike lanes at intersections; priority cycling signals; advanced stop lines for cyclists; wider cycling lanes; specific provisions for cyclists at roundabouts; and enhanced visibility of cycle lanes, foot paths and pedestrian crossings
 - Enforcement of safety policies (i.e. car – bike distance) and bike only lanes
 - Weather mitigation i.e. the provision of weather barriers (shelters) and underpasses, particularly in places where walkers/cyclists are required to wait (such as at intersections)
 - Availability of secure bike storage
 - Availability of rental bicycles at Massey University campus and/or central Palmerston North
 - Provision of incentives and rewards to people using active transport.
6. The student reports contribute valuable additional information to the study of staff at Massey University Manawatu campus and Palmerston North City Council by providing insights into the views of younger and newer residents of Palmerston North and a broader empirical foundation for understanding barriers to active transport in Palmerston North. Interestingly, the student respondents had similar perceptions of barriers to active transport to those of the respondents to the survey of Massey University Manawatu campus and Palmerston North City Council staff. The survey instrument worked successfully as an interviewer-administered questionnaire. It is recommended that the instrument be used to gather data from other organisation and other sectors in the city.

**ANY ENQUIRIES ABOUT OR COMMENTS
ON THIS PUBLICATION SHOULD BE DIRECTED TO:**

School of People, Environment and Planning
Massey University
Private Bag 11222
Palmerston North 4442

Email: S.J.FitzHerbert@massey.ac.nz
Telephone: + 64 (06) 356 9099 extn. 83937



Barriers to active transport in Palmerston North

Cheyne, CM

2015-09

<https://mro.massey.ac.nz/handle/10179/7720>

10/06/2021 - Downloaded from MASSEY RESEARCH ONLINE