TOWARDS A MORE COMPREHENSIVE PICTURE OF PARK-AND-RIDE: A MIXED METHODS STUDY OF STAKEHOLDER PERSPECTIVES AND TRANSPORT BEHAVIOUR IN GREATER WELLINGTON

By

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Thesis

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Abstract

In response to the environmental, economic and social costs associated with over-reliance on the private car, planners and policy-makers are promoting Park-and-Ride, or the combined use of car and public transport. Despite Park-and-Ride's growing popularity, little has been written on the subject in the New Zealand context. This thesis addresses this gap. Its objective is to understand the behaviour of commuters in order to inform the development of policies to increase walking and cycling to and from the station. It uses a mixed methods approach, based on stakeholder interviews and an online survey conducted in Greater Wellington.

Interviews with eight stakeholders involved in public transport planning and policy sought to provide insight into the challenges of implementing Park-and-Ride and how the concept can be developed in the future. More effective management of parking was seen as a key challenge for those tasked with making policy decisions. Stakeholders also discussed the potential for developing the concept, particularly by transitioning Park-and-Ride into interchanges for motorised and non-motorised transport modes, with priority given to walking and cycling access.

A survey conducted among 295 respondents who commuted to Wellington City sought to explore the psychological and contextual factors in predicting the intention to walk and cycle to the train station. The usefulness of the Theory of Planned Behaviour (TPB), with the addition of personal norm, environmental concern, and problem awareness, in predicting intention was tested. All TPB constructs were significant predictors and explained 54% and 36% of the variance in intention to walk and cycle respectively. The additional constructs made a small but significant contribution in explaining variance in intention (together, an additional 6% and 4% respectively). Based on the between-subjects design, the acceptability levels of proposed Park-and-Ride policies was low. Perceived effectiveness and fairness significantly influenced the acceptability of policies. Policy-makers may find these results useful in considering how to increase the acceptability of Park-and-Ride policies in future.

Key words: Park-and-Ride; public transport; parking; multi-modal; walking; cycling; policy acceptability; Wellington; New Zealand

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List of Abbreviations

AC	Awareness of Consequences
AR	Ascription of Responsibility
AT	Attitude
GHG	Greenhouse gas emissions
GWRC	Greater Wellington Regional Council
HCC	Hutt City Council
KPDC	Kapiti Coast District Council
MfE	Ministry for the Environment
MoT	Ministry of Transport
NAM	Norm Activation Model
NEP	New Ecological Paradigm
NZTA	New Zealand Transport Agency
PA	Problem Awareness
PBC	Perceived Behavioural Control
PCC	Porirua City Council
PN	Personal Norm
RLTP	Regional Land Transport Plan
RRP	Regional Rail Plan
RPTP	Regional Public Transport Plan
SEM	Structural Equation Model
SH1	State Highway 1
SH2	State Highway 2
SN	Social Norm
TDM	Travel Demand Management
TOD	Transit Oriented Development
TPB	Theory of Planned Behaviour
UHCC	Upper Hutt City Council
VBN	Value-Belief-Norm Theory
VKT	Vehicle Kilometres Travelled
WCC	Wellington City Council

Chapter One

Introduction

1.1 Background

Transportation plays a substantial role in generating greenhouse gas (GHG) emissions in New Zealand, with the transport sector making up about 20% of New Zealand's total GHG emissions each year (MfE, 2018). Rapid growth in GHG emissions from 1990 has been largely due to a significant increase in overall vehicle kilometres travelled (VKT), with light passenger and commercial vehicles responsible for most (about 92%) of the distance travelled on New Zealand roads in 2013. The high proportion of VKT utilising the private car highlights the dependence on this mode within the New Zealand transport system. Additionally, the distances being covered by New Zealanders in their cars is relatively small. Data from the Ministry of Transport (MoT) identified that 17% of vehicle trips are less than two kilometres and 43% are less than five kilometres (MoT, 2010). Given this, an important opportunity exists to integrate active transport into such trips. However, the challenge lies in the ability to change behaviour and provide for the effective promotion of more sustainable transport modes.

The negative externalities (adverse effects on others) of car use include reduced accessibility and mobility due to congestion, higher levels of air pollution and energy consumption, and decreased urban quality (De Groot, Steg, & Dicke, 2008; Haustein & Hunecke, 2007; Loukopoulos, Jakobsson, Gärling, Schneider, & Fujii, 2005). Strategies to redress these costs fall into two broad categories: travel supply measures and travel demand measures. The former strategies aim to provide the individual with a choice of alternative modes through improvements to services and facilities (Gärling et al., 2002). The latter strategies relate to discouraging car use by push measures, and encouraging the use of alternative modes (pull measures). The impetus to improve sustainability through travel supply and demand measures explains the strong appeal of multi-modal transport services to planners and policy-

makers. The Canterbury Regional Land Transport Strategy 2015-25, for example, defines multi-modal transport as travel involving more than one transport mode (e.g. private motor vehicle, walking, cycling, public transport). The combination of private motor vehicles and public transport allows commuters to take advantage of the individual strengths of the two transport modes while minimising their weaknesses (Lam, Holyoak, & Lo, 2001; Vincent & Hamilton, 2007).

To facilitate a combined car and public transport trip, parking facilities (known as Park-and-Ride) are positioned adjacent to transport nodes, some distance from the city centres, to act as a transfer point between low occupancy and high occupancy vehicles. This allows commuters to drive to the Park-and-Ride, thereby avoiding the congested central urban area, and continue their journey by public transport to their final destination within the central urban area. The location of the parking facilities is critical to the success of a Park-and-Ride. Building a Park-and-Ride too close to a destination will have little potential impact on traffic congestion and air quality. Nearly all the commute will still be by car, and unless parking is constrained in the city centre, few commuters will accept the transfer penalty so close to their destination. Therefore, the Park-and-Ride facility must be far enough out from the commuter's destination to warrant a change in transport mode.

Recent studies have empirically illustrated that Park-and-Ride can help to alleviate traffic congestion and other adverse external effects of travel by private car (Hamer, 2010; Kelly, Chowdhury, & Stevens, 2016). However, even if Park-and-Ride reduces the number of cars entering the city centre, achieving more measurable sustainability benefits at a regional level will require policy and infrastructure to encourage walking and cycling to the station. The use of active modes, even for short trips to the station could deliver a significant contribution to reducing New Zealand's transport sector emissions. The benefits of increasing active transport are also well researched, with convincing evidence to support walking and cycling from a public health perspective alone (Audrey, Procter, & Cooper, 2014; Bassett, Pucher, Buehler, Thompson, & Crouter, 2008; Giles-Corti, Foster, Shilton, & Falconer, 2010).

1.2 The Greater Wellington Region

The Greater Wellington Region was chosen as a case study site for this research. Greater Wellington consists of eight districts (Figure 1.1): Wellington City, Hutt City, Porirua City, Kapiti District, Upper Hutt City, South Wairarapa District, Carterton District, and Masterton District, ranging in population from 9,060 to 212,700, giving a total estimated resident population in 2017 of around 514,000 (Statistics New Zealand, 2018).

Figure 1.1. *Map of the Wellington Region showing the Territorial Authorities and State Highways in the Region. Source: GWRC (2017c).*

The latest data from the Household Travel Survey identified that, for the Wellington Region, cycling accounted for just three percent of all journeys to work, walking for six percent, 20% took public transport, while 68% either drove or were driven to work (MoT, 2014). The current level of public transport use is high, compared with a level of nine percent in Auckland, and four percent of commuters in Canterbury, as Wellington is more monocentric. In 2017, total public transport ridership averaged 6.8 million riders per month; 1.1 million of these riders (one-sixth) used the commuter train (GWRC, 2017b). Rail patronage has increased 67% over 1999-2017, or on average three percent per year, with relatively rapid growth in the last three years.

The Kapiti Line carries the most commuters, with 3,200 passengers per day, most embarking at Porirua and Paraparaumu stations (GWRC, 2013). The Hutt Valley Line carries approximately 3,000 passengers per day with Waterloo and Petone the most popular stations along this train line. The Johnsonville Line, Wairarapa Line and Melling Line carry smaller volumes of passengers, with 1200, 1000 and 400 boardings per day respectively. The high train ridership is reflected to a large extent by the supply of Park-and-Ride facilities at most train stations in the region. As shown in Figure 1.2, Greater Wellington Regional Council (GWRC) currently supplies approximately 5,500 parking spaces for commuters to use at train stations across the region, with Porirua and Waterloo train stations accommodating the highest number of cars, at 800 and 650 car parking spaces respectively (Appendix A) (GWRC, 2017d).

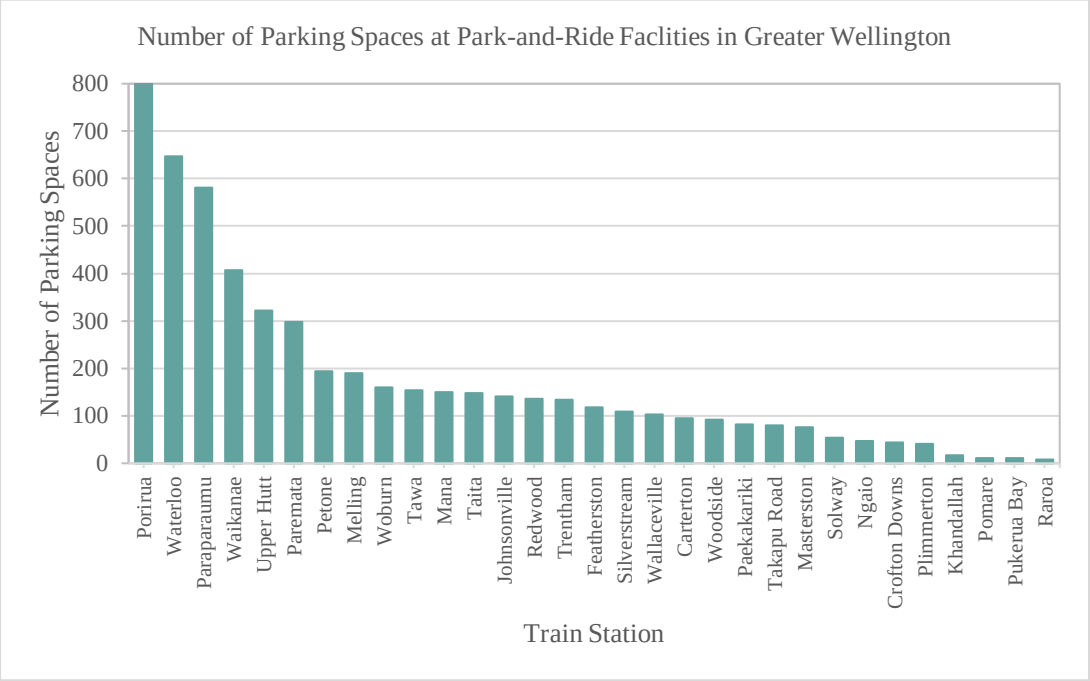

Figure 1.2. *The number of parking spaces at Wellington Park-and-Ride facilities. Source: GWRC (2017e); Vincent and Hamilton (2007).*

While the car is the most popular access mode with a share of 50% of all trips, walking accounts for 43% of all access trips to stations, and two percent cycle to stations in the region. However, these region averages hide large variations in walking and cycling levels between train lines; Johnsonville Line passengers are significantly more likely to walk to the station (76%) while being less likely to drive

to the station (23%). Kapiti and Melling Line passengers are significantly less likely to walk to the station (33% and 27%, respectively), while Wairarapa Line passengers are the most likely to drive to the station (65%). Overall, the bicycle accounts for only two percent of access trips to stations, partly due to the perceived advantages that the car has over this mode (GWRC, 2017f). Although access to stations by active modes in the Greater Wellington is low, the pressures of rail passenger growth and the shift towards promoting more sustainable travel options may lead to higher levels of walking and cycling in the future.

GWRC began actively promoting walking, cycling, and public transport, following a shift in policy direction in the early 1990s. Two strategies were introduced, the Transportation Strategy for Wellington's Inner City (1992) and a Transport Strategy (1994) to encourage people to use more sustainable modes of transport. These strategies marked the beginning of the resurgence of walking, cycling, and public transport. Several plans and strategies have been developed since, with the goal of improving the region's transport system. Wellington's Regional Land Transport Plan (RLTP) of 2015 is a statutory document, prepared under the Land Transport Act 1998 and in accordance with the Land Transport Management Act 2003, which provides the overall framework to integrate multiple programmes such as the Regional Public Transport Plan (RPTP) 2011-2021, Regional Rail Plan (RRP) 2010-2035, and the Long-Term Plan 2012-2022.

Through the current strategies and programmes, Wellington intends to achieve a 'transformational shift' to increase the number of public transport trips from 17.4 million per year in 2009/10 to 23 million by 2020 (GWRC, 2010). Besides the projects to improve public transport infrastructure in Wellington's CBD, such as Bus Rapid Transit and light rail, investment in rail and Park-and-Ride facilities has also been deemed a priority by GWRC and the territorial authorities to increase overall public transport patronage in the region. However, the cost to provide parking at stations coupled with finite road capacity and the need for emission reduction means that encouraging commuters to access their stations by low-carbon alternatives, such as walking or cycling, is highly desirable. GWRC recognise the importance of, and potential for, improving access to stations and have introduced policies designed to encourage the integration of walk, cycling and public transport.

Two policies in the RLTP seek to encourage the uptake of more sustainable modes. The first, policy 8.2c, aims to "ensure the public transport fares and ticketing system facilitate quick and easy connections between modes and services" by the 2020 target (GWRC, 2010, p. 38). The second, policy 8.5j, relates to the integration of walking and cycling with public transport; the policy sets out to "ensure [the] planning of public transport, walking, cycling and road networks support, enhance and integrate with the key public transport corridors" (GWRC, 2010, p. 39). The latter will have considerable practical implications for the rail industry in terms of the space required for bicycles on trains and in and around stations. A specific concern in the Wellington Region context is whether the aforementioned policies will increase the incidence of walking and cycling to the station. Research has shown that the provision of bicycle parking facilities can increase the likelihood of commuters cycling to the station (Bachand-Marleau, Larsen, & El-Geneidy, 2011; Martens, 2007; Rietveld, 2000; Zhao & Shengxiao, 2017). Conversely, the provision of free-of-charge plentiful car parking at stations can also discourage commuters from walking or cycling, as evidenced by Walton and Sunseri (2007).

1.3 Purpose

The catalyst for this Master's thesis was the observation that, despite the potential benefits, low levels of active transport-rail integration are evident in Greater Wellington, particularly at stations in the Kapiti Coast and the Hutt Valley. The overall objective was to understand the behaviour of commuters in order to inform the development of policies to increase the incidence of walking and cycling to and from the station. This included examining the psychological barriers as well as the physical and contextual factors affecting the decision to walk and cycle to the station. The research also assessed the future challenges of providing car parking at stations in terms of the effects on the transport system, and opportunities for implementing pricing strategies for Park-and-Ride.

1.4 Outcome and Contribution of this Research

This thesis aimed to contribute to the literature by exploring the challenges of Park-and-Ride at a time of growing concern about transport sustainability in the

Wellington Region. The knowledge generated in this research is of interest to those wanting to change travel behaviour generally and more specifically to those designing interventions to encourage walking and cycling to the station. This research will also contribute to assisting the development of guidance for Park-and-Ride parking policy and provision.

1.5 Thesis Outline

This research comprises five chapters. Beyond this introduction, Chapter Two provides an overview of the key strands of research this study draws on. It begins with an overview of the transport and environmental benefits of Park-and-Ride, and the negative effects of Park-and-Ride on land use, traffic and congestion levels, and alternative public transport services. Literature relating to behaviour change theories is explored, emphasising the most relevant, and summarising the central elements to form a conceptual model to be applied to walking and cycling behaviour for this research. Existing research on pricing policies is explored with a focus on the factors that influence acceptability judgments of policies. This chapter forms the basis of the development of research questions, outlined at the chapter's end.

Chapter Three describes the methodological approach of this thesis and how and where the research was conducted. It outlines the research design and the development of the survey and interview questions. It also explains how the interview and survey participants were selected. This chapter concludes with a summary of the type of analysis used for the qualitative and quantitative results.

Chapter Four presents the key results of this research. First, the results obtained from qualitative interviews are presented. Second, we examine which psychological constructs are important in the decision-making process to walk and cycle to the station and how these constructs interact. Lastly, we report the findings from the online survey on public acceptability of Park-and-Ride policies.

Chapter Five compares the findings from the literature and the research. The relevance of this thesis for policy is discussed, as well as the limitations of the study and potential for future research. This thesis ends with a conclusion on key ideas and findings.

Chapter Two

Literature Review

This literature review has three sections, beginning with an exploration of key literature on the transport and environmental benefits of Park-and-Ride, and the negative effects of Park-and-Ride on land use, traffic and congestion levels, and alternative public transport services. Following this, existing research literature and theory around travel decision making is reviewed to conceptualise the influencing factors and the likely attractors and barriers to the integration of walking and cycling and rail. Given the vast body of work on human behaviour theories, the review will focus on the dominant theories used in transport mode choice studies, the Value-Belief-Norm theory, the Norm-Activation Model and the Theory of Planned Behaviour. Lastly, existing research on transport pricing policies is explored with a focus on the factors that influence acceptability judgments of policies. Examples of Park-and-Ride policies implemented internationally are examined, with a particular focus on the impacts of the policies on access mode choice decisions, and whether or not pricing policies reduce car travel to the station.

2.1 Benefits of Park-and-Ride

The use of Park-and-Ride facilities for travel demand management (TDM) has a long history around the world. Park-and-Ride originated in the UK in the 1960s and soon developed elsewhere with the aim of reducing traffic and congestion levels on urban radial routes and in the CBD itself; reducing the need/pressure for increased road capacity, as well as reducing emission levels, energy use and other environmental impacts; and the amount of parking required in the CBD, replacing it with parking in other locations (Vincent & Hamilton, 2007; Wiseman, Bonham, MacKintosh, Xu, & Straschko, 2012). These benefits of Park-and-Ride are well documented in the literature. Firstly, Park-and-Ride promotes the use of high-occupancy vehicles for the public transport segment of the trip, which is often associated with significant

reduction in vehicle kilometres travelled (VKT) and vehicle emissions. For example, a study by Kelly et al. (2016) found that there was a significant drop in traffic volumes following the opening of a Bus Rapid Transit System (Northern Busway) between the North Shore and Auckland's central city. The Bus Rapid Transit System currently operates two major Park-and-Rides in Albany and Constellation Drive, located 19 and 15 kilometres from Auckland CBD respectively and providing 1500 parking spaces collectively. A sharp decrease in traffic volume was experienced at Constellation Drive, Tristram Avenue, and on the Auckland Harbour Bridge, which coincided with the opening of the Bus Rapid Transit (BRT) and Park-and-Ride in 2008.

A decrease in car traffic entering the city centre was also reported by Hamer (2010), who investigated the effectiveness of Park-and-Ride in Melbourne, Australia. Hamer classified Park-and-Ride depending on whether the parking facilities were located in the 'Inner Metropolitan Zone' (up to 14km from the CBD), the 'Outer Metropolitan Zone' (up to 50km from the CBD), or the 'Regional Zone' (more than 50km from the CBD). Approximately 50% of the users of Inner Zone Park-and-Rides walked to the station, 20% of users of Outer Zone and 12% of the Regional Zone Park-and-Rides walked. However, the most interesting finding from this study is the number of respondents who started driving to the station who previously had driven all the way to their destination. On average, between 30% and 50% had previously driven to their destination, with a higher proportion reported at Regional Zone Park-and-Rides (50%), and lower proportions at Inner Zone (33%) and Outer Zone (33%). While this study did not report VKT savings, there is the potential that some commuters were intercepted early in their commute, with users travelling only a short distance by car to the Park-and-Ride facility, compared with a trip that would have usually been up to 70 kilometres if the commuter drove to the CBD from the Regional Zone.

Park-and-Ride also offers a number of benefits to commuters by extending access to public transport beyond areas from which it is possible to conveniently access that service by walking and cycling. Because it increases access to public transport, Park-and-Ride also extends many of the benefits that accompany public transport access, including reduced cost of commuting and faster commute times. The most cited

factors affecting the decision to use Park-and-Ride facilities were journey cost; journey time; convenience and reduction of stress; and their attributes. Islam, Liu, Sarvi, and Zhu (2015) examined the factors affecting transport behaviour and their importance in Australia. Their study found that 68% of commuters shifted to using Park-and-Ride due to its ease and convenience, such as no traffic congestion and the ability to read books or official documents while on the train. Similarly, studies in Perth (Olaru, Smith, Xia, & Lin, 2014) and Shanghai (Ying & Xiang, 2009) found that passive factors, such as road traffic congestion, lack of parking space in the central city, and high parking fees in the central city were influential in commuters choosing to use Park-and-Ride. In addition, the low parking cost offered at Park-and-Ride compared to the central city was also an influential factor in the commuters' decision to use Park-and-Ride in Washington (Gayah, Stieffenhofer, & Shankar, 2014), Adelaide (Wiseman et al., 2012), Melbourne (Islam et al., 2015), and Oxford and York (Parkhurst, 1995).

2.2 Key Criticisms of Park-and-Ride

While Park-and-Ride is associated with a number of benefits, the foremost being the promotion of public transport use, there are also a number of problems with trying to accommodate a large number of public transport users by encouraging them to drive to the station and park. One of the first researchers to dispute the environmental merits of Park-and-Ride was Graham Parkhurst. Parkhurst has conducted a number of studies on the issue (Dijk & Parkhurst, 2014; Parkhurst, 1995, 2000a, 2003; Parkhurst & Meek, 2014), all of which look at the extent to which Park-and-Rides have reduced traffic and congestion levels. A clear pattern evidenced in his work was that Park-and-Rides throughout the UK resulted in an increase in traffic outside the urban area that was greater than any reduction within the urban area. As shown in Figure 2.1, this was particularly evident in Norwich, with the largest traffic generation effect of all the eight cities. The net increase in traffic was partly due to a large proportion of commuters driving up to 16 kilometres on average to access public transport, as well as a large number of commuters using Park-and-Ride who had previously caught alternative public transport to their destination.

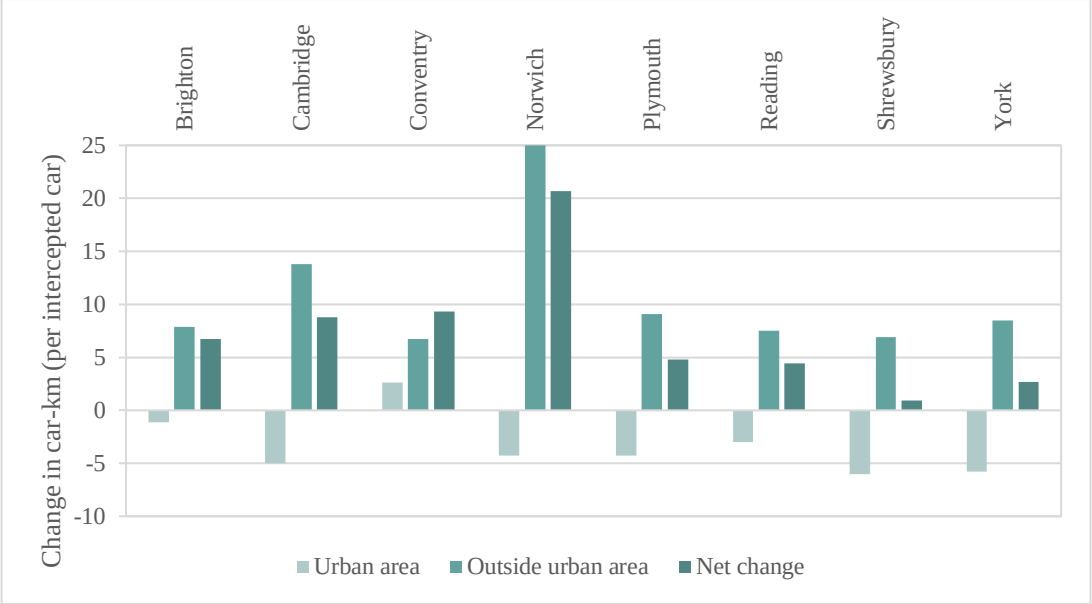

Figure 2.1. *Changes in traffic arising from Park-and-Ride implementation for eight UK cities*
Source: Data from Parkhurst (2000a), Table 8. Interception of car commuters.

Recent studies have built on the work of Parkhurst, providing further evidence of the unintended transport effects. Most studies that have estimated the change in transport behaviour have conducted before-and-after studies following the implementation of a Park-and-Ride facility, or have estimated the impact of Park-and-Ride in contrast with a situation wherein Park-and-Ride does not exist. Research carried out in Doncaster, Melbourne by Islam et al. (2015) offers an important case study of the impact of Park-and-Ride on transport behaviour. Their before-and-after study found that there were almost no new public transport users generated from the newly established Park-and-Ride. The majority of Park-and-Ride users previously walked to the station (61%) or caught the bus to their destination (23%) and subsequently accessed the station by car. Similar transport effects were evident in The Hague and Rotterdam. Mingardo (2013) found that in some cases Park-and-Ride can encourage car use at the expense of public transport: between 30% and 37% would do the entire journey by public transport if the facility were not available. Wiseman et al. (2012) surveyed new users of a Park-and-Ride facility in Adelaide, Australia. Of these users, 49% had shifted from alternative public transport to car use for the first part of their trip, leading to a notable increase of 17 VKT per person per round trip to the Park-and-Ride facility. Research carried out in Texas provides further evidence of a shift from alternative public transport to Park-and-Ride (Christiansen, Bullard, &

Peterson, 1981). In Dallas, 11% had used a regular bus route prior to using the Park-and-Ride, with slightly lower abstraction from public transport reported in Houston (8%).

Research carried out in the UK found that while a considerable number of commuters shift to public transport for the final leg of their trip, most would be unable to sustain their mobility patterns in the absence of Park-and-Ride. Clayton, Ben-Elia, Parkhurst, and Ricci (2014) asked users from three Park-and-Ride sites in Bath, UK to report on their alternative transport mode in the event that a Park-and-Ride was unavailable for a trip. 60% of the respondents indicated that they would have chosen to drive to the central city. While this figure does not necessarily give an accurate representation of what commuters would actually do, it does, however, reflect current preferences for different transport modes. Moreover, this high likelihood of reverting to previous transport habits could indicate that Park-and-Rides are 'making life easier for drivers' instead of discouraging a car-dependent culture.

While high-quality public transport usually increases public transport patronage and reduces car travel on affected transport corridors, critics also claim that the introduction of parking at public transport nodes does little to reduce car travel. This was particularly evident in a New Zealand study by Walton and Sunseri (2007), who discussed the travel behaviours of Park-and-Ride users in the Wellington Region. The authors found that there was strong evidence to suggest that Park-and-Rides at Woburn and Waterloo stations reduce potential walking trips due to the parking convenience, which was especially evident within a one-kilometre radius of Park-and-Rides in the study. The Wellington Public Transport Model (WPTM) development project provided additional evidence that New Zealand Park-and-Ride facilities encourage commuters to drive short distances (Ford, 2012). A rail intercept survey was undertaken on the four rail lines in the Greater Wellington Region (Hutt Valley Line, Kapiti Line, Melling Line and Johnsonville Line) in 2011. The survey covered, in a broad sense, the individual's origin, access/egress time, transport mode and trip purpose. While there were slight variations in access mode between the rail lines, for the most part, there were equal numbers of commuters who drove and walked to the station during the morning peak period (7 am to 9 am). When

comparing access mode with access distance, as expected, the majority of walking access trips were of less than five kilometres in length (93%); however, a large number (83%) of car access trips were also less than five kilometres.

Based on the studies reviewed above, the belief that Park-and-Ride contributes to an overall car traffic reduction was generally contradicted. Clearly, commuters are now tempted to use the more attractive Park-and-Ride alternative, as they often provide a higher frequency public transport service, routes that are more direct, and offer reliability advantages and cost savings. Alternative concepts of Park-and-Ride have been proposed by Parkhurst (2000b) and further developed by Meek, Ison, and Enoch (2011) in an attempt to alleviate the counter-productive effects that Park-and-Ride has in terms of attracting users from alternative bus services. The 'Hub and Spoke concept' is designed in a way to attract bus users without the need for accessing the Park-and-Ride service by car. The concept proposes additional connecting bus services to the Park-and-Ride site that are routed in a way so that nearly 40% of users are within two kilometres of a connecting bus service. Bus routes are seen as the 'spokes' of the hub-and-spoke, and the transport nodes are the 'hubs' where commuters connect to a more direct, higher frequency public transport service to the city centre.

A failing in some Park-and-Ride systems is that the site is located too close to the CBD. In addition, complementary restraint measures such as parking controls are sometimes not implemented in conjunction with the Park-and-Ride, so the original transport package is compromised and will never deliver the aims it was seeking to achieve. Bos (2004) researched the functionality of Park-and-Ride facilities and their role in encouraging commuters to the system as well as reducing overall VKT. Park-and-Ride is understood to be classified in three ways, depending on the location in relation to the commuters' destination. The three functions are 'destination functionality', 'origin functionality', and 'field functionality', as depicted in Figure 2.2.

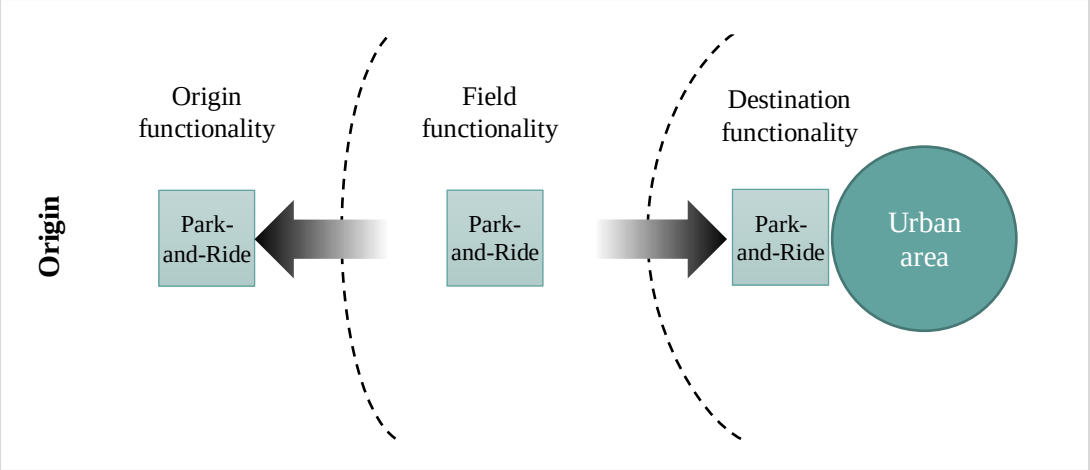

Figure 2.2. *Conceptualisation of the three locations of a Park and Ride facility (adapted from Bos (2004)).*

A 'destination functionality' Park-and-Ride includes those facilities built at the edge or periphery of an urban area. The main purpose of these facilities is to intercept commuters just before entering the urban area. However, a review of the international literature has shown that destination function facilities are not well suited to the task of reducing VKT and do not lessen the dependence on the private car. For example, Marshall and Truong (2014) found that when Park-and-Rides are located close to the central city, the positive environmental benefits diminish greatly. This was particularly evident at two stations in Denver, USA, which both had a CO_2-equivalent ratio of 0.88. The higher ratio indicates that these stations are less effective in facilitating sustainable habits, with commuters travelling up to 49 kilometres before transferring to public transport to avoid parking fees in the city centre or to limit their journey time on public transport. Mingardo (2013) provided similar findings. As depicted in Figure 2.3, Kralingse Zoom and Slinge Park-and-Ride facilities aim to intercept drivers just before their final destination; consequently, the part of the journey made by car was generally larger than that made by public transport. This means that the magnitude of VKT and vehicle emissions was very large (additional 1,028 and 390 VKT respectively).

An 'origin functionality' Park-and-Ride is typically located close to the origin of the commuter. Its chief function is to intercept drivers as close to their place of residence as possible, therefore, reducing the time and distance travelled by the low occupancy transport mode. This was particularly evident in The Hague where Mingardo (2013)

found that the Park-and-Ride facilities there created an overall reduction in VKT and related vehicle emissions. Most of the sites in The Hague area had an origin functionality and intercepted drivers early in their commute, with users travelling only a short distance by car to the Park-and-Ride facility. This reduced the number of VKT compared with a full trip. Marshall and Truong (2014) also offer insight into the impact that early interception has in reducing VKT. Park-and-Ride facilities located close to the commuters' origin in this study tended to have a lower average driving distance of five kilometres to access to Park-and-Ride compared with a full trip to the destination of 26 kilometres. This resulted in relatively low CO_2-equivalent ratios of 0.76, 0.77 and 0.81 respectively, where a ratio of less than 1.0 indicates the multimodal trip (car and transit) generates fewer GHG emissions than a drive-only trip.

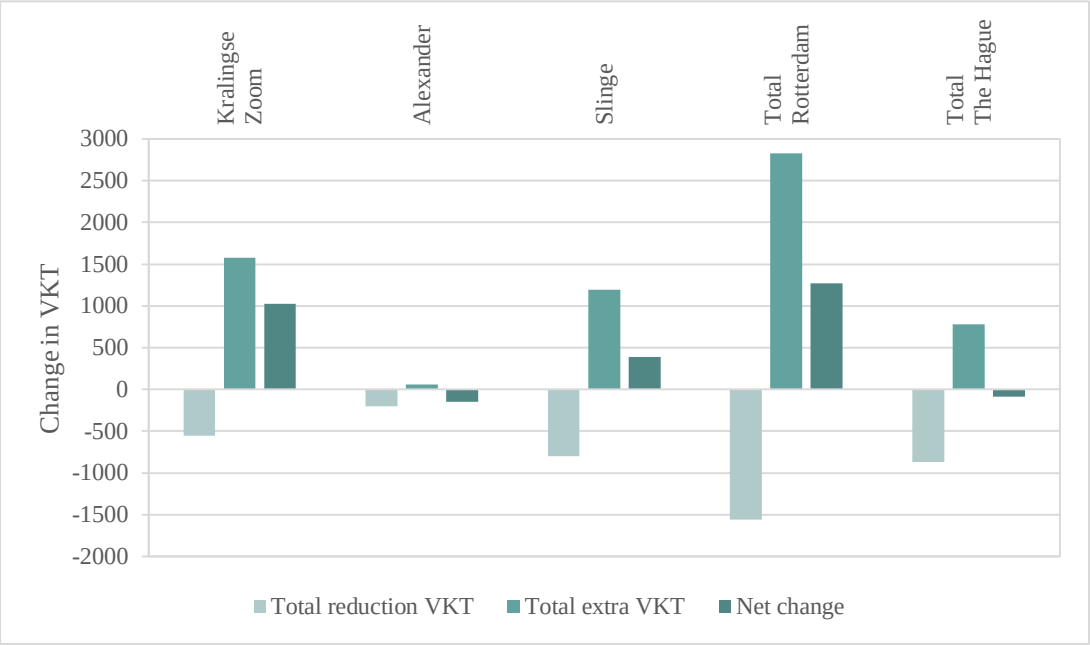

Figure 2.3. *Changes in traffic arising from Park and Ride implementation for three Park and Ride facilities in Rotterdam and six in The Hague. (n = 738). Source: Data from Mingardo (2013), Table 3 and 5.*

'Field functionality' Park-and-Rides fill the gap between the origin functionality and 'destination functionality' Park-and-Rides by intercepting drivers along transport corridors. 'Field functionality' Park-and-Ride facilities have received less attention in the international literature. However, as evidenced in Marshall and Truong (2014), Park-and-Ride facilities must be far enough out from the commuters' destination to

warrant a change in transport mode (i.e. origin functionality Park-and-Ride). Auckland Transport's Regional Public Transport Plan suggests that Park-and-Ride should only be located at "selected peripheral locations to extend the catchment area of the public transport network and encourage patronage growth" (Auckland Transport, 2015, p. 44). However, guidance provided by GWRC is not explicit about the locations where Park-and-Ride should be implemented in the Wellington Region. The Wellington Regional Public Transport Plan briefly states that "Park-and-Ride should be provided at appropriate sites" (GWRC, 2014, p. 9). The Regional Rail Plan provides additional clarity stating that the most appropriate location for Park-and-Ride is "upstream of areas experiencing major traffic congestion" (GWRC, 2013, p. 112). Given that decisions about parking provision and cost can have a significant influence on car users' choices, GWRC should ensure that Park-and-Ride facilities are located in such a location somewhere that maximises the interception of cars.

Another key issue evident in the international literature was that land devoted to car parking is a costly use of land which could be put to another more productive use. Several researchers suggest that Park-and-Ride could be packaged with urban developments to allow more commuters to access public transport without the need to use a car while also gaining a spin-off value from the investment (Duncan, 2017; Willson & Menotti, 2007). This form of development is called transit oriented development (TOD), which is defined as "the creation of compact, walkable communities centred around high quality public transport systems, which make it possible to live a higher quality life with reduced dependence on a car for mobility" (DIA, 2008, p. 48). Nasri and Zhang (2014) found that people living in TOD areas tended to drive less, reducing their VKT by 40% in Washington, and 20% in Baltimore, compared to people living in non-TOD areas. In a comparative study, Kamruzzaman, Shatu, Hine, and Turrell (2015) examined the transport behaviour of people living in TODs and people living in transit adjacent development (TAD) in Brisbane. While TAD are comparable to TODs with regard to being located around public transport nodes, TADSs are often characterised by poorly connected street layouts and relatively low-density housing. It was found that respondents living in TODs were more likely to use sustainable modes of transport (e.g. public transport and active transport) to commute to work compared to respondents living in TADs.

However, what remains unclear is whether public transport patronage levels at stations can be maintained without the provision of some parking. For example, Duncan (2010) stated that the intensity of TOD required to offset public transport patronage losses from a reduction in Park-and-Ride varied greatly depending on the station area characteristics. Their analysis of the Bay Area Rapid Transit system in San Francisco revealed that the most effective way to maximise light rail patronage was through the provision of Park-and-Ride, with only a handful of stations in the network likely to retain patronage levels with TOD densities less than 2.5 dwellings per km^2.

Lastly, Park-and-Ride can lead to issues of equity between those with and those without access to private cars. Equity refers to the fairness with which costs and benefits are distributed (Litman, 2002). Equity is often overlooked when implementing Park-and-Ride facilities, with motorised forms of transport prioritised over active modes (Meek, Ison, & Enoch, 2009). Park-and-Ride is often heavily subsidised to create user-charges significantly below market rates, which makes Park-and-Ride a low-cost option for commuters with a car available, cheaper than paying for parking in the city centre, and often costs less than using public transport for the whole journey (Parkhurst, 2003). However, commuters who access the station by walking, cycling, or by connecting bus services are usually not offered a corresponding subsidy for their own preferred modes of access, all of which use space at the station more efficiently. Given that the benefits of parking redound directly to car users, it can be argued that car users should cover the costs of building and maintaining Park-and-Ride facilities (Segelhorst & Kirkus, 1973). Raising the cost of parking at the station could contribute to the increased attractiveness of alternative modes. This was evidenced in an Australian study by Smith, Huang, and Taplin (2016), who found that a hypothetical doubling of parking fee (from AUS$2.00 to $4.00) has the potential to reduce Park-and-Ride use by 16%, while a tripling was estimated to reduce Park-and-Ride usage by 24%.

2.3 Behaviour Change and Decision-Making

In order to encourage more commuters to walk and cycle to the station, it is necessary to have an understanding of human behaviour and its antecedent conditions. Accordingly, this section reviews the prominent literature on human behaviour theories. There are several psychological theories that attempt to explain how an individual's behaviour is determined, and what shapes behaviour and decisions to behave in a particular way. Theory of Planned Behaviour (TPB), the Norm-Activation Model (NAM), and the Value-Belief-Norm (VBN) theory are the dominant theories used in transport mode choice studies. The VBN and NAM have influenced research on pro-environmental behaviour resulting from pro-social motivations. The TPB models pro-environmental behaviour based on self-interest. In the context of Park-and-Ride, the combination of car and public transport, one might assume that individual interests such as monetary costs would have a strong impact on this travel mode choice; however, pro-social motives may also play a role. For instance, people may take the train for the final leg of their commute because they see it as better for the environment and society as whole. Thus, both reasons should be accounted for in an attempt to understand an individual's motivations to walk and cycle to the station.

2.3.1 Theory of Planned Behaviour

The TPB conceptualises commuting within a framework of rational choice. Rational choice theory assumes that commuters make decisions by calculating the costs and benefits of the different alternatives and choosing the option that offers the highest expected net benefit or lowest expected net cost (McDonald, 2014; Steg & Vlek, 2009; Turaga, Howarth, & Borsuk, 2010). The framework of rational choice strongly informs the TPB, which assumes that mode choice is a deliberate process. The TPB is an extension of the Theory of Reasoned Action (TRA) developed by Ajzen and Fishbein (1975). The theory postulates that travel behaviour is determined by three rational determinants: (a) attitude; (b) social norm; and (c) perceived behavioural control. In combination, these three factors lead to the formation of a behavioural intention, which is the immediate determinant of behaviour.

Attitude was referred to by Ajzen (1991) as an individual's general disposition towards the behaviour. It is understood that based on their cognitive beliefs, individuals usually first consider the favourability and unfavourability of the consequences of the certain behaviour and form an attitude toward it (Khoo & Ong, 2013). This attitude can then transform into the actual performance of the behavioural action. For example, if an individual has a positive attitude towards walking or cycling they might be more likely to consider walking or cycling to access the station. The second determinant, social norm, as defined by Knussen, Yule, MacKenzie, and Wells (2004), "reflects the extent to which people important to the individual are perceived to support the behaviour, and the extent to which the individual is motivated to comply or conform" (p. 238). For example, if their friends think it is a good idea to walk and cycle, an individual is more likely to have an intention to walk or cycle to the station.

Unlike the TRA, the TPB takes into account non-volitional behaviours. Ajzen (1991) recognised that although intentions are necessary to produce a behaviour, they are not sufficient; the individual must also have control over the behaviour. For example, if people feel they lack resources or opportunities to perform the behaviour, they may not form an intention even though they have a positive attitude toward the behaviour and think that people of importance to them approve the behaviour. In the model, perceived behavioural control is seen, directly and indirectly, to affect behaviour through intention. The direct link, shown by the dashed line in Figure 2.4, represents the actual control a person has over performing the behaviour, which only exists when (a) the target behaviour is not under full volitional control and (b) perceptions of control over the behaviour are very close to the actual control.

Figure 2.4 depicts the extended version of the TRA i.e. the TPB, in the form of a conceptual model. The diagram shows that an individual considers the likely consequences of available alternatives (behavioural beliefs), they assess the normative expectations of others (normative beliefs); and they consider internal and external factors that may facilitate or hinder the performance of the behaviour (control beliefs). These beliefs result, respectively, in the formation of attitude, social norm and perceived behavioural control. The model assumes that individuals form behavioural intentions based on their attitude, social norm, and perceptions of

behavioural control, and that these intentions, together with actual behavioural control are the immediate determinants of behaviour.

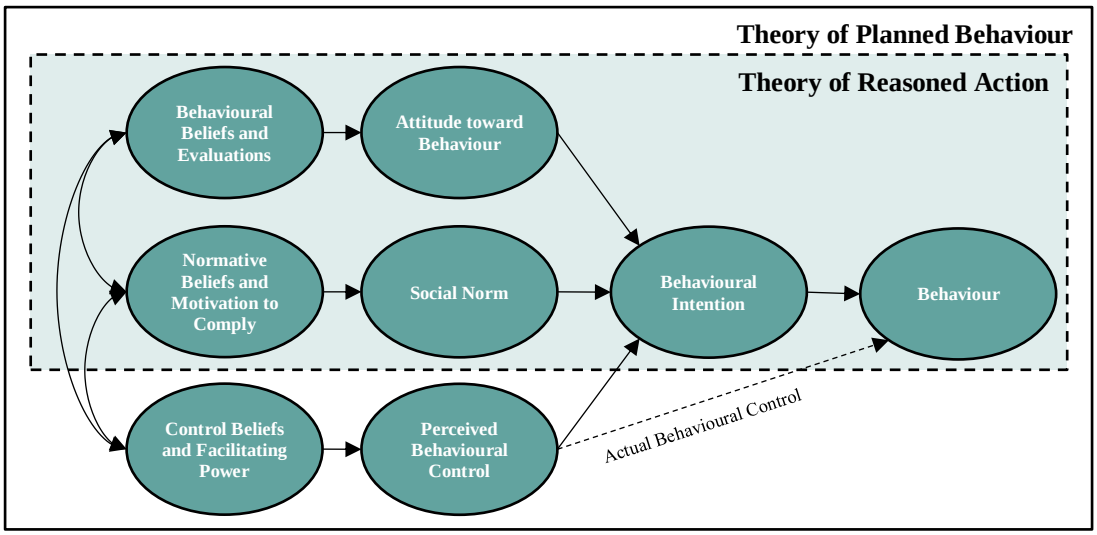

Figure 2.4. *Conceptual model of the Theory of Reasoned Action (Ajzen & Fishbein, 1975) and the Theory of Planned Behaviour (Ajzen, 1991). Adapted from Armitage and Conner (2001).*

Ajzen's TPB has been used in studies aimed at explaining transport mode choices; however, such applications have demonstrated varying degrees of predictive ability in explaining these behaviours. For instance, a study carried out in Germany examined the effectiveness of an intervention on travel mode choice shortly after participants changed their place of residence (Bamberg, Rölle, & Weber, 2003). The authors found that the components in the TPB fairly accurately predicted behavioural intentions, with 67% of the variance in intention explained by attitude, social norm and PBC. Behavioural intention and PBC were also shown to have strong links to public transport use (66% explained variance). Similarly, Heath and Gifford (2002) found that public transport use among students at a Canadian University could be predicted by the TPB. The three TPB variables explained just over 50% of the variance in intention to use the bus after the university implemented a universal bus pass programme, with attitude toward bus use ($p < 0.01$), social norm ($p < 0.05$) and PBC ($p < 0.001$) all statistically significant predictors of intention. Moreover, in predicting actual bus use, intention to take the bus and PBC explained 66% of the variance. However, both Bamberg et al. (2003) and Heath and Gifford (2002) had relatively high variance values compared to those reported in meta-analytic reviews. Armitage and Conner (2001), for instance, found that on average, 39% of the

variance in behavioural intention and 27% of the variance in actual behaviour has been explained by the constructs in the TPB.

While the TPB is one of the most frequently used model for explaining pro-environmental behaviour, the model retains many of the flaws of rational choice. The TPB does not incorporate social, environmental, moral, emotional and habitual factors, which have been shown to significantly influence transport mode choice (Bamberg et al., 2003).

2.3.2 The Norm-Activation Model and the Value-Belief-Norm Theory

By contrast, according to the idea of collective rationality, one should act in the interest of the collective since everyone will be better off if all cooperate (Nordlund & Garvill, 2003). This is often defined as a social dilemma, because pro-environmental behaviour may require the individual to restrain egoistic tendencies for the benefit of others. For instance, depending on the transport mode chosen by an individual, the commute trip will produce different levels of individual outcomes (e.g. travel time, flexibility, cost, and comfort) and collective outcomes (e.g. air pollution, congestion, noise, and energy consumption). According to the Norm-Activation Model (NAM) and the Value-Belief-Norm (VBN) theory, these moral and other altruistic considerations are the key to understanding pro-environmental behaviours (Schwartz, 1977; Stern, Dietz, Abel, Guagnano, & Kalof, 1999).

The NAM was established by Schwartz in 1977 in an attempt to explain altruistic behaviours. The model poses three types of antecedents to predict pro-social behaviour: (1) Awareness of Consequences (AC) of not acting pro-socially, (2) Ascription of Responsibility (AR) for the negative consequences of not acting pro-socially, and (3) personal norm (PN). The central assumption of this theory is that personal norm is a direct determinant of behaviour (Bamberg, Hunecke, & Blöbaum, 2007). Personal norm is defined by McDonald (2014) as the "feeling of moral obligation according to a person's values" (p. 180). As shown in Figure 2.5, norm activation begins when someone acknowledges that not acting pro-socially will lead to negative consequences for others or the environment (AC) and when someone feels responsible for these negative consequences (AR). If personal norm is not

activated, no actions will be recognised as appropriate and no pro-social action will follow (Bamberg et al., 2007; De Groot et al., 2008).

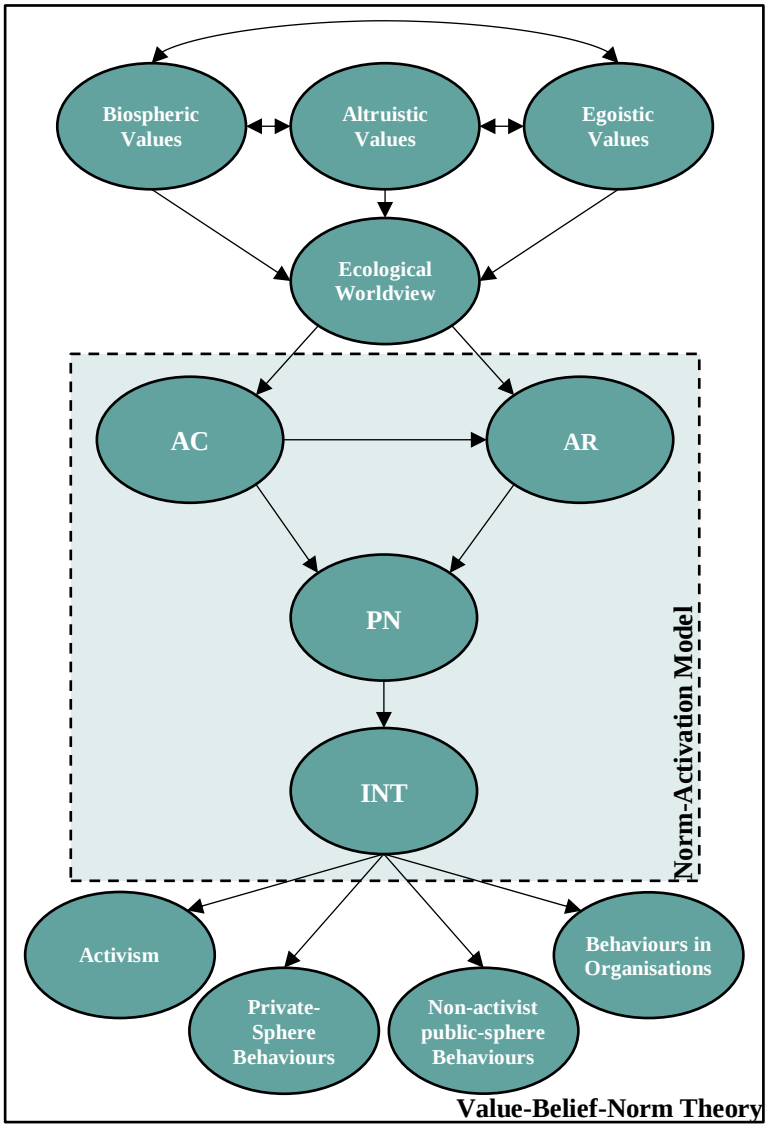

Figure 2.5. *Conceptual model of the Norm-Activation Model (Schwartz, 1977) and the Value-Belief-Norm Theory (Stern et al., 1999). Note. AC = awareness of consequences, AR = ascription of responsibility, PN = personal norm, INT = behavioural Intention.*

However, the NAM assumes that Adverse Consequences and Ascription of Responsibility are the only factors influencing personal norm. It also fails to explain factors other than personal norm which influence behaviour. Stern recognised this limitation and later developed the model into the VBN theory to take into account

environmental values, attitude, and behaviour[1] (Stern et al., 1999). As shown in Figure 2.5, the VBN theory links a person's ecological worldview, assessed by the New Environmental Paradigm (NEP) (Dunlap, Van Liere, Mertig, & Jones, 2000), and environmental values with the NAM. Stern et al. (1999) proposed that three different environmental values may affect environmental worldview and behaviour, namely an egoistic (i.e. values focusing on maximising individual outcomes), an altruistic (values reflecting concern for the welfare of others) and a biospheric value orientation (values emphasising the environment and the biosphere). Several studies have shown that the VBN theory, or key variables from the VBN theory, predict a wide range of environmental behaviours; however, only a few have examined the relative importance of the variables for sustainable transport mode choices (De Groot et al., 2008; Jakovcevic & Steg, 2013; Lind, Nordfjærn, Jørgensen, & Rundmo, 2015).

De Groot et al. (2008) examined the willingness to reduce private vehicle use following the implementation of a transport pricing policy in five European countries: Austria, Czech Republic, Italy, the Netherlands and Sweden. The authors found that of the three environmental values, biospheric values correlated most strongly with AC ($r = 0.25$)[2], AR ($r = 0.27$) and personal norm ($r = 0.42$), while, as expected, egoistic values were negatively related to AC ($r = -0.20$), AR ($r = -0.12$) and personal norm ($r = -0.21$). For example, individuals who possessed a strong biospheric value orientation were more aware of problems related to car use and felt responsible for the negative consequences of such behaviour, and therefore, held a strong intention to reduce their car use compared to those individuals with strong egoistic value orientations. AC, AR and PN also correlated strongly with each other as well as the intention to reduce car use.

Jakovcevic and Steg (2013) tested the extent to which the VBN theory could predict the intention to reduce private vehicle use in Argentina. In accordance with previous

[1] Stern's VBN distinguishes four types of environmentally friendly behaviour (as shown in Figure 2.5), namely, (1) environmental activism, (2) non-activist behaviours in the public sphere (3) private-sphere environmentalism, and (4) behaviours in organisations.
[2] Correlation coefficient from De Groot et al. (2008) are reported.

findings of De Groot et al. (2008), the authors found that (with the exception of the relationship between the three environmental values and AC) each variable in the VBN theory contributed to explaining the intention to reduce car use when the pricing policy was implemented. Personal norm explained 14% of the variance in intention to reduce car use when the pricing policy was implemented; however, an additional two percent of the variance in intention to reduce car use was explained when AR, AC, and environmental values (egoistic, altruistic and biospheric) were added to the model.

Both these studies appear to be consistent with Lind et al. (2015) and Steg, Dreijerink, and Abrahamse (2005) who showed that biospheric values were important for environmental beliefs, which were strongly associated with AR and AC. However, in contrast to the aforementioned studies, Lind et al. (2015) found that AR was negatively associated with public transport use (i.e. car users felt more responsible for averting the negative consequences of car use on the environment). One assumption was that those who most often used public transport did not feel responsible for the negative consequences of car use as they had already taken responsibility through their choice in using a sustainable transport mode. Secondly, it could be assumed that regular car users may feel responsible for the negative environmental consequences, but may not necessarily act on these beliefs.

While the adaption of the NAM to include values and beliefs increased the accuracy of the model, both the NAM and VBN do not consider the contextual factors (i.e. time, resources, money and rewards), which are included in the TPB and have been shown to significantly affect pro-environmental attitude and behaviour. Conversely, the NAM only focuses on internal norm (personal norm) whereas the TPB focuses on external ones (social norm), despite studies consistently showing a weak relationship between personal norm and pro-environmental behaviour (Jackson, 2005; Stern et al., 1999).

2.3.3 Integrating the Theory of Planned Behaviour and the Norm-Activation-Model

The choice to walk and cycle to the station is a complex decision process that cannot be explained by using one psychological theory. The theories discussed above are based on the assumption that behaviour takes place for either pro-social reasons (i.e.

NAM, VBN) or self-interest reasons (TPB), while in reality, motivations for such behaviour may be for both pro-social or self-interest reasons. While TPB and NAM have been successfully applied to the pro-environmental domain, integrating the two theories into a theoretical framework is expected to improve the overall quantity of explained behaviour. Several studies provide empirical support for the inclusion of variables from both psychological models. For example, Liu, Sheng, Mundorf, Redding, and Ye (2017) examined the psychological factors affecting individuals' intention to reduce car use in China using constructs from both the TPB and the NAM, including attitude, social norm, PBC, awareness of consequences, ascription of responsibility, and personal norm. The authors found that intention to reduce car use was strongly predicted by attitude ($\beta = 0.30$), PBC ($\beta = 0.23$), personal norm ($\beta = 0.12$), and social norm ($\beta = 0.04$). Similarly, Park and Ha (2014) proposed that recycling intentions were determined by attitude ($\beta = 0.14$), personal norm ($\beta = 0.19$), PBC ($\beta = 0.79$), social norm, and awareness of consequences; however, social norm and awareness of consequences were found to only indirectly influence intentions through attitude, personal norm, and PBC. Harland, Staats, and Wilke (1999) also provide substantial empirical support for the extension of the TPB to include personal norm. In their study, personal norm led to a significant increment in the variance explained in intention to use sustainable transport modes (R^2 change = 0.7).

A frequently referenced issue with the TPB, which the aforementioned studies did not account for, is that it does not include variables that examine environmental concern or beliefs (Ajzen, 2011; De Groot & Steg, 2007). If environmental concern is included it can give insight into the relationship between environmental concern and pro-environmental behaviours. Bamberg (2003) and De Groot and Steg (2007) both provide empirical support for the extension of the TPB to include environmental concern; however, their results suggested that environmental concern did not directly influence pro-environmental behaviour intent, instead environmental concern influenced behaviour indirectly through attitude.

In the present research, the theoretical framework adopted is essentially an extension of the TPB, which considers walking and cycling intentions to be determined by attitude, social norm, and PBC, consistent with the TPB, as well as personal norm,

problem awareness, and environmental concern. As depicted in Figure 2.6, the variables from the TPB (attitude, social norm, PBC) are directly and positively related to walking and cycling intention. Intention to walk and cycle to the station is likely to increase when the person has a positive attitude toward walking and cycling, perceives greater normative support for walking and cycling, and perceives walking and cycling as easy. Social norm is also predicted to directly influence attitude and PBC.

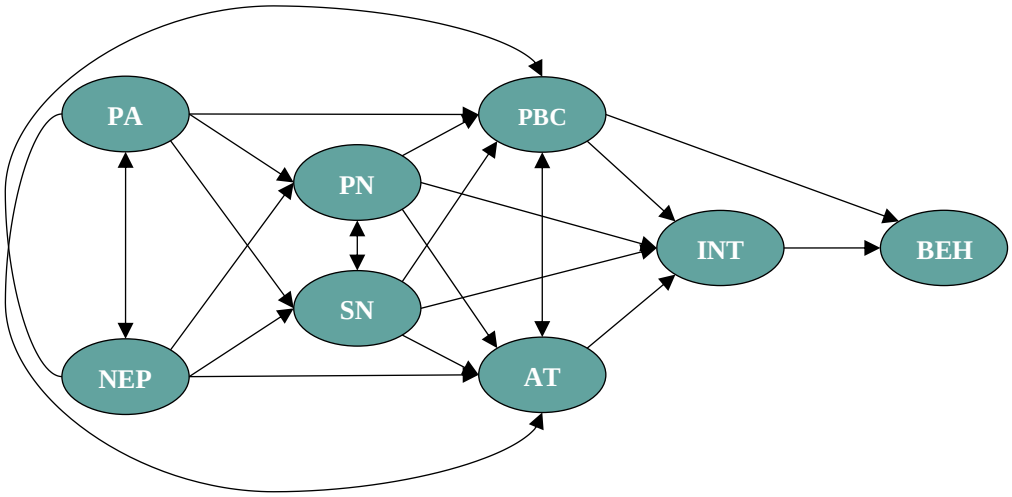

Figure 2.6. *Adjusted behaviour theory proposed for walking and cycling behaviour, model adapted from Ajzen (1991), Stern et al. (1999), and Schwartz (1977). Note. PA = problem awareness, NEP = environmental concern, PN = personal norm, SN = social norm, PBC = perceived behavioural control, AT = attitude, INT = behavioural intention, BEH = behaviour.*

Secondly, problem awareness precedes social norm. It is thought that when people are more knowledgeable about the environmental problems caused by car use, they will have a better sense of the effects on others and the environment. Also, they will tend to be more sensitive to what others think and say about environmental matters than those with little or no awareness. Thus, high levels of problem awareness will tend to increase social norm. A wealth of studies also show a relationship between problem awareness and social norm (Bamberg & Möser, 2007; Ha & Janda, 2012; Heath & Gifford, 2002; Mastrangelo, Gavin, Laterra, Linklater, & Milfont, 2014; Morley, 2011; Peters, Gutscher, & Scholz, 2011). Figure 2.6 also postulates that personal norm is an important predictor of walking and cycling behaviour and that personal norm is activated when people are aware of environmental problems (i.e.

problem awareness). Research provides empirical support for the problem awareness – personal norm link (Jansson & Dorrepaal, 2015; Nordlund & Garvill, 2003).

Thirdly, a person's overall evaluation of walking and cycling consists of a set of their beliefs about the behaviour from various aspects (e.g., social and personal contexts). As problem awareness reflects a person's beliefs about the attitude toward walking and cycling, problem awareness is predictive of their attitude toward walking and cycling. Therefore, a person who is highly aware of the environmental problems caused by car use will tend to have a more favourable attitude toward walking and cycling to the station.

Lastly, it is anticipated that environmental concern will contribute to the formation of attitude toward walking and cycling. That is, a person who is concerned about environmental issues will tend to have a more favourable attitude toward walking and cycling, which is consistent with previous studies examining conservation behaviour (Frick, Kaiser, & Wilson, 2004), purchasing green products (Maichum, Parichatnon, & Peng, 2016), the use of a 'green' electricity brochure (Bamberg, 2003), as well as the intention to use a Park-and-Ride facility (De Groot & Steg, 2007).

2.4 Managing Park-and-Ride Demand: Opportunities and Challenges

The capacity of a Park-and-Ride facility is limited by the number of parking spaces that can be provided. Often the supply of parking is inadequate to meet commuter demand. This is accentuated by the lack of parking charges at facilities in the Greater Wellington Region. One of the options is for planners and policy-makers to expand the capacity of the parking facility. However, land adjacent to stations is often expensive and local authorities cannot always afford to bear the costs of making it available for parking. Ongoing expansion is also not sustainable, with new parking spaces often filled almost immediately upon construction. Therefore, recognition of other types of policies to manage demand is needed to allow for growth in the system.

In choosing between policies to manage demand, policy-makers need to consider the attitude of the public toward such policies, and the extent to which any policies are likely to be acceptable. This is imperative, not only because levels of acceptability[3] may critically affect the effectiveness of the policy, but also because accountable governments need to be aware of public attitude if they want to act in the public's interest while at the same time maximising their own chances of being re-elected. A number of studies suggest that attitude vary with the nature of the policy, with the provision of information being more acceptable to the public than regulation to limit certain transport behaviours (Gärling et al., 2002; Jones, 1991; Loukopoulos et al., 2005; Steg, Dreijerink, & Abrahamse, 2006).

Parking price and supply restrictions are readily accepted by policy-makers as an effective measure for changing transport behaviour (Marsden, 2006). In the case of Park-and-Ride, most facilities are initially provided free of charge to encourage motorists into the system, when they would otherwise drive to their destination. However, the international experience is that, as with any unpriced economic good, free parking at Park-and-Ride facilities often results in over-consumption and the inefficient use of parking (Shoup, 2005). This is particularly evident in New Zealand, where most facilities are at capacity early each morning and consequently, some commuters cannot find parking, which leads to an overflow into surrounding areas. If parking is offered for a price, those people who currently drive then have the option of paying to park or they can choose to use a different mode of transport such as walking to access the station to avoid paying the parking fee. However, it has been widely recognised that charges can have negative side effects, as a small percentage of the intercepted drivers could revert to driving to their destination, or it may create pressure in suburbs adjacent to the station as car users search for an alternative parking space. These negative effects are of imminent concern to the public and local authorities, leading to a lack of immediate acceptance of parking charges, which strongly influences the policy's perceived likelihood of success.

[3] Acceptability is defined by Eriksson, Garvill, and Nordlund (2006) as "the degree of positive or negative evaluation of a TDM-measure that may be implemented in the future" (p. 16).

International case studies have shown limited public support for implementing policies that increase the cost of parking at public transport nodes. For example, in 2009, Calgary imposed a daily parking charge of $3.00 at all Park-and-Ride facilities in the city, all of which are located at least five kilometres from the CBD centre. Prior to implementing the charge, many of the Park-and-Rides were at capacity, with most filling up early morning. This had resulted in many frustrated people who spent considerable time searching for a space and either parked illegally in the Park-and-Ride or in adjacent suburbs. A study appointed by Calgary Transit found that just under half (41%) the respondents were in support of the charge with the remainder opposing (Calgary Transit, 2011). The implementation of the charge saw an increase in users accessing the station by connecting bus services (22% increase); however, one percent switched to driving all the way to their destination.

Stieffenhofer, Barton, and Gayah (2016) reported willingness to pay for parking at Park-and-Ride facilities in Seattle, Washington. Intercept surveys were conducted at 17 Park-and-Ride sites during morning peak hours. Of the 3,300 participants who completed the survey, only 28% were willing to pay for a parking space at the Park-and-Ride site; however, the proportion of respondents willing to pay increased to 46% when they were guaranteed a parking space. When respondents were asked how much they would be willing to pay to park, respondents indicated that they would be willing to pay an average of US$1.50 for a parking space, with respondents prepared to pay extra for a guaranteed a parking space (US$1.83).

In 2002, the San Francisco Bay Area Rapid Transit introduced a daily parking charge of $5.00 at their Park-and-Ride facilities (Syed, Golub, & Deakin, 2009). Surveys conducted before and after the charge was implemented found that the charge did not cause significant changes to bus patronage levels or access mode choices; however, more drivers were also willing to park informally to avoid the parking charge. Commuters were also more receptive to the policy if the revenue generated from the charges was directed at improving and maintaining the facilities for driving as well as other access modes.

A parking charge imposed at Park-and-Rides in the Netherlands appeared to significantly influence commuters transport mode (Mingardo, 2013). For instance, if a daily parking charge of €1–2 was introduced, half of the respondents stated that

they would still make use of the Park-and-Ride; 14% would drive their cars to the final destination; 16% would use public transport for the whole commute and six percent would cycle to their final destination. However, if a higher daily rate of €3-4 was introduced, more users stated that they would cycle to their final destination (25%); and fewer users would continue to use the Park-and-Ride (22%). Clearly, the monetary value of the parking policy must surpass a minimum threshold before people will actually change their transport behaviour.

While these examples provide insight into the public's response to pricing policies and their impact on access mode choice decisions, none of the aforementioned studies has sought to understand the factors that influenced the acceptability judgments. As a result, the following will explore literature on transport pricing policies more generally. It is mostly found that fairness, infringement on freedom, perceived effectiveness, environmental concern, and personal norm are determinants of transport policy acceptability. For example, Eriksson et al. (2006) demonstrated that acceptability of TDM measures (improved public transport, an information campaign, and an increased tax on fuel) were explained by general environmental beliefs (i.e. pro-environmental orientation, problem awareness, and personal norm) and beliefs related to specific TDM measure (i.e. perceived freedom and fairness, willingness to reduce car use, and effectiveness). Moreover, fairness, infringement on freedom, perceived effectiveness, and trust in government, have been shown to explain acceptability in sustainable transport policies in Japan (Kim, Schmöcker, Bergstad, Fujii, & Gärling, 2014).

Schade and Schlag (2003) investigated the acceptability of transport pricing strategies in four European cities. The authors used a range of factors that have been found to affect acceptability in transport pricing literature, these included problem perception, important aims to reach, social norm, knowledge about options, perceived policy effectiveness, equity, and attribution of responsibility. Based on a heuristic acceptability model, social norm and perceived effectiveness were found to be significantly and positively related to policy acceptability. This implies that respondents who had more social pressure to accept a pricing policy, and those who evaluated the policy as more effective in achieving its aim were more likely to evaluate the policy as acceptable.

Schuitema, Steg, and Rothengatter (2010) investigated the acceptability of transport pricing policies in The Netherlands. Respondents evaluated two pricing measures, which included a toll charge and a car-mass-dependent kilometre charge. The authors found that reducing collective problems related to car use was considered important for increasing perceived fairness and acceptability of both policy measures. De Groot and Schuitema (2012) examined respondents' acceptability of hypothetical push and pull policies using a within subject design. The authors found that push measures (i.e. fuel tax and fines for littering) were evaluated as less acceptable than the pull measures (i.e. public transport subsidies and improvements to rubbish bins). Social norm was also a strong predictor of acceptability of policies. More specifically, a strong social norm (i.e. the belief that majority of the public supported an environmental policy) was associated with higher policy acceptability evaluations.

A number of studies have specifically used the 15-item New Ecological Paradigm (NEP) scale to explain acceptability of policies. In a sample of 112 individuals from Groningen, the Netherlands, Steg, De Groot, Dreijerink, Abrahamse, and Siero (2011) demonstrated that egoistic values ($r = -0.27, p < 0.01$)[4], altruistic values ($r = 0.26, p < 0.01$), biospheric values ($r = 0.35, p < 0.001$), the NEP ($r = 0.42, p < 0.001$), and personal norm ($r = 0.54, p < 0.001$) were significantly correlated with acceptability of energy policies. It was found that those who more strongly endorsed egoistic values (i.e. anti-environmental) evaluated energy policies as less acceptable, while respondents more strongly endorsing biospheric values (pro-environmental) evaluated these policies as more acceptable. Poortinga, Steg, and Vlek (2004) assessed the relationship between values and the acceptability of home and transport energy-saving measures. The authors showed that values and environmental concern explained 17% of the variance in the acceptability of specific energy-saving measures.

It is also widely recognised that acceptability of a pricing policy diminishes as the charge increases (Cain, Celikel, & Jones, 2002). Jaensirisak, Wardman, and May

[4] Correlation coefficient from Steg et al. (2011) are reported.

(2005) assessed the acceptability of road pricing schemes in Leeds and London among car-users and non-car-users. The authors found significant differences in acceptance in terms of level of charge between car-users and non-car-users. A £1.00 charge was evaluated as acceptable by just under 56% of non-car users, while only 27% of car users were accepting of the charge. However, as expected, acceptance diminished significantly as the charge increased, with a £7.00 charge evaluated as the least acceptable (30% of non-car users and 9% of car-users).

2.5 Research Gap

Internationally, there is a growing body of literature on Park-and-Ride. The literature review presented above highlights challenges to decision makers of implementing Park-and-Ride. While Park-and-Ride can promote public transport use, there are also a number of issues with trying to accommodate cars at stations. However, there is clearly a research gap when it comes to literature that focuses on Park-and-Ride in the New Zealand context. Therefore, this research seeks to fill a large gap in the literature by investigating what Park-and-Ride issues are of concern to stakeholders and what impact these issues have on the development of Park-and-Ride in the future. The literature review also highlighted a lack of research examining the psychological factors affecting intention to use Park-and-Ride, with only one study, to the author's knowledge, looking at intentions to use Park-and-Ride. When looking at the methods used in other studies examining transport behaviour more generally, most only incorporate pro-social constructs or self-interest constructs. This study will, therefore, use an extension of the TPB to investigate whether the variables within the theory can effectively explain commuters' intention to walk and cycle to the station. Furthermore, there is a lack of research analysing the acceptance of parking fees at Park-and-Ride sites. This thesis will, therefore, extract findings from pricing policy studies in general and examine whether the same aspects are applicable to parking fees at Park-and-Ride facilities.

2.6 Research Questions

As stated in Chapter One, the aim of this Master's thesis is to understand the behaviour of commuters in order to inform the development of policies to increase the incidence of walking and cycling in the Greater Wellington Region. This thesis will also explore the future challenges of providing parking at stations in terms of the effects on the transport system, and opportunities for implementing pricing strategies for Park-and-Ride. With the literature discussed in this chapter in mind, this aim has been broken down into a number of research questions to be answered. These are:

1. What do key stakeholders perceive as the challenges of Park-and-Ride in the Wellington Region?
2. What are the likely future developments of the Park-and-Ride concept?
3. Can a behavioural model, adapted from the literature, explain Wellington commuters' intention to walk and cycle to the train station?
4. Why do Wellington commuters drive to the train station and what are the barriers to accessing the station by walking and cycling?
5. What are Wellington commuters' responses to a range of potential Park-and-Ride policies?

The purpose of research question 1 is to learn from stakeholders in the policy-making and planning field what challenges they perceive for Park-and-Ride in the Wellington Region. Research question 2 aims to gain insight into the future opportunities for developing the Park-and-Ride concept in the Wellington Region. Research question 3 aims to better understand the relationship of psychological constructs influencing walking and cycling intention and behaviour, and whether the theoretical framework is applicable to the study sample. Research question 4 explores the contextual factors that influence commuters' decision to walk, cycle and drive to the station. Lastly, research question 5 aims to explore the acceptability of potential Park-and-Ride pricing policies and whether level of parking fee, revenue use, perceived fairness, and perceived effectiveness influence acceptability judgements.

Chapter Three

Research Design and Methodology

This chapter describes the methods employed to address the aims of this study. A pragmatic approach to this research was taken, with both quantitative and qualitative methods employed to collect data. To collect data, semi-structured interviews were conducted with stakeholders, all of whom had significant experience of Park-and-Ride planning, operations and/or policy. Thematic analysis was used to identify, analyse, and report patterns and themes within the interview transcripts. An online survey was also used to capture commuter transport behaviours and commuters' response to various possible parking policies, and SPSS was used to analyse the responses. This chapter will explore in more depth the methods and the justifications for these choices.

3.1 Research Approach: Pragmatism

Epistemologically and philosophically, this research is framed from a pragmatic philosophical worldview. Pragmatists believe that the real world is a complex system that is not committed to any one system of philosophy and reality; instead it appreciates that research occurs within a social, historical and political context (Creswell, 2013). As such, pragmatic research is primarily focussed on the outcomes or consequences of the research. This problem-centeredness implies that the choice of research methods is based on the goal of best understanding the problem, rather than starting with a particular method in mind (Fetters, Curry, & Creswell, 2013). Pragmatic research, therefore, allows researchers freedom of choice in terms of methods, techniques, and procedures of research. As such, pragmatic approaches typically promote active mixing of methods and integration of research findings, as this offers the best opportunity for answering the research questions, rather than being constrained by methodological assumptions associated with the use of one particular method (Greene, 2006; Johnson & Onwuegbuzie, 2004).

The pragmatic worldview lends itself to this study since it fits closely with the researcher's views on understanding and explanation of reality, knowledge, society and the role of a researcher. The adoption of a pragmatic worldview also enabled the collection of both qualitative and quantitative data using the most appropriate methods for the context.

3.2 Positionality

When conducting research in the social sciences it is important to be clear about one's positionality (Cheng & Randall-Parker, 2017). The concept of positionality is based on the notion that the researcher's characteristics, in particular their biography and locatedness within social structures of class, gender, race and age, can influence the data that is produced (Cresswell, 2013; Teye, 2012). In my case, I am a 24 year old New Zealand European female postgraduate student from a middle-class background. My experiences and education has ultimately led to my interest in the environment and the desire to conduct research on a transport-related issue. While it is recognised that research cannot be fully value-free, there has been an attempt to minimise bias in the representation of stakeholder views. Interview questions were worded in an unbiased way and open-ended questions were asked to encourage participants views to come through in the data (Bourke, 2014).

There were also times that I was seen as both an 'outsider' and an 'insider'. (Mullings, 1999). With no direct links with public transport and policy industry, I recognised my position as an outsider. This outsider status played a definitive role in determining how interviewees chose to respond to my questions, and the information that they chose to disclose (Teye, 2012). Although all participants demonstrated their willingness to support my research, many of them made it clear that the views provided were from their own personal perspectives, not those of their organisation. On the other hand, there were also a number of characteristics which created similarities between the researcher and interview participant, which led to a semi-insider status (Dowling, 2005). In particular, background knowledge and understanding of the context of the research allowed me to partially and temporarily inhabit the space of an insider. The knowledge helped to build credibility and trust

within the industry, with many participants passing on names of potential interviewees (Mullings, 1999).

3.3 Research Design

Understanding the interface between people and transport decisions is, as with many environmental problems, highly complex. To recognise such complexity, a mixed methods approach was chosen. Mixed methodology can embrace both qualitative and quantitative methods for the purposes of obtaining a fuller picture and deeper understanding of a phenomenon (Johnson, Onwuegbuzie, & Turner, 2007). Mixed methodology is also increasingly recognised as a valuable approach because weaknesses in each method can be compensated by the counter-balancing strengths of the other (Fetters et al., 2013). This research collects primary data using two methods: semi-structured interviews and an online survey. For the purpose of this study, qualitative and quantitative data were seen as complementary. The qualitative data was used to gain a deeper understanding of the future role of Park-and-Ride in Greater Wellington and the practical and organisational barriers to implementing a range of demand management strategies from the viewpoint of a range of stakeholders. The quantitative data was used to explore commuter transport behaviour and commuters' responses to various Park-and-Ride policies. This quantitative method was chosen as it allows variables to be gathered and compared to each other. In this research, the main variables were the policy characteristics of level of parking fee and revenue use allocation. These were tested alongside respondents' environmental beliefs.

The process and techniques employed throughout this study constitute a research design closely aligned with the convergent model described by Creswell and Clark (2007). This research design involves the collection of qualitative and quantitative data at roughly the same time. Each data set is then independently analysed and the findings are integrated in the interpretation of the overall results (Fetters et al., 2013; Fielding, 2012). A convergent research design was most appropriate for this study as it offers an efficient way of collecting complementary datasets over a limited period, while still allowing for any contradictions, divergences and convergences to be reconciled at the point of interpretation (Moran-Ellis et al., 2006).

3.4 Interviews with Stakeholders

3.4.1 Rationale

Pragmatism lends itself to qualitative research through semi-structured interviews, as this type of research allows the researcher to gain in-depth understanding of the stakeholder participants' perspectives and meanings. The purpose of conducting the interviews was to canvass a range of participants involved in Park-and-Ride to gain perspectives on current best practice, future opportunities, and barriers to implementing various demand management strategies. For this reason, participants were selected based on their experience and in-depth knowledge of planning and managing Park-and-Ride, whilst the range of individuals represented a diversity of perspectives on the issues. Interviews with government sector officials were of particular importance as they provided necessary local government context, imperative because of the lack of New Zealand academic research on Park-and-Ride.

3.4.2 Interview Structure and Guide

Any potential ethical issues arising with the interviews were discussed and resolved through the ethics application process. Victoria University of Wellington Human Ethics Committee granted ethics approval for this research on 16th November 2017 (Appendix B). Interviews were conducted after each participant received an information sheet (Appendix C) outlining the intentions of this research and signed a consent form (Appendix D) that gave permission to use information gained through the interviews for this thesis. An external body information sheet (Appendix E) and consent form (Appendix F) were also used to gain permission from the organisation to have the participants' comments attributed to their place of work.

Interviewees were reminded that they were not required to answer all or any questions they did not wish to. With participants' consent, the interviews were audio recorded. Interviews were carried out during November and December 2017, each lasting approximately 30 minutes. All interviews were conducted face-to-face. Interviews were semi-structured and an interview guide (Appendix G) was used to focus the interviews but the conversation was allowed to diverge if interesting, relevant threads emerged (Bryman, 2008). This reflexivity supports the pragmatic

philosophical worldview that this study builds on and encourages the conscious and consistent effort to view the subject matter from different angles. Questions were open-ended and designed to provide insight into participants' opinions of Park-and-Ride.

After the interviews were transcribed, transcripts were provided to all participants, and they were invited to amend, comment on, or withdraw information from the transcripts.

3.4.3 Recruitment Methods

A snowball sampling technique was utilised in this study to recruit participants based on their relevance to the research. The rationale for employing this recruitment technique was that it was the only practical mode of tracing suitable participants to gain different and important perspectives on the topics in question. For this reason, participants were asked for recommendations of colleagues who might qualify for participation. Table 3.1 summarises the information about the interview participants. It should be noted, however, that two officers were present in the interviews with HCC and PCC. Given that stated opinions did not differ between the two interviewees in each case, the participants will be treated as one in the Results chapter. After interviewing 10 stakeholders across four different organisations, it was decided that saturation had been met, and further interviews would not substantially add to the data already collected (Guest, Bunce, & Johnson, 2006).

Table 3.1. *Interviewees' information*

Organisation	Number of Participants
Greater Wellington Regional Council (GWRC)	4 officers, 1 councillor
Hutt City Council (HCC)	2 officers
Porirua City Council (PCC)	2 officers
New Zealand Transport Agency (NZTA)	1 officer
Total	**10**

3.4.4 Interview Data Analysis

Thematic analysis was used to analyse the data from the semi-structured interviews and the written responses obtained from the open-ended questions in the online

survey. Thematic analysis is a method for identifying, analysing and reporting themes within data (Bryman, 2008). It is often used in research as it allows for large amounts of raw data to be reduced and grouped into common themes of manageable size. This type of analysis was most appropriate for this research as the interview data was used to complement findings in the quantitative component of this study, and was linked directly to concepts that emerged from the literature review. In addition, thematic analysis encourages researchers to make cross-comparisons between different parts of the interviews as well as between different interview participants. This was particularly important for this research, as interviewees were drawn from a variety of planning, operations and policy backgrounds. Using the methods discussed in Braun and Clarke (2006), a set of key themes was established after repeated reading of the transcripts. These themes were based on the frequency and emphasis placed on themes by participants, and on the researchers' own knowledge of the subject area gained from experience through the research period.

3.5 Online Commuter Survey

3.5.1 Rationale

Pragmatism also lends itself to quantitative research through surveys. An online survey was used rather than a paper survey for a number of reasons, such as the ability to implement question branching, so that only the relevant questions are presented to a respondent based on the response to earlier questions (Evans & Mathur, 2005; Kaplowitz, Hadlock, & Levine, 2004; Sue & Ritter, 2012). The most notable benefit of online surveys, however, is the ability to cover a large geographic area, which was crucial to the current research, which covered the entire Greater Wellington Region.

Despite the notable strengths, as with all research methods, there are a number of limitations. An obvious drawback is limiting the sample to commuters who are computer literate and have access to the internet (Sue & Ritter, 2012). However, the large majority of the target respondents in this research have internet access. The 2013 Census data shows that 80.8% of households in Greater Wellington have access to the internet, which is higher than the general New Zealand population

(Statistics New Zealand, 2013). A further limitation of online surveys is that they typically generate lower response rates than conventional paper/postal questionnaires (Bryman, 2008; Evans & Mathur, 2005). However, to counteract these limitations the survey design and recruitment methods were carefully created and tested. The justifications for these choices are discussed in more detail in Sections 3.5.2 and 3.5.5.

3.5.2 Survey Design

The survey was designed in such a way as to account for respondents viewing the survey in different formats (e.g. on computer or mobile device) and to prevent survey fatigue. The survey included both closed-ended and open-ended questions, with a range of response formats. Closed-ended questions comprised 'tick the box' methods and ranking attitudinal responses on a seven-point Likert-scale. Open-ended questions were used for the collection of supporting qualitative data, where the respondent typed directly into a boxed area.

A total of 73 questions were created, but respondents were only asked those questions that were relevant to them according to their answers as programmed into a Qualtrics questionnaire during the design phase of the survey. Participants were guided through the survey according to individual responses to previous questions, with the aim to gather information from each respondent that made sense to their specific situation. For example: 'What was the main mode of transport that you used to travel to Wellington City in the last 7 days?' If they answered train, then the participant was presented with 'In the last 7 days, which rail line did you use?'.

3.5.3 Survey Questions

The survey questions were formulated after an extensive literature review. The survey was launched using Qualtrics as Victoria University of Wellington has a licence agreement with this service. The survey's display characteristics were set to permit a 'mobile-friendly' display. Participants consented to taking the survey by indicating they had read and understood the Participant Information Sheet (Appendix H) that was provided online. The full survey can be found in Appendix I.

Screening questions were placed at the beginning of the survey in order to determine whether participants had characteristics that would make them eligible to take part in a study. Two separate questions limited eligibility to those (1) living in the Greater Wellington and (2) those who travelled to Wellington City in the last seven days. Those who indicated they did not live in Greater Wellington and/or did not travel to Wellington City in the last seven days were redirected to an end of survey message. The screening questions were followed by a series of questions pertaining to the travel choices to Wellington City in the last seven days. This included questions about their main destination in Wellington City and their main mode of transport. Participants whose main mode was train were then directed to answer questions about their train journey and those whose main mode was car (i.e. driver or passenger) were directed to answer questions about their car journey. Both train and car users were asked about their frequency of travel to Wellington. In addition, train users were asked about their origin station, station access mode, average time the train was boarded, and transport mode used at the egress end of their journey.

The next section focussed in on commuters' familiarity with Park-and-Ride and their opinion of and/or experiences with using Park-and-Ride. As it was thought that commuters who drove to Wellington City may not have heard of Park-and-Ride before completing the questionnaire, a description of Park-and-Ride was given before any questions were asked about Park-and-Ride. Car users were then directed to answer questions about their familiarity with Park-and-Ride, whether they have used facilities before, and what would encourage them to drive to the station instead of driving to Wellington City.

All participants were asked to evaluate a hypothetical Park-and-Ride policy. The policy measures aim to reduce the number of commuters accessing the station by private vehicle in order to decrease the environmental impact. However, with respect to political feasibility and policy implementation, it was deemed equally important to consider the fact that all train users, regardless of whether they drive, walk or cycle to the station, may possess certain attitude without engaging in behaviour consistent with that attitude. Therefore, to ensure the study was even-handed, all participants were given the chance to evaluate the policy. A between-subject design was chosen as it was expected that the participant's response to the second or third policy might

well be biased by their exposure to the first (Charness, Gneezy, & Kuhn, 2012). Each respondent was randomly assigned to one of nine different policy groups that differed in terms of parking fee (3 levels) and revenue allocation (3 levels). These policies and their specific measures are outlined in Table 3.2. It is understood that acceptability levels for a policy will increase when users expect to benefit from the allocation of revenues (Eriksson et al., 2006); therefore, in accordance with Schuitema and Steg (2008), three levels of revenue allocation were presented to respondents that were understood to benefit different transport modes (public transport, active modes and car users).

In relation to each policy, the respondents were asked six questions which were measured using a 5-point Likert scale: how acceptable would you find the policy proposed? ($1 =$ unacceptable; $5 =$ acceptable), to what extent do you perceive this policy to be a fair measure? ($1 =$ completely unfair; $5 =$ completely fair), how effective do you think this policy would be in discouraging commuters living in close proximity to the car parks from driving to the station? (1 = not effective at all; 5 = extremely effective), how effective do you think this policy would be in encouraging commuters to consider other modes of travel to the station? how effective do you think this policy would be in reducing congestion on the arterial roads leading into Wellington city? and how likely would this policy affect your daily transport behaviour? ($1 =$ extremely unlikely; $5 =$ extremely likely).

Table 3.2. *Three by three between-subject policy design.*

	Fee		
Revenue Use	$1.00 (n = 99)	$2.00 (n = 98)	$3.00 (n = 98)
Enhancing connecting bus services and/ or the provision of new feeder bus services (n = 100)	POLICY A n = 34	POLICY B n = 33	POLICY C n = 33
Improving pedestrian routes and cycling facilities/ routes to and around train stations (n = 96)	POLICY D n = 31	POLICY E n = 33	POLICY F n = 32
Funding the construction of more parking spaces at the train station (n = 99)	POLICY G n = 34	POLICY H n = 32	POLICY I n = 33

The final part of the survey was devoted to a series of behavioural questions. These behavioural questions have been adapted from several transport-related surveys in

the recent literature (Abrahamse, Steg, Gifford, & Vlek, 2009; Bamberg et al., 2007; Bamberg et al., 2003; Eriksson et al., 2006; Walton & Sunseri, 2007). Two or more questions were used to assess various aspects of attitude and perceived behavioural control (PBC), social and personal norm, problem awareness, intention to walk/cycle to the station as well as walking and cycling behaviour. Except for the attitude toward walking and cycling, other variables in the model were measured by a 7-point Likert scale ($1 = \text{strongly disagree};\ 7 = \text{strongly agree}$). Attitude toward walking and cycling was assessed by using 7-point semantic differential scale items with the stem 'In your opinion walking/cycling to the train station is… Bad – Good; Unpleasant – Pleasant; Not at all sensible – Sensible; Unrealistic – Realistic; Foolish – Wise; Unsafe – Safe; Inconvenient – Convenient; Inflexible – Flexible. A higher score indicates a more positive attitude toward walking and cycling to the station.

To assess opinions toward the environment, the final part consisted of a series of items from the revised NEP Scale (Dunlap et al., 2000). The NEP Scale is a 7-point Likert-type scale consisting of 15 items or statements reflecting five sets of beliefs: humanity's ability to upset the balance of nature (balance); the reality of limits to growth (limits); human domination of nature (anti-anthropocentrism); the idea that humans, unlike other species, are exempt from the constraints of nature (anti-exceptionalism); and the possibility of an eco-crisis (eco-crisis).

To date, the NEP scale has been the most widely used measure of environmental worldview (Eriksson et al., 2006; Lind et al., 2015; Steg et al., 2011). While many studies use all 15 items to measure environmental attitude, several studies have selected and recombined items to produce shorter versions of the scale in order to reduce redundancy and participant fatigue or boredom (Nisbet & Zelenski, 2013). In a meta-analysis, Hawcroft and Milfont (2010) sought to evaluate the effect of scale length on NEP scores among several studies from 36 countries. It was found that participants tended to score higher on shortened versions of the NEP scale (e.g. 6- or 7-item scales) compared with scales that had a higher number of items. However, the authors stated that the cause of the mean score difference was from the absence of items referring to the possibility of an 'ecological catastrophe' or 'ecological crisis' and the imbalance of pro- and anti- NEP items presented to participants. To counteract the potential inaccuracy in measuring environmental attitude, the current

study employed a balanced set of pro– and anti– NEP items as shown in Table 3.3. The survey ended with general background questions, where participants were asked to indicate their age, gender, employment status, income and education.

Table 3.3. *Series items used to measure environmental concern based on revised New Ecological Paradigm Scale (adapted from Dunlap et al. (2000), Table 1, p. 433).*

Revised NEP scale item	
1.	We are approaching the limit of the number of people the earth can support^{+}
2.	Humans have the right to modify the natural environment to suit their needs*
3.	When humans interfere with nature, it often produces disastrous consequences^{+}
4.	Humans are severely abusing the environment^{+}
5.	The balance of nature is strong enough to cope with the impacts of modern industrial nations*
6.	The so-called 'ecological crisis' facing humankind has been greatly exaggerated*
7.	If things continue on their present course, we will soon experience a major ecological catastrophe^{+}

Note: Agreement with four items marked with a $^{+}$ and disagreement with the three items marked with a * indicate pro-NEP responses. During the data analyses, the scores were recoded using the seven-point scale so that the lower the number (1) the less environmentally aware the participant was and the higher the number (7) the more environmentally aware the participant was.

3.5.4 Pilot Study

Before defining the final survey design, a pilot test was carried out. In the pilot test, 10 people were asked to report on any issues with both the question format and survey layout. The pilot study provided important feedback which resulted in several questions being reworded for clarity.

3.5.5 Recruiting Survey Participants

Given the large geographic area of this study, participants were recruited using a variety of methods – an email distribution through a snowball sampling method, and an intercept recruitment method at train stations with online completion by following a link displayed on a flyer. The first sample group was contacted via email using a snowball sampling technique. An email containing information about the study and a link to the Qualtrics survey was sent to a number of individuals and organisations in Wellington. Respondents were requested to forward the email on to anyone that they believed might be interested in completed the survey. The second sample group was

invited to participate via an intercept recruitment method at various stations in the Greater Wellington. The survey was conducted by requesting responses from a sample of individuals waiting to board the train between 05:00 a.m. and 10:00 a.m. during weekdays from 5th to 19th December 2017, and from 16th to 24th January 2018. Individuals approached were offered the chance to complete the questionnaire online by following a link to the internet browser based survey. Recruitment flyers[5] were also placed on the windscreen of cars parked in the designated Park-and-Ride facilities. 15 train stations were chosen across the Wellington Region (Mana, Melling, Paraparaumu, Paremata, Petone, Porirua, Redwood, Taita, Tawa, Trentham, Upper Hutt, Waikanae, Wallaceville, Waterloo, and Woburn). This was to achieve a broader sample of people than one station is likely to provide.

All participants were recruited through non-probability sampling techniques: convenience and snowball sampling, as these were deemed most practical and cost-effective for a research project of this size. However, it should be noted that there are a number of limitations. The foremost is that variability and bias cannot be measured or controlled (Acharya, Prakash, Saxena, & Nigam, 2013). Secondly, results from the sampled population may differ from the target population (Bryman, 2008). This means that the results may not be truly representative and the data may not be generalised beyond the sample. However, to limit these biases, recruitment emails were sent out to a number of organisations in the area.

3.5.6 Survey Responses

Due to the methods of data collection and the survey type being self-selecting it was difficult to gauge an overall non-response rate. Response rates for the snowball recruitment method could not be quantified given that recruitment emails could not be tracked. A total of 404 entered the online survey either via the link provided on the flyer or through email. Two respondents were identified as living outside the Greater Wellington Region, 36 respondents had not travelled to Wellington City in the last seven days, and 71 people did not complete the survey and were therefore

[5] See Appendix J for recruitment flyer.

deleted for a more complete analysis. The completion rate of the survey was 81%. A total of 295 responses were complete and these were used for the data analysis. IP addresses were checked for double entries but none were detected. To maintain confidentiality, the IP addresses were then deleted.

3.5.7 Analysis of Online Survey Data

A codebook including all the variables was created in the statistical programme SPSS. Likert-scale questions were then recoded, where necessary, to ensure that for all questions, a score of 1 indicated a negative view towards walking and cycling to the station, 4 indicated a neutral view and 7 a positive view. The items that were recoded were PN1, SN2, PBC1, PBC3, and BEH1 for walking behavioural model, and PN1, SN2, PBC3, and BEH2 for cycling behavioural model. The NEP scale items were also recoded to ensure that the lower the number (1) the less environmentally aware the respondent was and the higher the number (7) the more environmentally aware the respondent was. Once this was complete, missing values were addressed. It was decided that replacing missing values with a neutral response ('4') for the Likert scale questions was the most logical option. Skewness and kurtosis values were examined before the constructs were used in analyses[6]. Most values were within the range of ± 2.00 and ± 3.00 respectively, with the exception of PA2 and BEH2 of cycling behaviour.

Bivariate correlation analysis was used to examine the relationships between all the study variables (attitude, social norm, perceived behavioural control, personal norm, problem awareness, environmental concern, walking and cycling intention, and walking and cycling behaviour). Structural equation modelling (SEM) was then used to assess the applicability of the proposed behavioural models to walking and cycling behaviour. For each construct, the internal consistency of the items was evaluated using a Cronbach's alpha (α) correlation test. The validity of the items was then tested using confirmatory factors analysis (CFA). Analysis of Moment Structure (AMOS), a program for structural modelling techniques was used to conduct

[6] The full results can be found in Appendix K.

confirmatory factor analysis. Model fit was assessed by multiple indices including the goodness-of-fit index (GFI), normed fit index (NFI), non-normed fit index (NNFI), Tucker-Lewis Index (TLI), comparative fit index (CFI), and root mean square error of approximation (RMSEA). SPSS AMOS was also used to estimate standard errors and confidence intervals for the indirect effects by bootstrapping estimation technique. A 95% bootstrap confidence interval was estimated using 5000 re-samples for the indirect effects.

Spearman's correlation analysis was used to examine the relationships between policy acceptability, perceived fairness, perceived effectiveness, level of parking fee, revenue use, and transport mode change. Differences between the policy measure scores were assessed using ANOVA. Where a difference was confirmed, post-hoc analysis was performed to explore the nature of these relationships. The test used to do this was Tukey HSD, which compares the means of the variables of interest to identify whether the differences between any two of these means are greater than the expected standard errors. The aim of using this post-hoc test is to identify whether policy acceptability, perceived fairness, and perceived effectiveness differed between the policy measures.

Thematic analysis was used to analyse the open-ended questions in the online survey. A full explanation of the methods used in this analysis can be found in Section 3.4.4.

3.6 Methodology Summary

The nature of the problem that this thesis addresses allows for a pragmatic approach to be undertaken. Under pragmatism, mixed methods was justified and was designed to investigate Park-and-Ride in Greater Wellington. Semi-structured interviews were first used to gather data on stakeholders' perceptions of the challenges associated with the development of parking at stations and the future role of Park-and-Ride in Greater Wellington. Using qualitative analysis, the data from stakeholders was able to provide important contextual information about Park-and-Ride in Greater Wellington. An online survey was then used to collect data from commuters in Greater Wellington. Using both quantitative and qualitative analysis, the data

obtained was able to build a comprehensive picture of commuter behaviour, the barriers to using Park-and-Ride facilities, and acceptability levels of a range of potential Park-and-Ride policies and the factors that influence these levels. In the next chapter, the results are shown.

Chapter Four

Results

This chapter discusses the research findings in order of the research questions. Sections 4.1 and 4.2 address research questions 1 and 2, presenting the results of the qualitative data obtained from interviews carried out with Greater Wellington Regional Council (GWRC), Hutt City Council (HCC), Porirua City Council (PCC), and the New Zealand Transport Agency (NZTA). As established in Chapter Three, the methodological approach uses a thematic analysis to identify, analyse and report patterns and themes in the data.

The chapter then moves into quantitative analysis, and the results of the statistical analysis of the online survey. Section 4.3 addresses research question 3. An overview of the socio-demographic characteristics of the recent train user sub-sample is presented. Descriptive statistics and bivariate relationships are calculated for the variables in the model (attitude, social norm, PBC, personal norm, problem awareness, environmental concern, intention and behaviour). Following this, the proposed model for walking and cycling behaviour is estimated using structural equation modelling (SEM). Lastly, the predictors of intention to walk and cycle to the station are examined and differences in perceptions of the two transport modes are analysed. Section 4.4 addresses research question 4 and uses thematic analysis to explore what contextual factors influence commuters' decisions to walk and cycle to the station.

The final section addresses research question 5. Firstly, the socio-demographic characteristics of the survey sample are compared with the New Zealand 2013 census data for Greater Wellington. A correlation analysis is used to examine the relationships between the main variables of interest, such as policy acceptability, perceived effectiveness, and perceived fairness. Then, to examine differences between the different policy measures, ANOVAs (analyses of variance) are conducted.

4.1 Research Question 1

What do key stakeholders perceive as the challenges of Park-and-Ride in the Wellington Region?

Park-and-Ride is clearly not a panacea for all problems in the transport system, including the task of increasing transport sustainability, as shown in the literature review. There remain a number of challenges associated with the development of parking at stations, in particular, and its effects on the transport system. The stakeholders interviewed for this study were asked several open-ended questions about the challenges of using the land around stations for parking. These questions were asked with the intention that the ideas raised could be compared with solutions identified in the literature (see Discussion chapter). The challenges are broken down into four themes: impact on land use; demand management; commuters' spill-over to nearby residential and commercial areas; and competition with alternative public transport, walking, and cycling. This section is structured according to these themes. Quotes from the interview interviewees illustrate key ideas and opinions.

4.1.1 Impact on Land Use

When the stakeholders were interviewed, a strong theme articulated was the impact of parking on land use. A number of interviewees were negative about using the land around stations for car parking, with some stating that Park-and-Ride compromises the amenity values of the area (HCC officer), and can have detrimental impacts on the environment, with increased run-off and storm water discharge mentioned by GWRC officers 2 and 3 as a side effect of implementing expansive Park-and-Rides. In contrast, some interviewees maintained a positive view, with many believing that, in some circumstances, using land for parking can serve as an interim use, banking land for eventual infill conversion if and when the market conditions are ripe for Transit Oriented Development (TOD) (GWRC officers 2, 3, and 4). A related component raised by other interviewees was the desirability of public-private partnerships for making TOD affordable and viable. Given they are distinctly different form to traditional development in Greater Wellington, there seems to be reluctance among most councils to finance TODs. interviewees spoke of the need for developers and real estate investors to build and finance them (GWRC officers 2 and

4; and PCC officer). High land costs and fragmented land ownership patterns were also viewed as an impediment to development. GWRC officer 3 explained that this challenge could be overcome through land banking:

> If things change in the future when you've got [a demand for] TOD and you actually own the land well then you actually have more control over the destiny instead of relying on other things or other land ownership actually stopping you from building (GWRC officer 3).

But while it could be possible in some cases to convert existing Park-and-Ride facilities into TOD, the financial burden of the investment would be significant, and fall on the TOD developer. The developer would need to generate enough revenue to replace surface parking for the commuters, with more compact, but much more expensive structured parking.

4.1.2 Demand Management

When interviewees were asked about the major challenges their organisation was facing with regard to Park-and-Ride, a number of interviewees expressed significant frustration with the way in which Park-and-Ride was managed (GWRC officers 2 and 3; GWRC councillor; and HCC officer). At the time of the interviews, commuters could park free of charge, any day of the week, and for as long as required. However, from a policy perspective, offering free parking contradicts policies designed to decrease driving, and has led to demand exceeding supply at many of the Park-and-Ride facilities, with new parking spaces being filled almost immediately upon construction. Interviewees frequently mentioned that Park-and-Ride could benefit from improved parking management to reduce or shift demand, either by expanding the capacity by adding parking spaces to an existing facility (PCC officer); or reducing demand at a given Park-and-Ride by implementing parking restrictions (GWRC officer 3); or offering alternatives to driving (GWRC officer 1); and/or imposing parking charges (GWRC councillor).

Economic disincentives, such as parking charges, are capable of changing behaviour and were raised by the majority of interviewees as a viable option for managing demand. It was often said in the interviews that imposing a charge could help recover the cost of providing car parks (GWRC officers 1 and 2; and NZTA officer). However, many interviewees took the view that it would be challenging to

implement a parking charge in the absence of integrated ticketing and fares (GWRC officers 1, 2, and 3). Many interviewees felt that it was important to gain community acceptance of a parking charge when or if it is implemented, with some suggesting that there would be strong political and public resistance to parking charges (GWRC officer 3; and HCC officer). Some interviewees also expressed their concern at the impact charges could have on transport behaviour. For example, imposing a charge could decrease train patronage and encourage commuters to drive all the way to their destination (GWRC officers 3 and 4; HCC and NZTA officers).

In response to interviewees' concerns regarding the management of Park-and-Ride in the region, a number of suggestions were made by council officers to address the rapidly-emerging problem of the over-utilisation of capacity-constrained Park-and-Ride sites. There was a strong desire from interviewees to create a form of framework to promote more consistent decision-making across the region (GWRC officers 1-4; and GWRC councillor). One interviewee said that the framework needed to stipulate a set of criteria that would allow transport planners to assess the merits of providing more car parking compared with other alternatives, such as better bus network facilities, or the promotion of car-pooling, cycling and walking. One Greater Wellington officer explained:

> So a challenge for us is to actually be a bit clearer in our sort of strategic policy about where and when is it the right time to have more Park-and-Ride and where and when is it the right time to actually focus on other ways of accessing (GWRC officer 3).

4.1.3 Spill-Over to Nearby Residential and Commercial Areas

Closely related to the previous theme, a number of interviewees discussed the impact commuters had on surrounding residential and commercial areas and the challenges associated with the over-utilisation of specific Park-and-Ride sites (NZTA officer, GWRC councillor, and GWRC officer 4). Some local businesses raised concerns with the territorial authorities over the impact of loss of parking spaces due to increased demand for commuter parking. One interviewee spoke of the businesses in Upper Hutt suffering from lack of short-term parking spaces:

> A classic example is around the central Hutt station; the railway station is very close to a whole lot of businesses and schools […] so commuters get down there and start filling up all the parking spaces and then businesses will say to us 'my customers said to me I drove here

> and wanted to buy something from your store, couldn't find anywhere to stop so I went somewhere else' (HCC officer).

While these interviewees acknowledged that there was an issue with some sites being filled to capacity, sometimes an hour or more before the last morning peak train departs, they also spoke of the lack of local-level parking restrictions (i.e. 'residents only' parking and/or time-restricted zones). However, this was understood to be a challenge due to the complexity of how the transport system is managed across three different agencies. One interviewee hoped that the revised Park-and-Ride Strategy would allow different agencies to work more effectively and efficiently together (GWRC officer 4). GWRC officer 3 also echoed this by stating that the territorial authorities and the regional council need to collaborate to understand how parking is managed and enforced in the local areas surrounding Park-and-Ride sites.

4.1.4 Competition with Alternative Public Transport, Walking, and Cycling

Another theme emerging from the interviews was that providing parking at the station often transfers demand from existing transport modes. While Park-and-Ride allows commuters to access stations where densities are low or where access by other modes (e.g. walking, cycling, or alternative public transport) is limited, it often encourages unnecessary car use (GWRC officer 4). GWRC officer 4 articulated this theme clearly, in disputing the assumption that every new driver using Park-and-Ride is someone who used to drive to their destination in Wellington City – as distinct from someone who previously caught the bus, walked or cycled:

> …only a certain percentage of people using those new spaces are switching to public transport […] they might have been parking [in] nearby residential streets, or they might have been catching the bus or even walking or cycling (GWRC officer 4).

Many also felt that increased investment in Park-and-Ride facilities could hinder patronage and the long-term viability of alternative public transport services (GWRC officers 1, 2, and 4). In response to this concern, a number of suggestions were made to increase the patronage of these bus services. One interviewee said that offering free transfers between buses and trains could be key to encouraging car users to use these feeder services, given that people make reasoned choices and tend to choose

alternatives with the highest benefits less costs (GWRC officer 3). Economic disincentives, as suggested above, also have the potential to encourage commuters to walk, cycle, and use alternative bus services to access the station (GWRC officers 1 and 2, and NZTA officer).

Park-and-Ride also tends to encourage further population dispersal to locations which are entirely car-dependent. The interviewees spoke of the challenges of changing behaviour, particularly for those with structural barriers such as residents in the Western Hills (HCC officer). Some interviewees were also doubtful that high levels of train ridership could be supported without Park-and-Ride, especially in areas with low density and high car ownership. GWRC officer 3 communicated:

> For [feeder] buses to be viable they need certain conditions to be in place, the further you get out from Wellington City the harder that is. You can have additional bus services in those places, but what it means, without those conditions of density, urban form and culture […] you just have to subsidise it more and more and so the subsidy becomes such that it could be way cheaper to provide Park-and-Ride (GWRC officer 3).

4.2 Research Question 2

What are the likely future developments of the Park-and-Ride concept?

There has been limited research on developing the concept of Park-and-Ride to better fulfil policy goals, such as reductions in car use, congestion and traffic-related emissions. Drawing on this experience, stakeholders were asked how the concept of Park-and-Ride could be developed in the future. The future developments mentioned fell into three themes: mobility hubs, responsiveness to new technologies, and bus-based Park-and-Ride. This section covers these themes, using quotes from the interviewees to illustrate key ideas and opinions.

4.2.1 Mobility Hubs

In stakeholder interviews, a strong theme that emerged, particularly among the Regional Council interviewees, was the idea of mobility hubs. Mobility hubs are places of connectivity where different modes of transport come together seamlessly and where there is intensive concentration of employment, living, shopping and/or

recreation. GWRC officer 4 articulated this theme clearly when discussing the future role of Park-and-Ride in Wellington:

> They'd be called mobility hubs, which is basically where a whole lot of transport options come together in a place where people can choose and they might take an Uber, they might pick up a bike share, there'll be drop-off facilities for autonomous vehicles (GWRC officer 4).

Of particular importance to many interviewees was the key role that cycling plays in increasing the catchment area of a station, by enabling commuters to cycle to stations inaccessible by walking. However, the majority of interviewees mentioned that, with the growing popularity of cycling, the current facilities for cyclists were no longer adequate and spoke of the necessity to provide more secure bike parking (GWRC officer 3). Improved bike facilities also do not suit everyone; they only help if commuters do not want to use their bike at the other end of the journey. The ability to carry bikes on trains is also determined by the capacity of the rail network, and with increasing train patronage, some interviewees noted that there would be limited space for bikes on trains in the future, which could create tension between cyclists and commuters (GWRC officer 3).

Another component of a mobility hub discussed in interviews was shared mobility. Shared mobility is a term used to describe transport services that are shared among commuters, including public transport, taxis, bike-sharing, car-sharing, and ride-sharing. Ride-sharing could reduce the number of vehicles on the road and encourage a behavioural shift towards multi-modal, sustainable transport which complements public and active forms of transport. In particular, there was strong advocacy for encouraging ride-sharing as a means of limiting demand for car parking at stations and changing the region's car-centric culture. This was particularly well communicated by the GWRC councillor:

> All we're doing is just continuing to build car parks because there's a demand […] we're not asking ourselves why that demand exists and how we might limit that demand by car-sharing or any other number of options (GWRC councillor).

4.2.2 Responsiveness to New Technologies

Another theme that came out of the interviews was the emergence of new technologies. Although only mentioned briefly in several interviews, it has the potential to have profound implications not only for Park-and-Ride but for the entirety of the transport network. Many interviewees expressed the necessity to keep up with technology in order for public transport to retain a competitive advantage over other transport modes (GWRC officer 3). Other interviewees voiced the challenges of positioning the public transport sector to adapt to the inevitable changes that will accompany these technologies (GWRC officer 4). One function that will likely change with the emergence of new technologies will be the type of parking required at stations. Parking demand is currently accommodated through long-stay parking facilities; however, with the onset of new transport technologies there is expected to be an increased demand for short-stay, kiss-and-ride, and drop-off facilities (GWRC officer 3). Future infrastructure should, therefore, strike a balance between meeting the demand of today, while being adaptable for likely reductions in future need, as expressed by GWRC officer 4:

> I think that we just need to be able to adapt as easily as possible. The last thing we want is a whole lot of expensive fixed infrastructure that just […] turns into a lemon that we can't do anything with and we just end up demolishing (GWRC officer 4).

4.2.3 Bus-Based Park-and-Ride

The third theme identified in the thematic analysis was the development of bus-based Park-and-Ride. Bus-based Park-and-Ride is also referred to in the literature review as a destination functionality Park-and-Ride, often located at the edge of the CBD and intercepting commuters before they enter congested areas. In this case, most of the journey is done by private motor vehicle, with the last segment completed by public transport. The interviewees had mixed views on the future development of this concept: while some interviewees were in support (NZTA officer), others expressed concerns from an environmental perspective. GWRC officer 3 explains this concern:

> I don't really support that approach [bus-based Park-and-Ride] because you're still getting the majority of your trip by car and it's, from an environmental perspective, from a

> congestion perspective, it doesn't do much for the environment or congestion (GWRC officer 3).

Another interviewee spoke of the informal nature of a bus-based Park-and-Ride in Karori. Informal areas are not designated as Park-and-Ride facilities, have no formal agreement with property owners and are not subsidised by GWRC; however, commuters have been observed using the Zealandia over-flow car park for Park-and-Ride purposes (GWRC councillor). Although this shared-use site has proven popular, it should be remembered that Park-and-Rides are introduced to provide common locations where commuters can transfer from a low to a high occupancy transport mode. It follows that Park-and-Ride is more suitable for train stations as the Wellington City bus network is made up of a number of interchanges and bus stops with commuters accessing public transport from a number of locations (GWRC officer 2). One interviewee explained the difficulty of implementing bus-based Park-and-Ride in Wellington City:

> … that's quite difficult because […] with the train station you have one node where people go to, with the bus network there is no one dominant node because you've got multiple stops… So where do you provide the Park-and-Ride? and will people actually use it as opposed to just parking in residential streets so it's a bit of a challenge to work out how to deal with that (GWRC officer 2).

Another interviewee from GWRC spoke of the importance of making international comparisons when deciding to implement bus-based Park-and-Ride, to obtain a wider, international perspective on the benefits and costs of such facilities (GWRC officer 4).

4.3 Research Question 3

Can a behavioural model, adapted from the literature, explain Wellington commuters' intention to walk and cycle to the train station?

Structural equation modelling (SEM) was used to investigate whether the proposed theoretical model can explain walking and cycling intention and behaviour in the Wellington Region sample. In the first step, Confirmatory factor analysis (CFA) was used to assess the fit of the dimensional structure of attitude, social norm, perceived

behavioural control (PBC), personal norm, problem awareness and environmental concern (assessed through the NEP scale). Cronbach's α was then calculated to examine scale reliability and internal consistency. Lastly, SEM was used to examine the structural relationship between the variables as proposed in the theoretical model described in Section 2.3.3. The main predictors of intention to walk and cycle to the station were then analysed and discussed separately.

4.3.1 Train User Sub-Sample Characteristics

A train user sub-sample of data from the online survey was used as input for the behavioural models. Questions in the online survey allowed the definition of the sub-group of respondents as those who used the train in the last seven days. Table 4.1 presents the socio-demographic characteristics of the recent train user sub-sample (full study-sample socio-demographics are presented in Section 4.5).

Table 4.1. *Socio-demographic variables of the train user sub-sample (n = 188).*

Variable	(%)	Variable	(%)	Variable	(%)
Place of Residence		**Age**		**Income**	
Lower Hutt	29.8%	18 – 25 years	4.3%	$1 - $25,000	1.6%
Porirua	20.7%	25 – 34 years	19.3%	$25,001 - $50,000	8.7%
Kapiti Coast	19.7%	35 – 44 years	25.1%	$50,000 - $100,000	51.9%
Upper Hutt	18.1%	45 – 54 years	25.7%	$100,001 +	37.7%
Wellington City	7.4%	55 – 64 years	23.0%	**Employment**	
South Wairarapa	2.7%	65 years +	2.7%	F/T paid employment	97.3%
Masterton	1.1%	**Education**		P/T paid employment	1.6%
Carterton	0.5%	No Qualification	1.1%	F/T student	0.5%
Gender		H/S qualification	17.7%	P/T student	1.1%
Female	54.5%	Tertiary degree	63.6%	Not in paid employment	1.1%
Male	44.4%	Tertiary other	18.2%		
Other	1.1%				

Note. F/T = Full time, P/T = Part time, H/S = High school. Respondents could select multiple options for employment.

The data was similar to that for the whole sample; however, more respondents identified themselves as being from Kapiti Coast (19.7% compared to 15.9%), Porirua (20.7% versus 17.6%), and Upper Hutt (18.1% versus 13.9%). Fewer respondents identified themselves as being from Wellington City (7.4% versus

21.4%). There were more males in the sub-sample compared to the full study sample (44.4% versus 36.6%). Slightly more respondents indicated that their highest level of education was a high school qualification (17.7% versus 15.1%). Slightly more respondents were in the highest income category (37.7% versus 34.0%).

4.3.2 Descriptive Statistics

Descriptive statistics for each construct potentially explaining walking and cycling behaviour are summarised in Tables 4.2 and 4.3. The standard deviation values showed a narrow spread around the mean. Attitude towards walking and cycling to the station (AT) were mostly positive. This suggests that, in general, there was a positive perception of walking and cycling in Greater Wellington. Respondents also felt that it was easier to walk to the station compared to cycling, as shown by mean scores of 4.10 and 3.72 for perceived behavioural control (PBC) respectively. Walking and cycling were also investigated as a social norm (SN). Respondents' perception of the social pressure to walk to the station was slightly higher than for cycling (3.48 and 3.12 respectively); however, the difference was not significant. Personal norm (PN) also scored higher for walking (3.32) compared to cycling (3.12). Intention to cycle to the station was neutral (2.24); however, the mean score for the cycling behaviour construct was low (1.24), suggesting that there is a gap between intention to cycle to the station and actual cycling behaviour.

Bivariate correlations between all psychological constructs are presented in Tables 4.2 and 4.3. Intention to walk to the station correlated with all the TPB constructs ($r = 0.669, p < 0.01$; $r = 0.584, p < 0.01$; $r = 0.673, p < 0.01$ for attitude towards walking to the station, social norm and perceived behavioural control, respectively) and with the additional constructs of personal norm ($r = 0.570, p < 0.01$), problem awareness ($r = 0.198, p < 0.01$) and environmental concern ($r = 0.235, p < 0.01$). Similarly, intention to cycle to the station correlated with all the TPB constructs ($r = 0.444, p < 0.01$; $r = 0.567, p < 0.01$; $r = 0.409, p < 0.01$ for attitude towards cycling to the station, social norm and perceived behavioural control, respectively) and with the additional constructs of personal norm ($r = 0.522, p < 0.01$), problem awareness ($r = 0.194, p < 0.01$) and environmental concern ($r = 0.150, p < 0.05$).

Table 4.2. *Walking means, standard deviations (SD), Cronbach's α, and bivariate correlations (n = 188).*

Construct	Mean	SD	α	AT	PN	SN	PBC	PA	NEP	INT	BEH
AT	4.21	1.61	0.922	-							
PN	3.32	1.28	0.722	0.588**	-						
SN	3.48	1.34	0.687	0.492**	0.573**	-					
PBC	4.10	1.78	0.816	0.655**	0.563**	0.406**	-				
PA	5.61	1.07	0.837	0.250**	0.164*	0.376**	0.202**	-			
NEP	5.25	0.97	0.870	0.227**	0.126	0.352**	0.120	0.623**	-		
INT	3.05	1.69	0.790	0.669**	0.570**	0.584**	0.673**	0.198**	0.235**	-	
BEH	3.04	2.12	0.870	0.630**	0.562**	0.488**	0.673**	0.152*	0.149*	0.845**	-

Table 4.3. *Cycling means, standard deviations (SD), Cronbach's α, and bivariate correlations (n = 188).*

Construct	Mean	SD	α	AT	PN	SN	PBC	PA	NEP	INT	BEH
AT	3.49	1.54	0.914	-							
PN	2.92	1.23	0.525	0.579**	-						
SN	3.12	1.18	0.710	0.406**	0.540**	-					
PBC	3.72	1.50	0.821	0.514**	0.430**	0.219**	-				
PA	5.61	1.07	0.837	0.378**	0.249**	0.254**	0.166*	-			
NEP	5.25	0.97	0.870	0.231**	0.150*	0.255**	-0.006	0.623**	-		
INT	2.24	1.15	0.545	0.444**	0.522**	0.567**	0.409**	0.194**	0.150*	-	
BEH	1.24	1.24	0.808	0.320**	0.444**	0.517**	0.249**	0.059	0.007	0.607**	-

Note. α = Cronbach's alpha, SD = standard deviation, AT = attitude, PN = personal norm, SN = social norm, PBC = perceived behavioural control, PA = problem awareness, NEP = environmental concern, INT = intention, BEH = behaviour. Except for the attitude, all constructs were measured by a 7-point Likert scale (1 = strongly disagree; 7 = strongly agree). ** Correlation is significant at the 0.01 level (2-tailed). * Correlation is significant at the 0.05 level (2-tailed).

4.3.3 Testing of Reliability and Validity of the Measurement Models

Confirmatory factor analysis (CFA)[7] was used to test whether the specified set of constructs was influencing responses in a predicted way (Bryman & Cramer, 2011). The CFA results for walking behaviour indicated that the standardised factor loading (λ) for one of the indicators for personal norm (PN1) did not meet the minimum criterion of 0.5, so this item was omitted to increase reliability and decrease measurement error (Ford, MacCallum, & Tait, 1986). After excluding this item, the results showed a satisfactory fit to the data ($\chi^2 = 15.567, \chi^2/\mathrm{df} = 1.730, p = 0.076, \mathrm{GFI} = 0.980, \mathrm{NFI} = 0.982, \mathrm{CFI} = 0.992, \mathrm{TLI} = 0.975, \mathrm{RMSEA} = 0.062$). The results for cycling behaviour indicated that the λ value for one of the indicators for perceived behavioural control (PBC4), and one indicator for social norm (SN1) was significantly lower than 0.5. Deleting these items from the model resulted in satisfactory model fit, $\chi^2 = 35.081, \mathrm{df} = 9, \chi^2/\mathrm{df} = 3.898, p = 0.001, \mathrm{GFI} = 0.957, \mathrm{NFI} = 0.932, \mathrm{CFI} = 0.947, \mathrm{TLI} = 0.834, \mathrm{RMSEA} = 0.124$.

Cronbach's alpha (α) was used to assess the internal validity of the measures used in the survey instrument. As shown in Tables 4.2 and 4.3, most constructs for the walking behavioural model are within the acceptable range ($\alpha \geq 0.7$), which confirms that the constructs were reliable and the component variables within each construct were consistent with each other (Hair, Black, Babin, Anderson, & Tatham, 2006). Estimates for the cycling behavioural model are comparable on most constructs, other than personal norm and cycling intention, which have a lower internal consistency.

4.3.4 Testing of the Structural Equation Models

Having established that the SEM is suitable, the relationship between the behavioural model variables and the outcomes was examined. Figures 4.1 and 4.2 present the results of the structural model showing the standardised structural coefficients (β) for each pathway and explained variances (R^2). The following will discuss the main

[7] The full results can be found in Appendix L.

findings on predictors of intention to walk and cycle to the station and analyse the difference between the two transport modes.

Intention and Behaviour

In the walking behavioural model, the TPB constructs accounted for 53.6% of the variance in intention, with PBC, social norm, and attitude each representing a unique contribution to the model ($\beta = 0.345; 0.282; \text{and } 0.264, \text{respectively}, p < 0.001$). The addition of personal norm, problem awareness, and environmental concern led to a significant increment in the variance explained in walking intentions (R^2 change $= 6.6$). Together, the constructs in the behavioural model explained 60.2% of the variance in walking intentions. Similarly, in the cycling behavioural model, the TPB constructs accounted for 35.5% of the variance in intention, with social norm representing a unique contribution to the model ($\beta = 0.381, p < 0.001$). The unique contribution of PBC and attitude approached significance at the conventional $p < 0.05$ level ($\beta = 0.209$; 0.159, respectively). The addition of personal norm, problem awareness, and environmental concern led to a significant increment in the variance explained in cycling intentions (R^2change $= 4.0$). Together, the constructs in the behavioural model explained 39.5% of the variance in cycling intentions.

The standardised path coefficient between intention and behaviour was high for both walking ($\beta = 0.716, p < 0.001$) and cycling behaviour ($\beta = 0.606, p < 0.001$). The results also showed that a significant proportion of the variance (72.9%) of walking behaviour could be explained by walking intention and PBC, while cycling intention and PBC explained 36.7% of the variance of cycling behaviour. Both behavioural models had a direct effect of PBC on walking and cycling behaviour in addition to the indirect effect of PBC on behaviour mediated by intention. The direct predictive effect of PBC on walking behaviour was quite small ($\beta = 0.192, p < 0.001$); however, contrary to the hypothesised behavioural model, PBC did not have a direct effect on cycling behaviour, and instead influenced cycling behaviour indirectly through its effect on intentions $\beta = 0.16$ ($S.E. = 0.04$), 95% CI $[0.08, 0.24], p < 0.001$). Therefore, an increase in PBC would lead to a stronger intention to walk to the station, but also an increase in the likelihood

that this intention will lead to a positive walking behaviour, by acting directly on intention and behaviour.

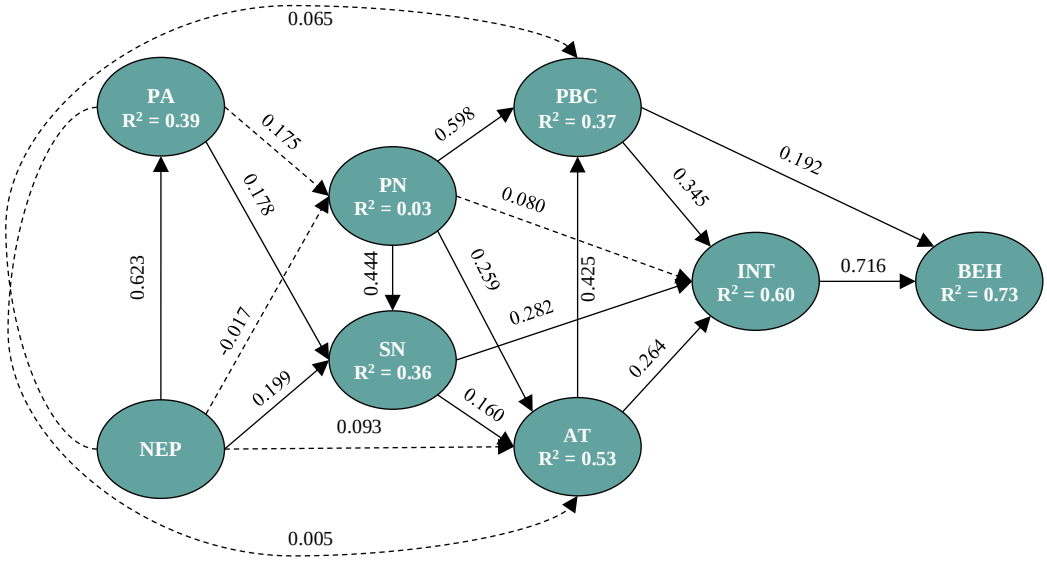

Figure 4.1. *Structural equation model with standardised path coefficients and explained variances for walking behaviour. Dashed lines indicate non-significant paths (p > 0.05).*

Note. AT = attitude, PN = personal norm, SN = social norm, PBC = perceived behavioural control, PA = problem awareness, NEP = environmental concern, INT = intention, BEH = behaviour.

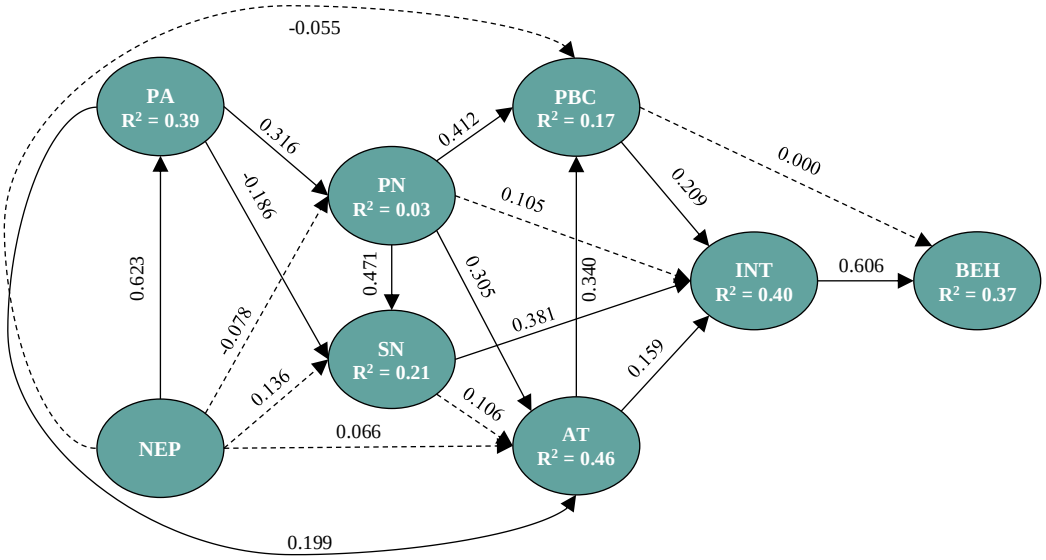

Figure 4.2. *Structural equation model with standardised path coefficients and explained variances for cycling behaviour. Dashed lines indicate non-significant paths (p > 0.05).*

Perceived Behavioural Control

PBC was hypothesised to predict walking and cycling intention and be directly affected by personal norm and problem awareness. The model showed that the largest influence on PBC was from personal norm, in both the walking behavioural model ($\beta = 0.598, p < 0.01$) and the cycling behavioural model ($\beta = 0.412, p < 0.001$). However, the effect of problem awareness on PBC was not statistically significant suggesting that, for the Greater Wellington Region train user sub-sample, the ease of walking and cycling to the station were more important than awareness of global environmental problems caused by car use when deciding whether to walk and cycle to the station. To test the statistical significance of the indirect effect of NEP and problem awareness on PBC, mediation analyses[8] was conducted using SPSS AMOS 25.0[9]. Results showed that the standardised indirect effect of NEP on PBC was significant in the cycling behavioural model ($\beta = 0.15$ ($\mathrm{S.E.} = 0.07$), 95% CI $[0.03, 0.29], p < 0.01$); however, the indirect effect of NEP on PBC was not significant in the walking behavioural model ($\beta = 0.06$ ($\mathrm{S.E.} = 0.05$), 95% CI $[-0.03, 0.14], p = 0.216$). The standardised indirect effect of problem awareness on PBC was also significant in the walking behavioural model ($\beta = 0.12$ ($\mathrm{S.E.} = 0.05$), 95% CI $[0.01, 0.22], p < 0.05$) and in the cycling behavioural model ($\beta = 0.11$ ($\mathrm{S.E.} = 0.04$), 95% CI $[0.03, 0.20], p < 0.01$). This implies that stronger personal values and principles, and awareness of global environmental problems are associated with a greater feeling of PBC.

Attitude

The formation of attitude toward walking and cycling to the station was associated with personal norm, PBC, social norm, and problem awareness. The largest influence on attitude was from PBC, in both the walking behavioural model ($\beta = 0.425, p < 0.001$) and the cycling behavioural model ($\beta = 0.412, p < 0.001$). There was also a strong association between problem awareness and attitude toward

[8] Mediation analyses measures the extent that one variable affects another (Gunzler, Chen, Wu, & Zhang, 2013).
[9] The full results can be found in Appendix M.

cycling ($\beta = 0.199, p < 0.05$); however, the relationship was insignificant for attitude toward walking. There was also a strong association between social norm and attitude toward walking ($\beta = 0.160, p < 0.05$); however, the relationship was insignificant for attitude toward cycling. When considering the indirect effects on attitude, there were similarities between the walking and cycling behavioural models. Problem awareness had significant indirect effect on attitude toward walking mediated by social norm ($\beta = 0.13$ (S. E. $= 0.05$), 95% CI $[0.03, 0.24], p < 0.01$). The model also showed an indirect effect of NEP on attitude toward walking ($\beta = 0.13$ (S. E. $= 0.06$), 95% CI $[0.01, 0.26], p < 0.05$). This indirect effect was also present for cycling behaviour ($\beta = 0.17$ (S. E. $= 0.07$), 95% CI $[0.03, 0.29], p < 0.01$). Therefore, increasing environmental concern and awareness of global environmental problems, which is linked to the formation of personal norm, could be beneficial in changing attitude towards walking and cycling to the station.

Social Norm

The results showed that the formation of social norm comes from a combination of personal norm, problem awareness, and NEP. Together the three constructs explain 35.6% variance of the social norm construct in the walking behavioural model and 21.2% variance in the cycling behavioural model. The largest influence on social norm was from personal norm, in both the walking behavioural model ($\beta = 0.444, p < 0.001$) and the cycling behavioural model ($\beta = 0.412, p < 0.001$). There was a weak positive association between problem awareness and social norm toward walking ($\beta = 0.178, p < 0.05$). However, the relationship between problem awareness and social norm was negative in the cycling behavioural model ($\beta = -0.186, p < 0.05$); that is, social norm strength decreased as the level of awareness of environmental problems caused by cars increased. The direct effect of NEP on social norm was not statistically significant in the cycling behavioural model ($\beta = 0.136, p = 0.102$), suggesting that personal norm and problem awareness were more important than environmental concern when deciding whether to cycle to the station.

4.4 Research Question 4

Why do Wellington commuters drive to the train station and what are the barriers to accessing the station by walking and cycling?

As discussed in Section 4.3, attitude, social norm and PBC explained 54% and 36% of the variance in commuters' intent to walk and cycle to the station, and intentions and PBC explained 73% and 37% of the variance in walking and cycling behaviour respectively. Walking and cycling behaviour, therefore, does not depend on motivations alone; many contextual factors may facilitate or constrain transport behaviour. The model only considers individuals' perceptions of contextual factors, as expressed in PBC; therefore, this section will explore what contextual factors influence commuters' decision to walk, cycle and drive to the station. Respondents were asked to state what factors would have to change for them to consider walking and cycling to the station. While respondents were asked about walking and cycling separately, common themes emerged between the two transport modes. The factors influencing the decision to not walk and cycle to the station are broken down into four themes: travel time and distance, poor/unsafe walking and cycling routes, bicycle storage and trip-end facilities, and weather and topography. This section is structured according to these thematic groups, using quotes from the survey respondents to illustrate key ideas and opinions.

4.4.1 Travel Time and Distance

A number of respondents expressed a view that travel time and distance to the nearest station was a significant impediment to walking and cycling. Some respondents spoke of their maximum tolerable walking distances, which varied between respondents, and were described in terms of distance or time – "I would have to live a lot closer to the station. At the moment if I were to walk to my closest station it would be more than 20 minutes each way"; "[I] would not consider [walking], it is 3 kilometres away". Similarly, distance was also a limiting factor for cycling – "I live 6 km from the station. I would not consider cycling". It was also clear that a number of respondents considered car travel the fastest mode of transport with respect to journey times and as a result, they saw this as a positive attribute of this mode and a reason to use it in favour of walking – "It's just time. It is a 10-

minute walk, or a 3-minute drive". Other respondents stated that residential relocation could impact their transport behaviour – "I would have to move house to consider walking". This could have important implications for behaviour change interventions, suggesting that those moving into new homes may be a prime target for encouraging walking and cycling as an access mode.

4.4.2 Poor/Unsafe Walking and Cycling Routes

Safety was found to be an important PBC factor in relation to cycling. For example, respondents referred to their fear of cycling next to cars, cycling at night and the generally unpleasant experience and vulnerability of cyclists when sharing the road space with motorised traffic – "personal safety. I do not trust most drivers to share the road with cyclists". Several respondents also referred to their safety as a behaviour control factor in relation to their ability and desire to walk – "while I like walking and the distance is not an issue the no/poor lighting and track surface (dirt/gravel), along with the weather and safety at that time are factors". In addition to this, the ease of access was considered an important factor that might influence the decision to walk and cycle to the station. For example, many respondents suggested that a lack of cycle and walking routes prevented them from using this form of transport at all – "It's a miserable walk […] provision of walking paths separated from SH2 would make a huge difference".

4.4.3 Bicycle Storage and End-of-Trip Facilities

A number of respondents referred to bicycle theft and the role this played in influencing their negative attitude toward cycling to the station. For example, one respondent explained that there was a lack of trust in the cycle storage facilities available to them – "better facilities to leave your bike in for the day. Current set-up has poor security. Very open to weather and potentially thieves". In addition to a perceived need for more secure bicycle parking is the need for sufficient space for bicycles, a challenge many respondents noted – "availability of very secure, weather protected, free-of-charge bike storage at the train station". A few respondents would also prefer to travel with their bicycles and would consider cycling if there were more facilities for storing their bike on the train. This could reflect either that respondents need their bikes at the destination end of their train journey or that they

are not confident in the security of station bike parking – “the train system does a very poor job at catering for cyclists. There is very limited space to take a bike on the train and a regular bike cannot be taken onto a train during peak hours”. Respondents also mentioned that work-related factors played an important role in their decision to not commute by bicycle. Another respondent noted a lack of adequate cycling facilities at the end of their trip, such as secure storage, showers and changing rooms was an obstacle for cycling – “[My] employer [would need] to provide excellent shower, changing room, and secure clothing storage facilities”.

4.4.4 Weather and Topography

The fourth theme identified in the thematic analysis was weather and topography, mentioned by several respondents as a hindrance to walking and cycling – “At the moment if I were to walk to my closest station it would be more than 20 mins each way and up a steep hill with no weather protection”. Hilly topography was frequently stated as a deterrent to walking and cycling for transport – “where I live, [there are] very steep hills on the way home at the end of the day”; “I live 2km away from the station up a very steep hill – It's just not practical or easy to walk”. Another respondent added – “while the downhill ride would be somewhat fun I would not want to cycle back up the hill at the end of the day in my work clothes”. Lack of weather protection en route to the station as well as at the station was also a barrier to walking and cycling, with some suggesting that they would walk and cycle to the station in good weather conditions – “I need to walk to the station normally by the riverbank and go through a small subway under the bridge and then cross the bridge. These areas are very exposed so I can only do this in fine weather”. While weather cannot be altered unlike built environment factors, the deterrent effect of weather could be mitigated by end-of-trip facilities, such as shelter, showers, and bicycle storage design.

4.5 Research Question 5

What are Wellington commuters' responses to a range of potential Park-and-Ride policies?

The last part of the survey asked respondents about their opinions regarding a hypothetical Park-and-Ride policy. In this section, the main findings from this set of questions are discussed. First, the socio-demographic characteristics of the survey sample are compared with the Wellington Region data from the 2013 Census. This is followed by correlation analyses to examine the relationships between policy acceptability, perceived effectiveness, and perceived fairness. Lastly, ANOVAs were conducted to examine differences between the different policy measures. Where the ANOVA found a significant difference, the post-hoc test, Tukey HSD, was used to explore the nature of these relationships.

4.5.1 Survey Sample Characteristics

The socio-demographic characteristics of the 295 survey respondents are shown in Figures 4.3 to 4.7. The survey was open to all residents of the Greater Wellington Region and – unlike the sub-sample examined in Section 4.4 – respondents where not necessarily recent train users. The majority of respondents identified themselves as being from Lower Hutt (26%), Wellington City (21%), Porirua (18%), Kapiti Coast (16%), and Upper Hutt (14%). Participation from Masterton, Carterton, and South Wairarapa was low. Figure 4.4 shows that males are underrepresented in the study sample, while females are overrepresented. Figure 4.5 shows that 6% of the respondents were aged between 18 and 24, 22% were aged between 25 and 34, 26% were aged between 35 and 44, 24% were aged between 45 and 54, 21% were aged between 55 and 64, and 2% were aged over 65 years. The respondents' educational level was also included in the survey instrument. A majority (84%) of the respondents had tertiary education (either a degree or other form of qualification); 15% had a high school qualification; and 1% had no qualification. Figure 4.6 shows that the study sample exhibits a strong bias toward those with incomes higher than $50,001. These figures demonstrate that the study sample is not representative of the population of the Wellington Region. This could be due to the sampling strategy used and its significance as a limitation is considered in the Discussion chapter.

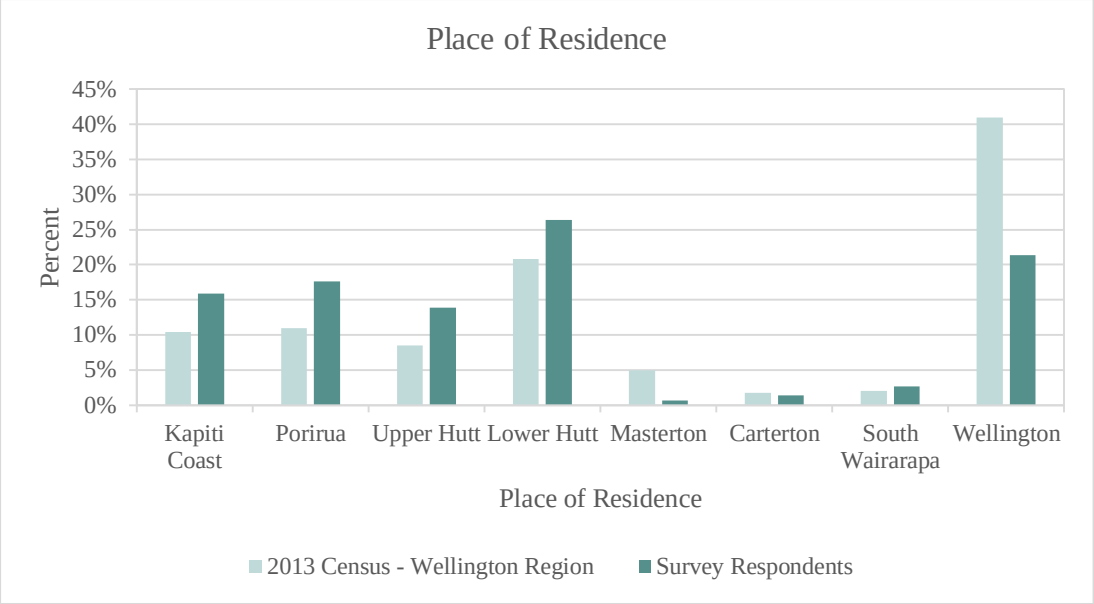

Figure 4.3. *Place of residence of survey sample (n= 295) compared to 2013 Census data for the Wellington Region.*

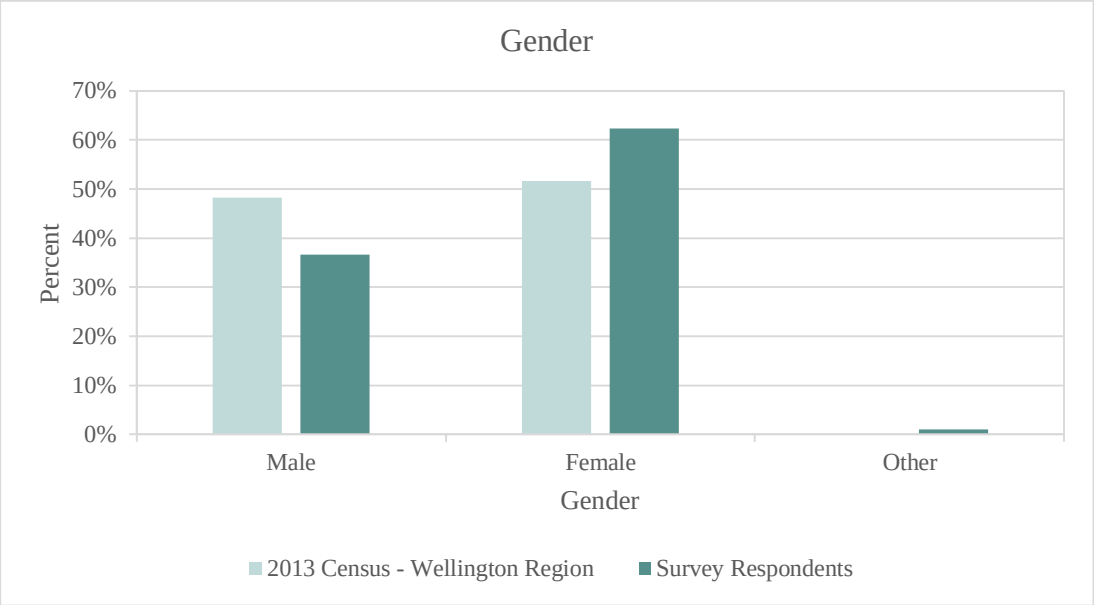

Figure 4.4. *Gender of survey sample (n= 295) compared to 2013 Census data for the Wellington Region. Note. the option to select 'other' was not available in the 2013 census.*

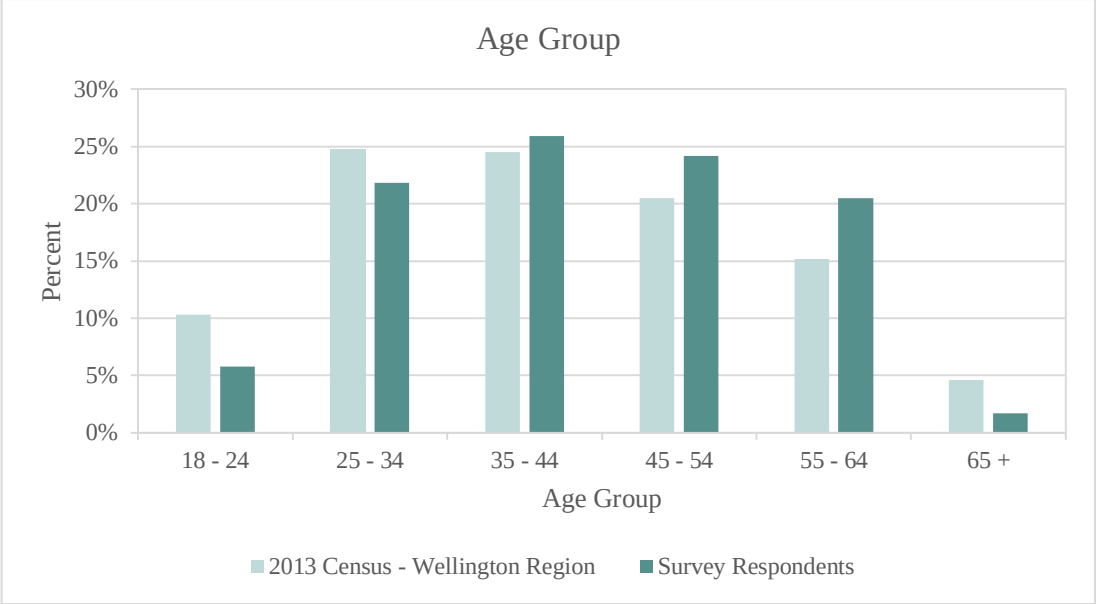

Figure 4.5. *Age of survey sample (n= 295) compared to 2013 Census data for the Wellington Region.*

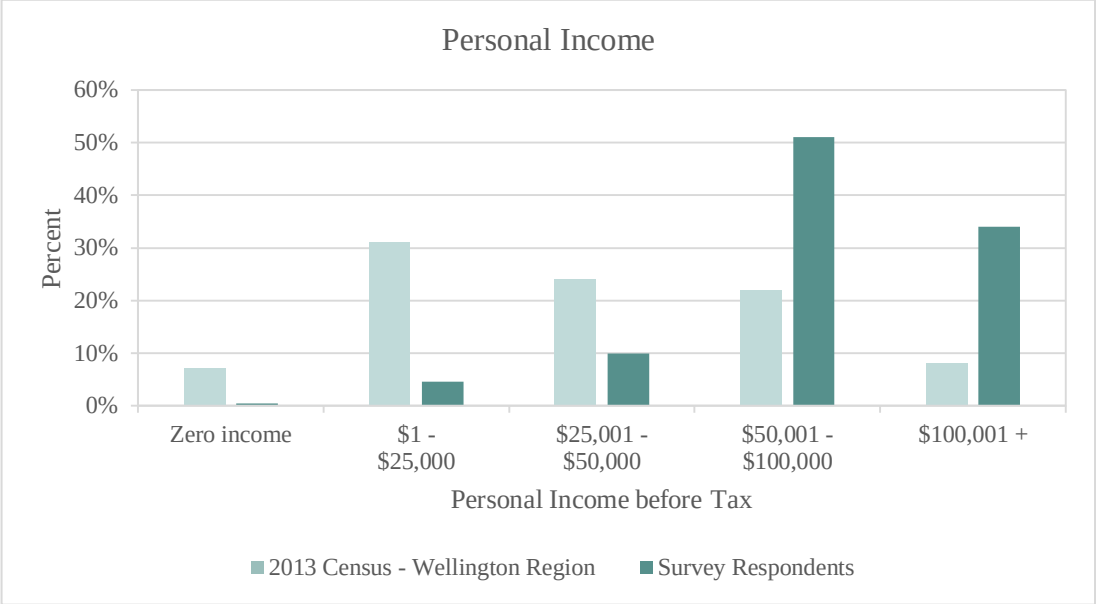

Figure 4.6. *Personal income before tax of survey sample (n= 295) compared to 2013 Census data for the Wellington Region.*

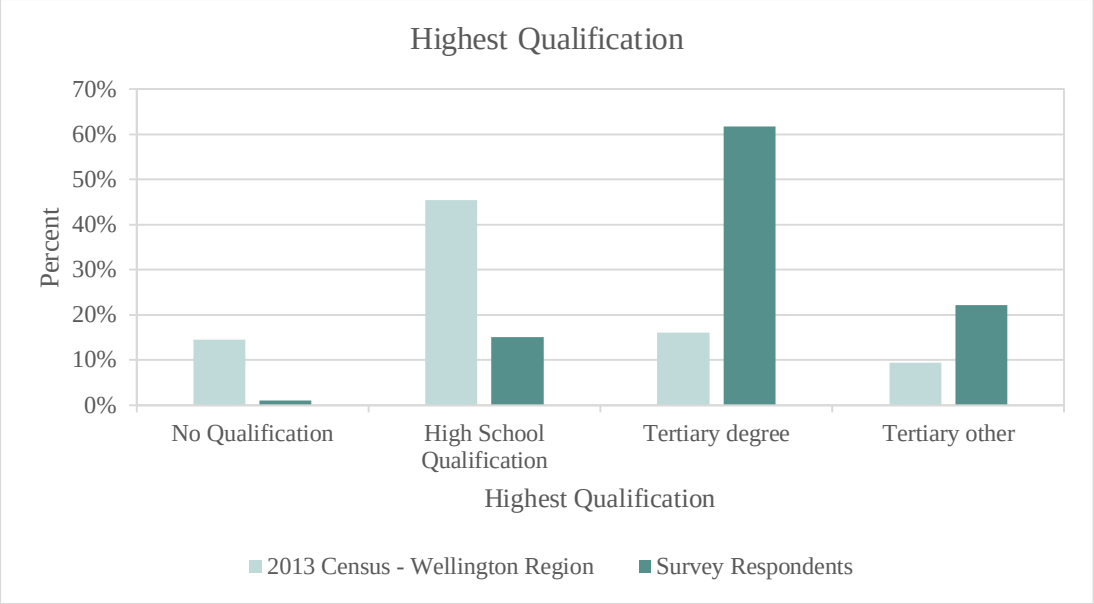

Figure 4.7. *Highest qualification of survey sample (n= 295) compared to 2013 Census data for the Wellington Region.*

4.5.2 Correlation Analysis

Due to the variables being non-normally distributed, Spearman's correlation coefficient was calculated. The correlations and their significance are displayed in Table 4.4. Policy acceptability was most strongly and positively related to perceived fairness ($r = 0.820, p < 0.001$), and, to a lesser extent perceived effectiveness ($r = 0.405, p < 0.001$). Perceived effectiveness was also significantly related to perceived fairness of policies ($r = 0.377, p < 0.001$) and level of parking fee ($r = 0.238, p < 0.001$). Likelihood of changing transport mode was negatively related to perceived fairness ($r = -0.321, p < 0.001$) and policy acceptability ($r = -0.356, p < 0.001$), and positively related to revenue use ($r = 0.139, p < 0.05$).

Table 4.4. *Spearman's correlation matrix (n = 295).*

#	Variables	1	2	3	4	5	6
1	Acceptability	1.00					
2	Perceived Fairness	0.820**	1.00				
3	Perceived Effectiveness	0.405**	0.377**	1.00			
4	Parking Fee	-0.065	-0.063	0.238**	1.00		
5	Revenue Use	0.020	0.037	-0.041	0.000	1.00	
6	Mode Change	-0.356**	-0.321**	-0.099	0.046	0.139*	1.00

Note. The scale for fee runs from 1 (low) to 3 (high). Revenue use runs from 1 (improved public transport), 2 (improved walking and cycling), and 3 (more car parking spaces). ** Correlation is significant at the 0.01 level (2-tailed). * Correlation is significant at the 0.05 level (2-tailed).

4.5.3 Policy Acceptability

Table 4.5 defines the parking fee and revenue use for each of the different Park-and-Ride policies.

Table 4.5. *Park-and-Ride policy description of parking fee and revenue use.*

Policy	Parking fee	Revenue use
A	$1.00	Enhancing connecting bus services and/or the provision of new feeder bus services
B	$2.00	
C	$3.00	
D	$1.00	Improving pedestrian routes and cycling facilities/routes to and around train stations
E	$2.00	
F	$3.00	
G	$1.00	Funding the construction of more parking spaces at the train station
H	$2.00	
I	$3.00	

As shown in Figure 4.8, all policies were considered slightly unacceptable with mean scores a little over two. The most acceptable policy was Policy A ($M = 2.79, SD = 1.616$), while the least acceptable policy was Policy F ($M = 2.06, SD = 1.390$). A one-way ANOVA revealed no significant effect of specific policies on acceptability ($F(8,293) = 0.948, p = 0.477$).

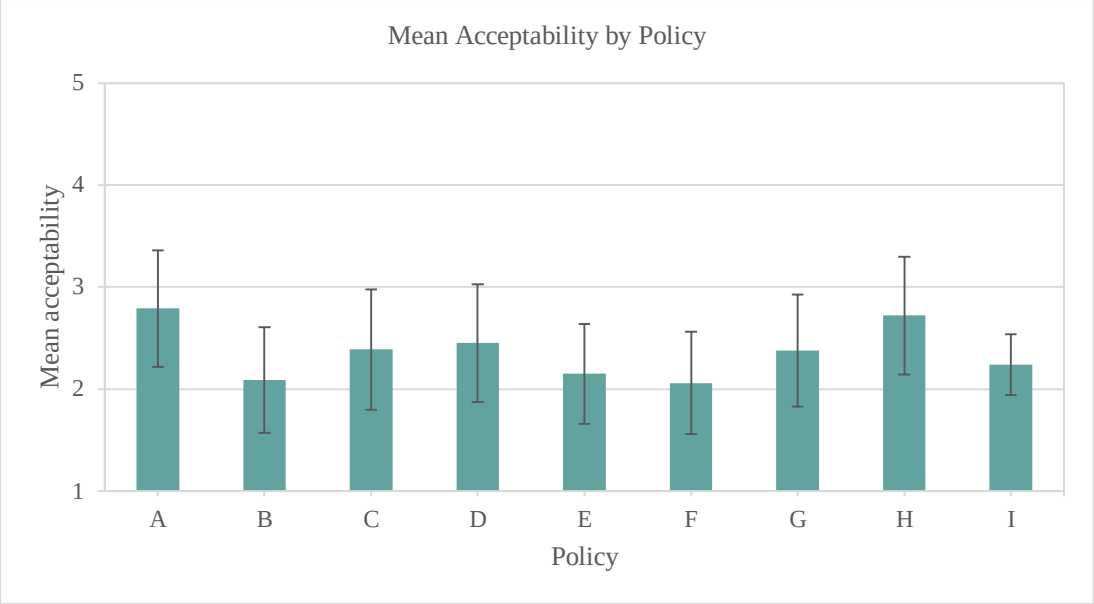

Figure 4.8. *Mean and 95% confidence intervals of acceptability scores by policy (1 = very unacceptable; 5 = very acceptable).*

On average, all levels of parking fee were considered either slightly unacceptable with means of around two. As expected, the most acceptable level of parking fee was \$1.00 ($M = 2.54, SD = 1.574$), while the least acceptable level of parking fee was \$3.00 ($M = 2.23, SD = 1.419$). A one-way ANOVA revealed no significant effect of parking fee on policy acceptability ($F(2,293) = 1.065, p = 0.346$). In terms of the effect of revenue use on policy acceptability, all types of revenue use were considered either slightly unacceptable with means of around two. The most acceptable type of revenue use overall was constructing more parking spaces at the station ($M = 2.44, SD = 1.533$), while the least acceptable type of revenue use was improving walking and cycling infrastructure ($M = 2.22, SD = 1.438$). A one-way ANOVA revealed no significant effect of revenue use on policy acceptability $F(2,293) = 0.652, p = 0.522$).

4.5.4 Perceived Policy Fairness

As shown in Figure 4.9, all policies were perceived unfair with mean scores of around two. The fairest policy was Policy G ($M = 2.74, SD = 1.355$), while the least fair policy was Policy C ($M = 2.30, SD = 1.334$). A one-way ANOVA revealed no significant effect of specific policies on perceived policy fairness ($F(8,293) = 0.477, p = 0.872$). On average, all levels of parking fee were

perceived unfair with mean scores of around two. The fairest level of parking fee was \$1.00 ($M = 2.61, SD = 1.321$), while the least fair level of fee was \$3.00 ($M = 2.40, SD = 1.311$). The one-way ANOVA revealed no significant effect of parking fee on perceived policy fairness ($F(2,293) = 0.713, p = 0.491$). In terms of the effect of revenue use on policy fairness, all types of revenue use were perceived as unfair with mean scores of around two. The fairest type of revenue use overall was constructing more parking spaces at the station ($M = 2.62, SD = 0.076$), while the least fair type of revenue use overall was improving walking and cycling infrastructure ($M = 2.45, SD = 0.132$). A one-way ANOVA revealed no significant effect of revenue use on perceived policy fairness ($F(2,293) = 0.415, p = 0.661$).

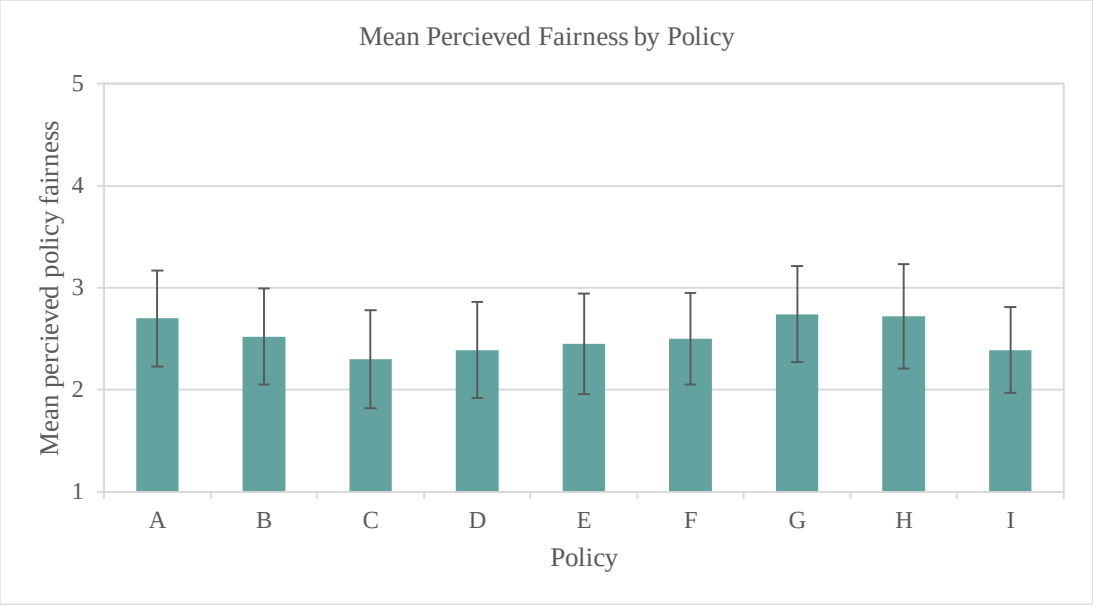

Figure 4.9. *Mean and 95% confidence intervals of perceived fairness scores by policy. (1 = completely unfair; 5 = completely fair).*

Figure 4.10 shows a positive correlation between policy acceptability and perceived fairness. The coefficient of determination (R^2) was 0.26, which indicates that 26% of variance in policy acceptability was explained by perceived policy fairness. This suggests that respondents evaluated the hypothetical policy as more acceptable if they thought that the policy would be fairer. For example, Policy A, with a parking fee of \$1.00 from which revenue was allocated to enhancing connecting bus services, was ranked as the third fairness (mean score of 2.70) of the nine policies and was regarded as the most acceptable (mean score of 2.79). In contrast, Policy F, with a parking fee of \$3.00 from which revenue would be allocated to improving walking

and cycling infrastructure, was ranked as the third most unfair (mean score of 2.50) of the nine policies and was regarded as the least acceptable (mean score of 2.06).

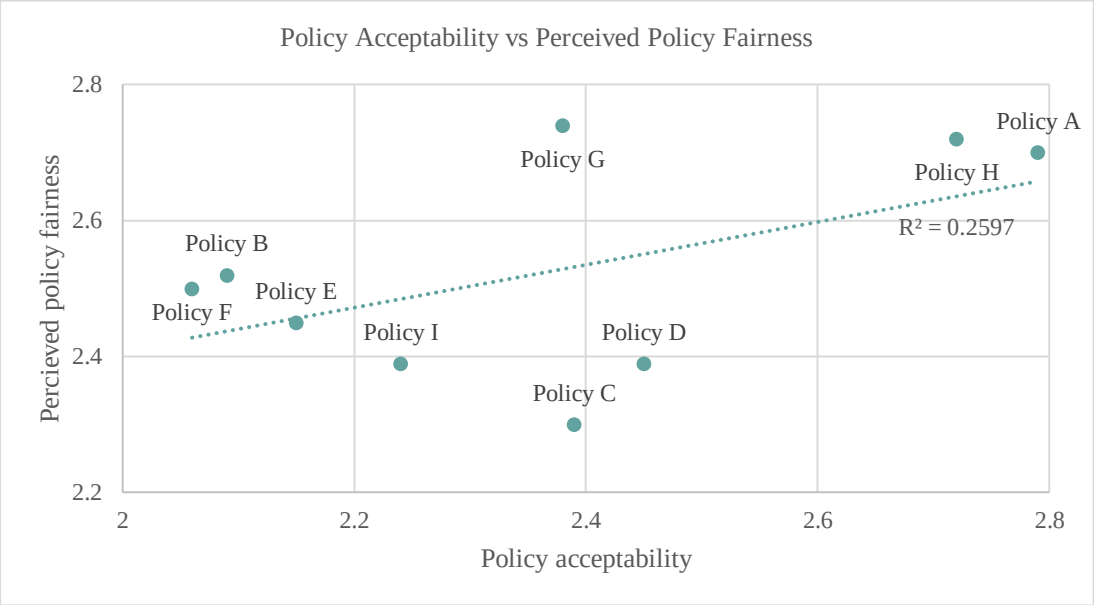

Figure 4.10. *Relationship between policy acceptability and perceived policy fairness.(R^2 = 0.2597).*

4.5.5 Perceived Policy Effectiveness

As shown in Figure 4.11, on average, all policies were considered either not effective at all or slightly effective with mean scores of between one and two. The policy viewed as most effective was Policy C, with a parking fee of $3.00 from which revenue was allocated to enhancing connecting bus services ($M = 2.45, SD = 0.918$), while the least effective policy was Policy G, with a parking fee of $1.00 from which revenue was allocated to constructing more parking spaces ($M = 1.73, SD = 0.606$). Tukey-HSD test showed that respondents evaluated Policy C as significantly, $F(8,292) = 2.891, p < 0.05$, more effective than Policy A ($M = 1.80, SD = 0.661$), Policy D ($M = 1.78, SD = 0.723$), and Policy G ($M = 1.73, SD = 0.606$).

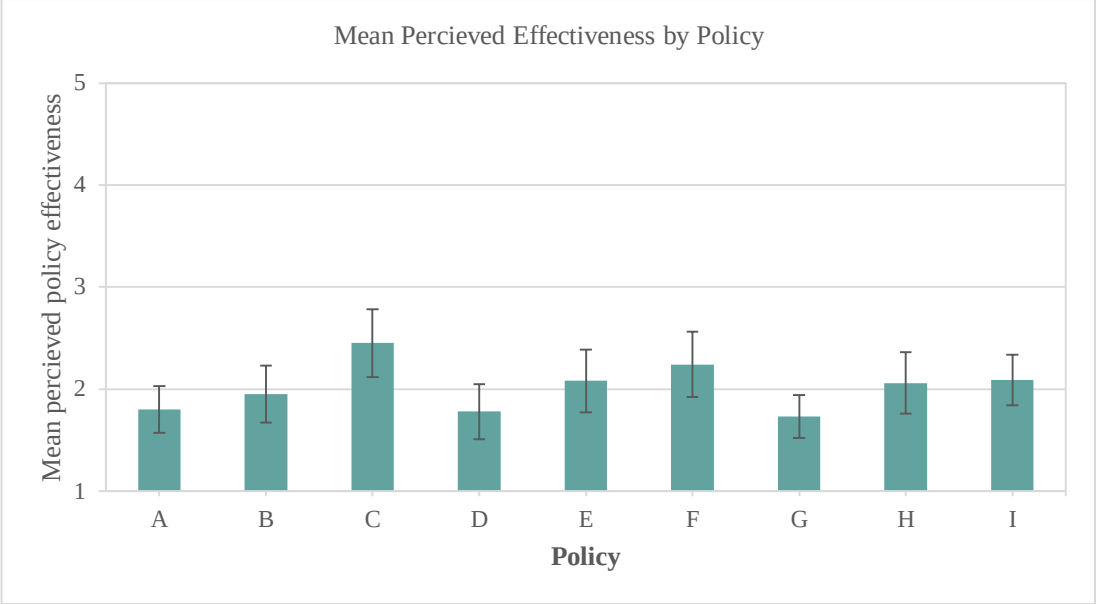

Figure 4.11. *Mean and 95% confidence intervals of perceived effectiveness scores by policy. (1 = not effective at all; 5 = extremely effective).*

Figure 4.12 shows that all levels of parking fee were considered either not effective at all or slightly effective with mean scores of between one and two. The most effective level of fee was \$3.00 ($M = 2.26, SD = 0.852$), while the least effective level of fee was \$1.00 ($M = 1.77, SD = 1.657$). Tukey-HSD test showed that the low parking fee (\$1.00) was significantly, $F(2,290) = 9.575, p < 0.001$, more effective than the high parking fee (\$3.00). In terms of the effect of revenue use on perceived policy effectiveness, all types of revenue use were considered either not effective at all or slightly effective with mean scores of around two. The most effective type of revenue use overall was enhancing connecting bus services ($M = 2.06, SD = 0.831$), while the least effective type of revenue use overall was constructing more parking spaces at the station ($M = 1.96, SD = 0.729$). The one-way ANOVA revealed no significant effect of revenue use on perceived policy effectiveness ($F(2,292) = 0.463, p = 0.630$). This suggests that the type of revenue use did not appear to affect effectiveness levels of Park-and-Ride policies.

Figure 4.12. *Mean and 95% confidence intervals of perceived effectiveness scores by level of parking fee.*

Figure 4.13 shows a negative correlation between policy acceptability and perceived policy effectiveness. The coefficient of determination was not high, $R^2 = 0.11$, which indicates that 11% of the variance in policy acceptability was explained by perceived policy effectiveness. This means that as participants perceived that the policy would be more effective in achieving the aim of the policy, acceptability levels of the policy decreased. For example, Policy F, with a parking fee of $3.00 from which revenue would be allocated to improving walking and cycling infrastructure, was ranked as the least acceptable (mean score 2.06) of the nine policies but was regarded as the second most effective policy (mean score 2.24). Policy A, with a parking fee of $1.00 from which revenue would be allocated to improving walking and cycling infrastructure, was ranked as the most acceptable (mean score 2.79) of the nine policies but was regarded as the third least effective policy (mean score 1.80).

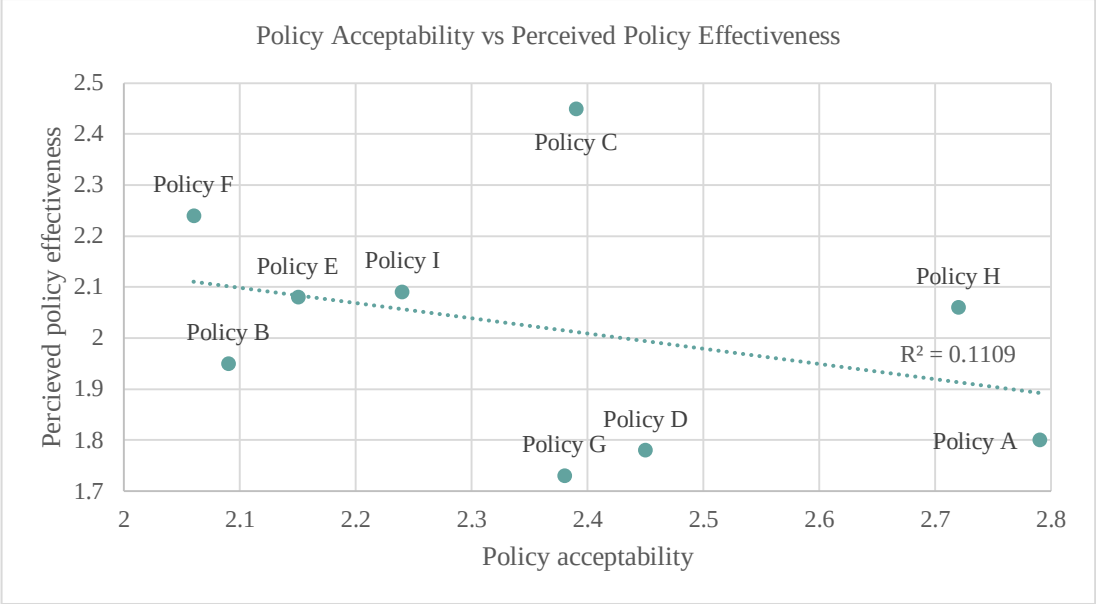

Figure 4.13. *Relationship between policy acceptability and perceived policy effectiveness. (R^2 = 0.1109).*

4.5.6 Impact of Park-and-Ride Policy on Transport Mode

The previous analyses revealed levels of policy acceptability, perceived fairness and perceived effectiveness of the nine hypothetical Park-and-Ride policies. A further aim was to explore how effective the policy would be in changing respondents transport behaviour. Figure 4.14 suggests that all policies were considered neither unlikely nor likely to change transport behaviour with mean scores of around three. The policy that was viewed as most effective in changing the respondents transport mode was Policy G, with a parking fee of $1.00 from which revenue was allocated to constructing more parking spaces ($M = 3.97, SD = 1.364$), while the least effective policy in changing behaviour was Policy A, with a parking fee of $1.00 from which revenue was allocated to enhancing connecting bus services ($M = 2.97, SD = 1.507$). A one-way ANOVA revealed no significant effect of specific policies on likelihood of changing transport mode ($F(8,294) = 1.635, p = 0.115$).

Figure 4.15 shows that all types of revenue use were considered neither unlikely nor likely to change transport behaviour with mean scores of around three. Tukey-HSD test showed that respondents evaluated polices with revenue allocated to constructing more parking spaces as significantly, $F(2,294) = 3.381, p < 0.05$, more effective in

changing transport behaviour ($M = 3.81, SD = 1.562$) than policies with revenue allocated to enhancing connecting bus services ($M = 3.26, SD = 1.637$).

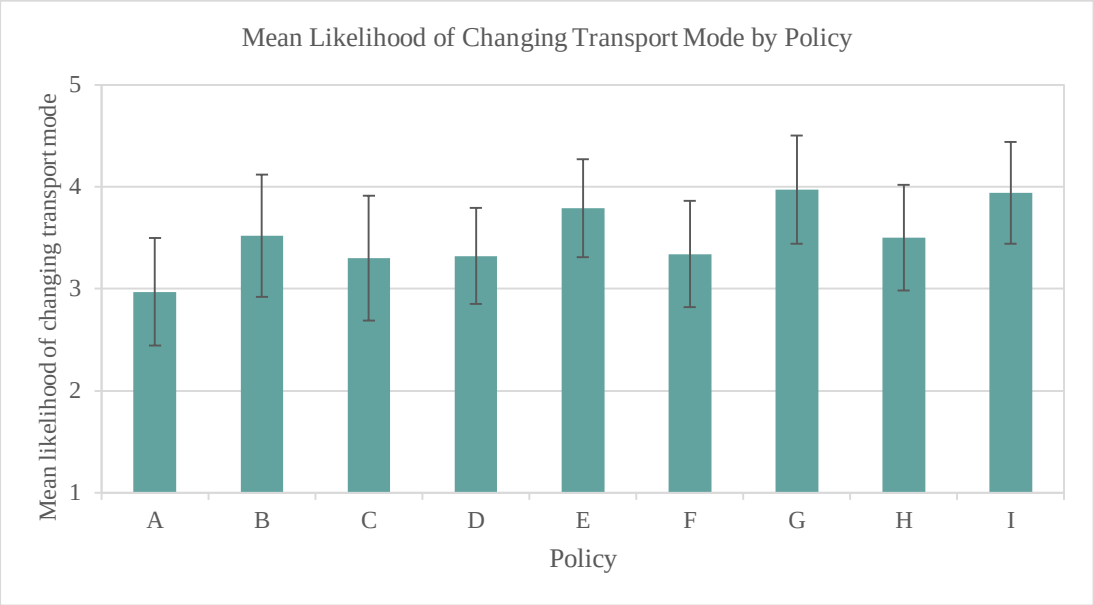

Figure 4.14. *Mean and 95% confidence intervals of likelihood of changing transport mode by policy (1 = extremely unlikely; 5 = extremely likely).*

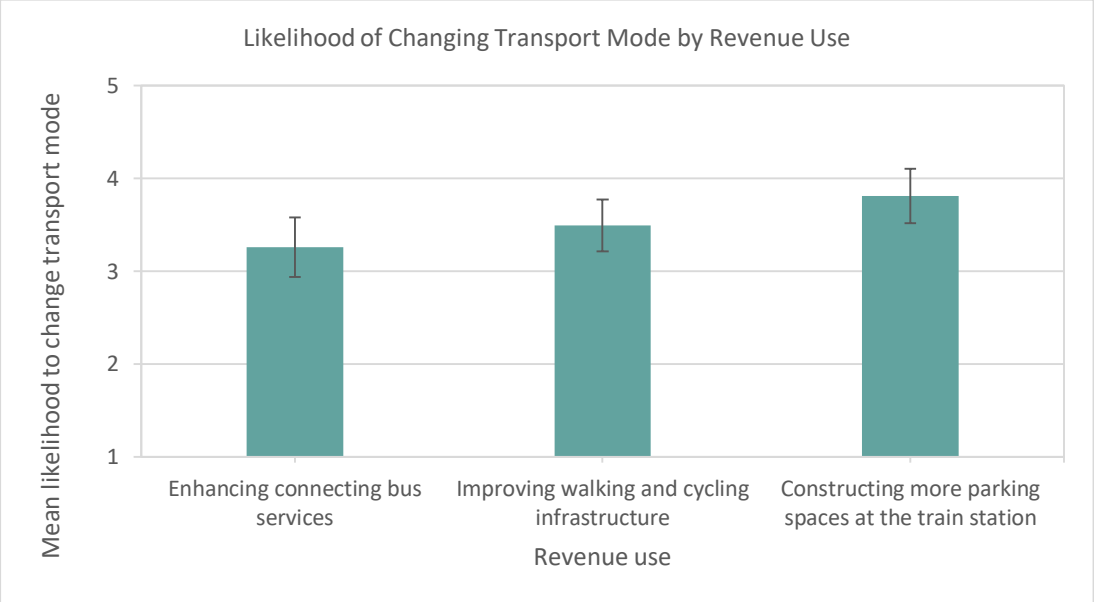

Figure 4.15. *Mean and 95% confidence intervals of likelihood of changing transport mode by revenue use.*

4.6 Results Summary

The stakeholders interviewed identified a range of challenges associated with Park-and-Ride. Most of the participants agreed that more needed to be done in terms of managing demand for parking at stations, which was also seen as critical for future development of the Park-and-Ride concept. The stakeholders suggested that implementing a parking charge would be a viable option for managing demand; however, community acceptance, lack of integrated ticketing, limited strategic policy guidance, and enforcement could delay implementation. The interview results also highlighted that the emergence of new technology would have profound implications for Park-and-Ride, with many interviewees expressing the necessity to accommodate or respond to bike-sharing, car-sharing, ride-sharing, and other future technologies to retain a competitive advantage over other transport modes.

The results from the SEM analyses indicate that the association between norm, intentions, and behaviours marks a central difference between the two transport modes. Social norm played a more important role than PBC in predicting cycling intentions and behaviour. The opposite was true for walking, where social norm, while statistically significant, was not nearly as important as PBC. This could suggest that for the Greater Wellington sub-sample of recent train users, cycling to the station could be influenced more by what society and people close to the individual think of the behaviour rather than the perceived ease of cycling. Personal norm had an indirect association with walking and cycling intention through attitude, social norm and PBC.

The key message that came from the qualitative component of the survey was that walking and cycling were perceived to take too much time, needed planning and equipment, and were unsafe. Time and distance factors were stated by the majority of respondents to be a significant impediment to walking and cycling. However, equally mentioned was the lack of adequate walking and cycling infrastructure. This perception was a fundamental barrier to cycling in particular, and it seemed clear that changes to roads, including building a network of segregated cycle ways, was needed in order to encourage commuters to cycle to the station.

The results for the Park-and-Ride policy evaluation indicated that parking fees and revenue use did not appear to affect policy acceptability and perceived policy fairness; however, there was a statistically significant association between the level of parking fee and perceived effectiveness of the Park-and-Ride policy. Higher ($3.00) parking fees were perceived as more effective in achieving transport aims than low parking fees ($1.00). Additionally, revenue use had a significant association with respondents' likelihood of changing transport mode. Commuters were more likely to change their transport behaviour when policies had their revenues allocated to enhancing connecting bus services.

The following chapter summarises and discusses the results of this chapter. The next chapter will also discuss the limitations of this research and offer recommendations for future research and policy.

Chapter Five

Discussion and Conclusion

The purpose of this research is to investigate Park-and-Ride in Greater Wellington**.** It aims to answer five research questions: (i) what do key stakeholders perceive as the challenges of Park-and-Ride in the Wellington Region?; (ii) what are the likely future developments of the Park-and-Ride concept in the Region?; (iii) can a behavioural model, adapted from the literature, explain Wellington commuters' intention to walk and cycle to the train station?; (iv) why do Wellington commuters drive to the train station and what are the barriers to accessing the station by walking and cycling?; and (v) what are Wellington commuters' responses to a range of potential Park-and-Ride policies? This chapter summarises and discusses findings of this study, linking the results presented in Chapter Four with the relevant literature and theoretical framework in Chapters Two.

5.1 Summary of Research Findings

5.1.1 Challenges of Park-and-Ride

The interview participants identified a number of challenges associated with the development of parking at stations, in particular, and its effects on the transport system. A prevalent theme that emerged from the interviews with stakeholders was that providing parking at the station often transfers demand from existing public transport services. This decreases the viability of those bus services which lose patronage, and ultimately the viability of business and communities which depend on them. While the proportion of users abstracted from alternative public transport was not quantified in this study, the international literature makes it clear that marginal bus routes are the most obvious sufferers from Park-and-Ride induced abstraction, as evidenced by studies in Australia (Public Transport Users Association, 2016; Wiseman et al., 2012), UK (Parkhurst, 2000a), and the Netherlands (Mingardo, 2013). In spite of the significance of the issue, no literature

was found specifically discussing the issue of equity, which is particularly concerning given that Park-and-Ride services are often subsidised from public funding. A few studies, however, have acknowledged that equity is often overlooked when implementing Park-and-Ride facilities (Duncan, 2017; Meek et al., 2009; Wallis, Ballantyne, Lawrence, & Lupton, 2014).

While some stakeholders considered the expansion of existing Park-and-Ride facilities as likely and positive, others were slightly less enthusiastic about expansion. Those opposing felt that continued expansion of parking facilities beyond the capacity constraints of each site would create major delays within the parking areas, thereby reducing the attractiveness of Park-and-Ride. The challenge for planners is to determine an appropriate balance of parking relative to other access modes (walking, cycling, and bus services). Too much parking can be detrimental to alternative access modes, while too little parking will result in spill-over parking into nearby residential and commercial areas. Therefore, the appropriate balance is critical to maximise the efficiency of the transport system. However, as mentioned by two representatives from the Regional Council, there is a lack of information available to assist decision makers in planning and developing Park-and-Ride. A framework to promote more consistent decision-making across the region is necessary to inform decisions with regard to the purchasing of land for Park-and-Ride.

It seems that there is a need for innovative approaches to parking management operations in order to resolve these issues. However, managing parking demand and supply effectively seems fraught with challenges for those tasked with making policy decisions. During the interviews, stakeholders mentioned four different strategies to manage demand including, (i) expanding parking capacity by adding parking spaces to an existing facility; (ii) reducing parking demand by encouraging use of alternative modes and more accessible land use development; (iii) increasing parking efficiency by sharing, regulating and pricing; and (iv) improving enforcement and control of parking regulations to address spill-over problems. These strategies appear to be in line with what is acknowledged in the literature and what has been successful in other case studies (Calgary Transit, 2011; Martens, 2007; Mingardo, 2013; Stieffenhofer et al., 2016; Syed et al., 2009).

The cost of building and maintaining Park-and-Ride facilities is substantial and – in line with 'beneficiary pays' – should be borne by the users rather than local taxpayers. Public money should continue to be used to subsidise public transport, which is available to everyone, rather than parking, which is available only to those who are able to drive and can afford a car. The international literature also makes it clear that providing free or reduced cost public car parks results in 'over-consumption' and the inefficient use of parking (Shoup, 2005). During the interviews, stakeholders frequently mentioned that introducing a parking charge could be an effective way to solve this issue. Those people who currently drive to the station then have the option of paying to park or choosing to use a different mode of transport to access the station to avoid paying the fee. However, a few stakeholders felt that there would be public acceptability issues that would make the introduction of parking charges problematic. A study by Eriksson et al. (2006) suggests that perceived fairness and perceived effectiveness were important for the acceptability of TDM measures in Sweden. Awareness of the consequences that car use has for the environment was also associated with more acceptance (Nordfjaern & Rundmo, 2015). This links to the quantitative component of this research, which showed that overall acceptance of a parking charge was low among respondents in Greater Wellington**.**

There are also practical issues related to the introduction of a parking charge that were raised by some stakeholders – how the charge would be enforced, and how the revenue raised from the parking charge would be utilised – among a number of important questions that need to be addressed. What was clear from the interviews was that many stakeholders thought it would be challenging to implement a charge in the absence of integrated ticketing. Integrated ticketing has the potential to overcome cost and convenience barriers especially for those who combine bus and train in their commute. Payment machines could be installed at Park-and-Ride sites temporarily until integrated ticketing is implemented in 2020 (GWRC, 2010). Charging for parking at Park-and-Ride sites is also a potential mechanism for funding other transport-related projects. If the revenue raised from the parking charge is allocated to specific areas, it will likely improve acceptability of a parking charge. For example, the results from the survey in the current research suggested that respondents were more accepting of revenue being allocated to the construction

of more parking spaces, while revenue allocated to improving walking and cycling infrastructure was the least acceptable. However, if revenues are allocated as preferences suggest, it is likely that the new parking infrastructure would induce new Park-and-Ride demand. Some stakeholders also saw lack of enforced parking restrictions around stations as a major challenge, especially if a charge is implemented. The failure to create and/or enforce parking restrictions in areas around stations means that vehicles spill over into nearby residential and commercial areas. However, no literature was found specifically discussing the impact of spill-over parking on the viability of local businesses, and this could be an area of useful future research.

Some of the interviewees also suggested that using the land around stations for development rather than parking would allow more people to access the train system without driving. International evidence suggests that the replacement of Park-and-Ride facilities with TOD can, in some contexts, generate a net reduction in vehicle kilometres travelled, by promoting a transport mode shift from the car to more sustainable modes (Duncan, 2017; Mees, 2014). However, the concept of TOD itself remains disputed among the stakeholders. There are still many obstacles to overcome in order to successfully implement TOD projects in Greater Wellington, obstacles which are well documented in the literature (e.g. Duncan (2010); Mees (2014); and Willson and Menotti (2007)). While the Regional Council lacks jurisdiction over land-use consenting decisions, it can work with the local authorities to encourage transport-supportive land use patterns. In addition, the Regional Council can form partnerships with private developers to explore opportunities for TOD in the future. This has been identified as a focus area in the Wellington Regional Public Transport Plan, which seeks to actively encourage developments that maximise integration with walking, cycling and public transport services (GWRC, 2014). In many ways, the potential for conversion of Park-and-Ride facilities to housing and other land uses represents a *de facto* form of land banking.

Currently, major investment opportunities are being potentiated as the Regional Council purchases land adjacent to stations. This land was bought relatively cheaply with surface parking developed to serve as an interim land use for eventual TOD in the future. It is anticipated that substantial land value increases along the rail corridor

in the future (due to an increase in people wanting to live or work near them) will encourage private developers to lease or buy parts of this land to invest in higher density housing. However, investing in a large but temporary parking structure in such a location makes it harder to cash in the banked land when the market conditions are ripe for TOD.

5.1.2 The Future of Park-and-Ride

Considering the rising popularity of Park-and-Ride throughout the Greater Wellington, it can be assumed that Park-and-Ride will continue to grow. The concept of Park-and-Ride has changed very little but there are potential developments that may enhance its role in reducing car use. In particular, as discussed in the Results chapter, three themes emerged from the interviews with stakeholders regarding the future development of the Park-and-Ride concept: (i) mobility hubs; (ii) responsiveness to new technologies; and (iii) bus-based Park-and-Ride. This section discusses these results in the context of similar studies looking at ways in which the concept could be developed in the future as well as exploring the wider implications of these results in relation to transport policy.

The central theme that emerged from the interviews was mobility hubs. As recognised in the Results chapter, mobility hubs are places of connectivity where different modes of transport come together seamlessly and where there is an intensive concentration of employment, living, shopping and/or recreation. The participants from both the Regional Council and from the City Councils identified a number of new and existing hub features, including the incorporation of shared mobility (i.e. public transport, bike-sharing, car-sharing, and ride-sharing), and a strong emphasis on improving cycling facilities. These appear to be in line with what is acknowledged in the literature and what has been successful in other case study areas (Enbel-Yan & Leonard, 2012; Shaheen & Chan, 2016).

While Park-and-Ride is the dominant use and preferred access mode for most train users, it is likely that in the future there will be a reduction in the reliance on Park-and-Ride facilities with more commuters using more sustainable modes to access the station. Revenues drawn from parking fees in the future can be used to finance the provision of cycling facilities and improve pedestrian access, while at the same time,

reduce the demand for parking. Several stakeholders discussed the potential for a bicycle-sharing scheme at stations as a substitute for, or in conjunction with, other public transport services. The presence of bikes for hire also has the potential to dissuade some commuters from taking their bikes on the train, thus freeing up capacity on the train for others. This will be crucial in the future, as based on predicted patronage increases for the region (23 million public transport trips by 2020), the rail system will need to accommodate additional passengers (GWRC, 2010). The success of bicycle-sharing schemes is well documented in the literature (DeMaio, 2009; DeMaio & Gifford, 2004; Shaheen & Chan, 2016; Sherwin, 2010; Zhao & Shengxiao, 2017). Bike sharing has been shown to improve the accessibility and affordability of travel, through greater transport choice, reduced journey times and reduced mobility costs (Ricci, 2015), as well as having major health co-benefits (Randal, 2013). However, as mentioned in the Results chapter, a number of respondents viewed inadequate and unsafe cycling routes as a barrier to cycling to the station – and the literature notes that they have also been a major barrier to uptake of bicycle-sharing schemes (Fishman, Washington, & Haworth, 2012). The implication is that more needs to be done to create cycle routes that increase perceived safety levels for people riding bicycles, both in Wellington City and across the region.

Many of the interview participants also discussed the role that shared mobility plays in changing the region's car-centric culture. They noted that car-sharing and ride-sharing have the potential to improve transport choices and allow people to access the station in environments not supportive of walking and cycling. Car-sharing is still in the early stages of development in Wellington (Sobiecki, 2017), and is not well known or widely used in New Zealand outside Wellington City; however, there is potential for station based car sharing in the future. The concept of station based car sharing refers to a model where the fleet of car share vehicles are based at popular railway stations (Barth & Shaheen, 2002). Stakeholders in the present study viewed ride-sharing as another essential component in a mobility hub. Currently, car-pooling is encouraged by the Regional Council through premium parking locations at Petone, Paraparaumu and Waikanae stations. The parking spaces are reserved for commuters who arrive at the station with two or more people in their car; however, there is currently no enforcement for non-compliance.

The integration of taxi/Uber and public transport has received less attention in the international literature (Wright & Nelson, 2014). This form of ride-sharing has the potential to serve as a feeder system connecting commuters from less densely populated areas to public transport. As mentioned by one interviewee, the current configuration of parking facilities is likely to change, with more of an emphasis on pick up/drop off facilities to accommodate private vehicles, taxis and ride-share. However, it should be noted that while the incorporation of car sharing and ride share schemes at mobility hubs will improve transport choices for many commuters, the adoption of low-emissions vehicles can be encouraged by providing supportive infrastructure such as electric vehicle charging stations.

Several stakeholders discussed the development and adoption of emerging transport technologies, with the potential for some technology enhancements to greatly improve a range of transport services, and hence demand for these services. The introduction of smart parking was mentioned by a stakeholder as a mechanism to make more efficient use of existing parking facilities, improve station accessibility, and help increase train patronage. Smart parking provides real-time information to commuters about available parking at stations and is a means of offering reduced parking fees and premium parking locations to those who carpool to stations (Huang, 2015; Rodier & Shaheen, 2010). New technologies also have the potential to deliver real-time traffic and routing information directly to drivers, enabling them to minimise congestion end route to the transport hub, reducing delays (Round & Cervero, 1996).

The final theme that emerged from the interviews with stakeholders was the development of bus-based Park-and-Ride. While some stakeholders advocated for an increase in formal bus-based Park-and-Ride, others were less enthusiastic about the prospect. Bus services are generally developed to serve specific residential areas and to connect these outlying areas with the city centre; however, the introduction of bus-based Park-and-Ride is clearly a substitute for local residential accessibility by bus. Wellington City currently has two informal bus-based Park-and-Ride sites, one in Karori, serving the bus services from west Wellington suburbs, and one in Miramar, serving the bus services from east Wellington suburbs. Commuters generally drive to these interchanges as they offer a greater number of bus services than are offered in

their residential area. For example, the suburb of Karori is served by one bus route which links Karori to Wellington City; however, the informal Park-and-Ride at the Zealandia car park in Karori is served by multiple bus routes, so can provide not only a more direct and quicker service, but also a more frequent level of service to Wellington CBD. In the light of comments from respondents in this study, GWRC needs to consider the benefits of enhancing the current bus services against the provision of bus-based Park-and-Ride.

This said, it is important that future planning and development of Park-and-Ride facilities strikes a balance between meeting the demand of today, and being adaptable to likely reductions in future need for parking. For public transport services to remain competitive, the Regional Council needs to actively respond to emerging technologies and at the same time meet the changing needs of the community. The purchase of land adjacent to stations puts the Regional Council in a good position to pursue emerging opportunities and meet future challenges.

5.1.3 Would Current Train Users Consider Walking and Cycling Access?

The second part of this research looked at ways to motivate train users to walk and cycle to the station rather than driving. The first part of this assessment considered the psychological factors relating to walking and cycling, including the influences of attitude, social and personal norms, perceived behavioural control (PBC), problem awareness and environmental concern. The second part gave insight into the contextual issues of choosing to walk and cycle to the station. In addition, a specific measure, pricing, was assessed as part of a strategy to reduce car use to the station. This section is structured according to these elements, synthesising relevant literature to compare, contrast and consider explanations for the results and relationships found.

Intentions and Psychological Factors

The findings from this research provide support for the effectiveness of Ajzen's (1991) TPB in predicting intentions to walk and cycle. It also offers some evidence for the incremental validity of additional variables. The results from the structural equation model (SEM) indicated that attitude, social norm and PBC yielded a moderate level of prediction and together explained 54% of the variance in walking

intention, and 36% of the variance in cycling intention. These explained variances are larger than the 27% average level of explained variance found in Armitage and Conner's (2001) meta-analysis of studies using the TPB framework. Thus, individuals who had a positive attitude toward walking and cycling perceived greater normative support for walking and cycling, and perceived walking and cycling as easy, also had stronger intentions to engage in the behaviour. In addition to demonstrating the importance of the TPB constructs, the present findings validate the importance of including personal norm, environmental concern, and problem awareness in the modified TPB for predicting walking and cycling. For example, 60% of the variability in walking intention and 39% of the variability in cycling intention is explained by the six constructs: attitude, social norm, PBC, personal norm, environmental concern, and problem awareness. As for the proportion of variance explained in regard to behaviour, the 73% explained for walking behaviour and 37% for cycling behaviour found in this research was higher than the 27% found by Armitage and Conner (2001). This may be partly due to the use of self-reports, which will be discussed in Section 5.3.

The most important variable in predicting intentions to walk to the station was PBC. Thus, participants who had a high perception of behavioural control also had a strong intention to walk to the station. This supports research on the TPB consistently showing that PBC is the strongest predictor of intentions. For example, PBC was found to be the strongest and only significant predictor of walking intention and behaviour among university students in Hong Kong (Guibo, Ransford, Hui, & Vivian, 2015). Lemieux and Godin (2009) also found PBC to be a significant determinant of active commuting intention among undergraduate and graduate students in Quebec, Canada. However, respondents' intention to cycle to the station was mainly influenced by social norm and to a lesser extent PBC and attitude. This suggests that, for the Wellington Region sample, participants were more concerned with support from one's social surroundings and less on the perceived ease or difficulty of cycling to the station. The high explanatory power that social norm appears to have in the present research extends the work of Bamberg and Schmidt (2003), who found a significant influence of social norm on intentions to use a car in Germany; and Frater, Kuijer, and Kingham (2017) who found social pressure by friends strongly influenced the intention to cycle to school in Christchurch. Eriksson

and Forward (2011) also reported a significant increase in intention to bike after social norm was added as a predictor of intention. Social support more generally was also found to be positively correlated to cycling in Graz, Austria (De Geus, De Bourdeaudhuij, Jannes, & Meeusen, 2008) and in Flanders, Belgium (Titze, Stronegger, Janschitz, & Oja, 2007).

A possible explanation for the variation in the relative importance of social norm between the two transport behaviours could be due to expectations and attitude of respondents' employers and co-workers. For example, some respondents in a comparative study conducted in Delft, the Netherlands, and Davis, California, reported feeling uneasy walking into the office in cycling clothes, while others faced a lack of understanding from their colleagues and were subject to negative comments for choosing to cycle to work (Heinen & Handy, 2012). A study conducted in Belgium also found that many considered not biking as they did not like to arrive sweaty and red-faced (Simons et al., 2013). Therefore, the difference in the importance of social norm between the two transport modes could be due to the perceived intensity (and perspiration as a consequence) of cycling compared to walking. Creating a social environment supportive of cycling is one way in which cycling mode share may be increased, as is the provision of cycling facilities at workplaces.

One of the most interesting results from the analysis arose from comparing the interaction between PBC and behaviour between the two transport modes. In contrast to predictions of the TPB (Ajzen & Madden, 1986) and the findings from the broader literature examining the TPB and cycling behaviour (Haustein & Hunecke, 2007; Quine, Rutter, & Arnold, 1998), PBC failed to emerge as a significant predictor of cycling behaviour independently of the effect of intention. There are a few potential explanations for the non-contribution of the PBC variable in the cycling behavioural model in this study. First, it may be a consequence of the behaviour being under complete volitional control (Ajzen & Madden, 1986). However, this seems to not hold for this research. Cycling is a planned activity requiring some preparation for its completion and is understood to be influenced by many factors outside the control of the individual, e.g. the built and natural environment, availability of resources, time constraints (Aarts, Paulussen, & Schaalma, 1997; Notani, 1998; Singleton, 2013).

Thus, volitional control is limited. An alternative explanation put forward by Milković and Štambuk (2015) is more likely. The authors claimed that PBC might not always correspond with actual behavioural control, as a person can perceive certain behaviours to be more or less feasible than they actually are. Furthermore, if individuals are familiar with the behaviour in question, which is likely to be the case for individuals with high levels of past behaviour, PBC should be more accurate and, consequently, PBC should adequately reflect actual control and the PBC-behaviour relationship should be stronger (Armitage & Conner, 2001; Bozionelos & Bennett, 1999; Verplanken & Wood, 2006). Therefore, it is possible that participants in this research may not be accurate in judging the level of control they actually have over cycling to the station due to factors outside of the participants' control, or equally, unfamiliarity with the behaviour may be responsible for participants' inaccurate judgement of control (Langer, 1975; Sheeran, Trafimow, & Armitage, 2003).

Although PBC did not significantly predict cycling behaviour, the opposite was true for the prediction of walking behaviour, with both intention and PBC strong predictors of walking behaviour. PBC had a beta weight of 0.19, supporting Ajzen's argument that attitude concerned with PBC may also exert direct effects on behaviour (Ajzen & Madden, 1986). This is also in line with existing empirical work that showed PBC to have a strong direct and positive effect on a number of behaviours, including the decision to use a car (Klöckner & Friedrichsmeier, 2011), public transport (Liu, 2017), fruit consumption (De Bruijn et al., 2007), and recycling (Chan & Bishop, 2013). In these studies, PBC served as a proxy for actual control, and thus indirectly as well as directly increased the explanation of the behaviour in question.

Research on the TPB has consistently shown that personal norm (feelings of moral obligation) are significant predictors of intentions in the presence of other TPB predictors such as attitude, social norm and PBC. For example, personal norm was a significant predictor of intentions to use public transport (Bamberg et al., 2007; Heath & Gifford, 2002), to use the car for short trips (Harland et al., 1999), to not commit driving violations (Parker, Manstead, & Stradling, 1995), to reduce car use for commuting (Abrahamse et al., 2009; Nordlund & Garvill, 2003), and to purchase organic food (Arvola et al., 2008). Interestingly, the results from this research

suggest that personal norm did not exert a statistically significant influence on walking and cycling intentions. This is in line with existing empirical works that showed personal norm to be notable for explaining less variance. For example, Wang, Fan, Zhao, Yang, and Fu (2016) found that personal norm only accounted for an additional one percent of variance over and above the TPB constructs. Evans and Norman (2003) also failed to show a significant effect of personal norm on road-crossing intentions among adolescents in Wales. However, the results from the present research provide support for attitude as a strong moderator of personal norm and intention, implying that the formation of a favourable/unfavourable attitude toward walking and cycling is influenced by one's feelings of moral obligation to reduce [one's] car use. The insignificant direct influence of personal norm on intention, in conjunction with the significant impact of social norm, suggests that, for the Wellington Region sample, the intention to walk and cycle to the station is based on some need to conform to social standards and social injunctions, rather than on an internalised, personal, feeling of moral obligation to 'do what feels right'.

Of particular interest in this research was determining the influence of general environmental beliefs on behaviour intentions, either directly or indirectly. The results suggested that general environmental beliefs do not directly influence walking and cycling intention. This result is consistent with the value-action gap as described by Ajzen and Fishbein (1975), predicting a weak relationship of beliefs with behaviour, but stronger relationships of beliefs with attitude and of attitude with behaviours. Although the direct impact of general environmental beliefs was insignificant, the result also highlights their indirect impact on walking and cycling intention via attitude and social norm. As predicted, individuals who are concerned about environmental issues tend to have a more positive attitude toward cycling and have a stronger intention to cycle to the station. However, the relationship between general environmental beliefs and attitude toward walking is insignificant. While the NEP items value the environment in general, these pro-environmental values did not translate into positive attitude towards walking to the station. This is particularly interesting, as earlier studies (Bamberg, 2003; De Groot & Steg, 2007; Diekmann & Preisendörfer, 2003; Frick et al., 2004; Kaiser, Wölfing, & Fuhrer, 1999) suggest a relationship exists.

At least two explanations for the finding of an insignificant relationship between general environmental beliefs and attitude toward walking are possible. First, as suggested by Gardner and Abraham (2010), the relationship between general environmental beliefs and attitude could be context-dependent. In their study, the authors found that attitude toward non-car transport modes were influenced by general environmental beliefs, but attitude toward driving were not. An alternative explanation put forward by Vaske and Donnelly (1999) also seems likely. The authors claimed that a weak or insignificant value-attitude relation could be due to the broad and general nature of environmental beliefs, which are shared by many individuals and thus are unlikely to explain much of the variability in specific attitude. While there was a statistically significant pathway between general environmental beliefs and attitude toward cycling, only five percent of the variability in attitude was explained by environmental beliefs. This is in line with existing empirical works which showed that general environmental beliefs are only one possible influence on attitude (Han, Hsu, & Sheu, 2010; Vallerand, Deshaies, Cuerrier, Pelletier, & Mongeau, 1992).

The results from this research also provide support for the inclusion of problem awareness in the TPB. The results demonstrate that problem awareness is an antecedent of social norm as well as personal norm. Therefore, individuals who are aware of the global environmental problems caused by car use tend to have a strong sense of social expectation and feel a personal obligation to walk and cycle. Problem awareness was also a strong predictor of personal norm in studies by Nordlund and Garvill (2003), looking at the willingness to reduce personal car use; Jansson and Dorrepaal (2015), looking at personal norm for dealing with climate change; and Hunecke, Blöbaum, Matthies, and Höger (2001), who looked at travel mode choice. The relationship between problem awareness and social norm has previously been established (Bamberg & Möser, 2007; Ha & Janda, 2012; Mastrangelo et al., 2014; Peters et al., 2011); however, the SEM analysis for the current research showed significant differences between the effect of problem awareness on social norm between the two transport modes. Specifically, problem awareness was found to have a direct and positive effect on social norm regarding walking, while problem awareness had a direct and negative effect on social norm regarding cycling. This finding is somewhat surprising; after all, raising awareness of a problem should raise

the sense of urgency in an individual's social circles about taking action, and in doing so, influence the individual's intention to either walk or cycle to the station.

Environmental Factors

The qualitative responses provide further insight into the contextual issues of choosing to walk or cycle to the station. As discussed in the Results chapter, four themes emerged from the survey respondents regarding the factors influencing the decision to not walk and cycle to the station: (i) travel time and distance; (ii) poor/unsafe walking and cycling routes; (iii) bicycle storage and end-of-trip facilities; and (iv); weather and topography.

The main theme that emerged from the participants' comments was the perceived lack of safety of cycling to the station. This was primarily due to the lack of cycling infrastructure and perceived driver behaviour towards cyclists. International literature also suggests that allowing cycles on board trains, building bicycle paths to stations, providing bicycle parking at stations, and providing a bicycle-sharing scheme are all methods of improving bike access to trains, which promotes cycling while helping people reach the public transport system (Morley, 2011; Pucher & Buehler, 2008; Song, Preston, & Ogilvie, 2017). Of these options, GWRC is most able to provide increased bike parking as a means to support bike access as they have direct influence over the land use at most stations. While GWRC already provides bicycle parking at several of its stations (see Appendix A), this thesis has demonstrated that participants could be encouraged to cycle if there were a greater quantity of more secure, weather protected, and free-of-charge bicycle parking available at the stations with the greatest need. This is also in line with existing literature indicating that bicycle infrastructure improvements at the station correspond with an increase in bicycle access (Martens, 2004, 2007; Schneider, Baltes, & TCRP, 2005; Zhao & Shengxiao, 2017). Specifically, a Dutch study found that the installation of secure bicycle parking led to an increase in bicycle used for access trips as well as increased user satisfaction (Martens, 2007). However, better bicycle parking only helps if the commuter does not want to use their cycle at the other end of their journey.

The preference expressed by some of the participants for the option to bring their bicycle on board the train presents serious challenges to promoting more widespread cycle usage. Capacity limitations prevent users from carrying their cycles on board most trains in Greater Wellington during peak hours. Although no studies have explicitly measured the impact of the ability to carry bikes on board the train on cycling levels, Pucher and Buehler (2008) found that most respondents preferred to take their bike on board the train or bus so they could use their bike at both ends of their trip. The presence of easily available bikes for hire at popular stations could encourage more people to cycle at the egress end of the trip and also discourage some commuters from taking their bikes on the train, thus freeing capacity for others. For example, Murphy and Usher (2015) and Sherwin (2010) found that the provision of a bicycle-sharing scheme at stations increased rail patronage, and played an important role in trip-chaining between different forms of public transport (e.g. train and bus services).

Poor and unsafe walking and cycling routes to the station were also mentioned by survey respondents. This is consistent with Ono, Silcock, and Gerilla-Teknomo (2013) who found that reckless and careless attitude of drivers were detrimental to cyclists' perceived safety; and Holman, Donovan, and Giles-Corti (1996) who found that lack of continuous footpaths and cycle ways in Perth, Australia were a deterrent to increased usage. Many respondents reported not wanting to walk and cycle in areas of heavy traffic and noise. For a number of stations in Greater Wellington, SH1 and SH2 create additional challenges. The ease of accessing the station platform from the surrounding neighbourhood and the extent to which the station is well connected to destinations through the local street network is compromised by complex intersections with extended wait times, and indirect walking and cycling routes. Nevertheless, even in such unfriendly landscapes, interventions can help improve the station's accessibility and increase safety by reducing conflict between pedestrians/cyclists and vehicles. For example, the RiverLink project which is currently in consultation with the community aims to improve transport links for the people of central Lower Hutt (GWRC, 2018).

Along with the more fundamental enabling factors, survey participants highlighted the importance of various environmental factors that were previously studied in

relation to walking and cycling (Halldórsdóttir, Nielsen, & Prato, 2017; Randal, 2013; Sherwin, 2010; Walton & Sunseri, 2007). Distance to the station, time of travel, weather, and route steepness were mentioned in the survey in the present study as barriers associated with walking and cycling to the station. Distance to the station was almost always cited as an important factor preventing participants from walking and cycling to the station. This finding is consistent with distance being found to be one of the most important factors influencing access mode choice in Singapore (Koh & Wong, 2013), California (Weinstein Agrawal, Schlossberg, & Irvin, 2008), and the Netherlands (Givoni & Rietveld, 2007; Keijer & Rietveld, 2000; Rietveld, 2000).

Evidence from the present study's survey also suggests that the majority of participants are only likely to cycle or walk to the station if routes do not involve steep gradients. Again, this result is consistent with the findings of Rietveld and Daniel (2004), Rodríguez and Joo (2004), Timperio et al. (2006) and Parkin, Wardman, and Page (2008), that slopes had a negative impact on walking and cycling. Interestingly, the impact of topography on walking and cycling is in contrast to the findings from Walton and Sunseri (2007), who found that hilly topography did not impede walking trips to the trains station in Wellington and Auckland. Policy and planning measures can be devised to minimise the influence of access distance and topography on walking and cycling. As mentioned in Section 5.1.1, transitioning Park-and-Ride facilities into TOD would put more people in close proximity to the station and allow more commuters to access the station by walking and cycling. Topographical constraints could also be overcome with the introduction of electric bikes (Lovejoy & Handy, 2012). Further policy suggestions will be discussed in Section 5.2.

Policies to Encourage Walking and Cycling

The introduction of a parking fee at Park-and-Ride facilities can be seen as an effective way to solve many of the transport-related issues in Greater Wellington**.** Charging for Park-and-Ride is likely to be unpopular, with all policies evaluated as not acceptable. However, acceptability was marginally higher for policies with low parking fees than with high parking fees. The findings are in line with those of Cain et al. (2002), in an Edinburgh study, who found that acceptability diminishes as the

charge increases. In terms of revenue use, respondents were more accepting of revenue allocated to the construction of more parking spaces, while revenue allocated to improving walking and cycling infrastructure was the least acceptable. This supports research regarding the acceptance of demand management strategies that have consistently shown that people find policies more acceptable when revenue use from the fee is allocated to directly benefit the person charged. For example, Schuitema and Steg (2008) found that car users evaluated a kilometre charge policy as more acceptable when revenues were allocated to the transport system than if revenues were allocated to general public funds. Ubbels and Verhoef (2005) also found that revenue allocations that were in the direct interest of the individual were more popular, with revenues allocated to abolishing existing car taxes more acceptable than if revenues were allocated to the general budget.

Research on the acceptability of transport demand management strategies has consistently shown that perceived effectiveness has an influence on the acceptability of policies (Bamberg & Rölle, 2003; Jakobsson, Fujii, & Gärling, 2000; Rienstra, Rietveld, & Verhoef, 1999; Schade & Schlag, 2003). Effectiveness refers to the degree to which policies are likely to reduce various transport-related problems such as (i) discouraging commuters living in close proximity to the Park-and-Ride from driving to the station; (ii) encouraging commuters to consider other modes of travel to the station; and (iii) reducing congestion on the arterial roads leading into Wellington City. The results from the correlational analyses showed that there was a negative correlation between perceived effectiveness and policy acceptability. This suggests that respondents were strongly driven by egoistic motivational processes, with policy measures considered more acceptable when respondents expected to be better off financially and when revenues directly affected the respondent. In particular, the most acceptable parking fee was $1.00, while the most effective was $3.00. Evaluations in terms of revenue use differed too, with constructing more parking spaces at the station seen as the most acceptable, while the most effective was enhancing connecting bus services.

There are two possible explanations for the negative relationship between perceived effectiveness and acceptability. First, perceived effectiveness and actual effectiveness of policies are different. Therefore, the conclusions drawn above

should be treated with caution as respondents could be wrong in their judgements given that they do not have experience with such Park-and-Ride policies (Steg et al., 2006). Equally, it is possible that respondents evaluated the policy strategically as less effective to try and reduce the likelihood of implementation (Rienstra et al., 1999). In addition, it is quite possible that policies which are not popular with local respondents are nevertheless in the wider pubic intent, taking into account considerations such as air quality and climate change.

Perceived fairness was also found to be important for the acceptability of Park-and-Ride policies, shown by the positive correlation between perceived fairness and policy acceptability. This would suggest that policies seen to be most fair should be most acceptable. Indeed, for some policies there would appear to be a broadly positive relationship between rankings for perceived fairness and acceptability. Policy A had the highest levels of acceptability and was also perceived as the third fairest policy. This policy had a parking fee of $1.00 from which revenues were allocated to enhancing connecting bus services. Policy F was regarded as the least acceptable and was perceived as the third most unfair of the nine policies. This policy had a parking fee of $3.00 from which revenues were allocated to improving walking and cycling infrastructure. Thus, for the Wellington Region sample, respondents were less willing to accept a policy where they perceive that it is unfair. This is in line with the findings from Jakobsson et al. (2000), on the acceptability of road pricing; and Eriksson et al. (2006) looking at the acceptability of TDM measures. Therefore, the present study extends the literature in the transport policy domain by providing insight into the factors influencing acceptability judgements and furthermore this research shows that low levels of perceived fairness and effectiveness form barriers to policy acceptance.

Lastly, though no statistical differences were found between parking policy and likelihood of changing transport mode, Policy G was considered the most effective policy in changing the respondent's transport behaviour. The policy involved a parking fee of $1.00 from which revenue would be allocated to constructing more parking spaces at the station. Policy A, with a parking fee of $1.00 and revenue allocated to improving walking and cycling infrastructure, was found to be the least effective in changing the respondent's expected transport behaviour. The lack of

significance could be partially accounted for by the fact that the monetary value of the parking policy appears to need to surpass a minimum threshold before people would actually change their transport behaviour. There are also significant gaps in the public transport and cycling network and existing services are not always of sufficiently high quality; therefore, the proposed policies are unlikely to deter people from driving to the station until attractive supply-side alternatives to the private car are provided.

5.2 Research Contributions

Interest in Park-and-Ride as a mode has expanded rapidly in New Zealand. This thesis has contributed to the limited body of research that exists regarding Park-and-Ride in New Zealand. Accordingly, this thesis offers policy-makers and local authorities insight into a wide range of issues relating to the development of Park-and-Ride, including future strategies for managing parking demand. First of all, the findings of the qualitative component offer insight into the future role of Park-and-Ride should play in tackling the negative externalities of car use. Results suggest that policy-makers and planners should place more of a focus of stations as interchanges for motorised and non-motorised transport modes. The current lack of priority for walking and cycling access reflects the prevalence of the motor vehicle as the preferred mode of transport at many of the stations in the region. Raising the profile of walking and cycling and the benefits of accessing the station by these modes within the transport policy and planning sector will not only have positive effects on the environment but will reduce land and transport costs, as cycle parking is considerably cheaper than car parking spaces.

The results from the survey also highlight the need for clearer criteria for the development and placement of cycle parking at stations, with shelter and security being of primary importance. However, some cyclists prefer to take their bikes with them on the train so they can use them at both ends of their journey or to ensure that their bicycle is safe from vandalism. The latter can be accommodated through the provision of ample, sheltered, secure bicycle parking at stations; however, the former causes problems during peak hours when much of the capacity of the train is needed

to accommodate passengers. This has implications for the management of the limited capacity of bicycle carriage.

Research that provides a better understanding of factors relevant to the choice of transport modes can help formulate interventions that will encourage walking and cycling as a mode of transport. Therefore, the findings from this research could contribute to formulating policies with regard to actions which could encourage walking and cycling. The results reaffirm the need to consider walking and cycling separately. While both transport modes are non-motorised alternatives to driving, the factors that influence the behaviours vary in a number of important ways. Social norm is far more important for cycling than walking; therefore, policy-makers aiming to increase walking probably do not need to focus interventions on changing commuters' social norm. The fact that PBC was the most important factor in predicting walking and that this was influenced most by the built environment, suggests that changes to the physical environment (i.e. street networks, land use, and pedestrian infrastructure) may be enough to encourage more walking to the station, without significant 'soft' policies that tap into attitude and social norm. Interventions could also be anchored on participants' stronger perception of walking as an easy, practical and flexible mode of transport to the station. The insignificant impact of personal norm on walking and cycling intention is in contrast to some other research and raises questions about how to measure personal norm for walking and cycling behaviour.

The current research has illustrated that understanding attitude and opinions held by the public toward Park-and-Ride pricing policies is important for ensuring their successful implementation. Results from this research may assist policy-makers during the formulation and implementation of measures in order to increase acceptability among users of Park-and-Ride facilities. For instance, when pricing policies are planned in the future, it is essential to consider how to increase the policy's perceived fairness and effectiveness. The findings suggest that different strategies ought to be considered when attempting to increase the acceptability of different measures. For example, greater acceptance of policies can be achieved by allocating revenues to car-oriented infrastructure. However, the implications are that the implementation of policies with revenues allocated to non-motorised modes is

likely to be a politically risky alternative; particularly given the more negative evaluations associated with such policies. Since all of the policies evaluated in the current research had low acceptability, it could be beneficial from a political perspective to adopt an incremental approach where pricing policies are trialled before being implemented permanently. Additionally, charges could be first implemented at the inner-most stations in the Wellington Region (e.g. Petone, Crofton Downs, Ngaio, Johnsonville) that are operating at capacity before expanding to other Park-and-Ride sites throughout the region (e.g. Waterloo, Porirua). This type of approach will be important if the policy's aim(s) are to be achieved.

5.3 Limitations of this Research

Some limitations with the present research deserve mention. Firstly, although representatives from Greater Wellington Regional Council, Hutt City Council, and Porirua City Council were interviewed, representatives from Wellington City Council, Upper Hutt City Council, and Kapiti Coast District Council were not available to be interviewed, despite various contacts being made. Interviewing representatives from additional councils would have been beneficial to gain an understanding of the specific challenges associated with Park-and-Ride within their respective communities, providing further insights into the future role of Park-and-Ride, possibly diversifying the conclusions that this thesis reached, or strengthening existing findings. Nevertheless, the current research offers an insight into perspectives on Park-and-Ride in Greater Wellington and raises important questions for future research.

Another limitation of the present study was the mode of recruitment of survey participants. A self-selection recruitment method was used whereby the invitation to complete the questionnaire was open. Emails were sent to a number of individuals and organisations in Wellington, and flyers were handed out at stations in the Wellington Region. While the two recruitment techniques allowed a large portion of the region's population to be reached, self-selection bias resulted in an unrepresentative study sample. Residents from Lower Hutt, Porirua, Kapiti Coast, and Upper Hutt were well-represented and Masterton, Carterton, South Wairarapa, and Wellington City residents were possibly poorly-represented. Although the

questionnaire was administered online, flyers were only handed out at the main Park-and-Ride stations in Lower Hutt, Porirua, Kapiti Coast, and Upper Hutt, which would explain why these residents may have been well-represented in the study sample. Despite the limitations in sample representativeness, the questionnaire captured the views and opinions of those who regularly commute to Wellington City by train and car, and so does provide valuable insights into transport behaviour and perceptions of walking and cycling in the Wellington Region.

The measures in the online questionnaire were subjective (self-reported) behaviour measures, rather than objective observations. Self-reported behaviour measures are susceptible to under- and over-reporting. Respondents could have, therefore, under-reported behaviours deemed inappropriate or they could have over-reported behaviours viewed as appropriate (Armitage & Conner, 2001; Arvola et al., 2008; Audrey et al., 2014). The sufficiency of the cycling behavioural model was a potential concern. The TPB model (attitude, social norm, and PBC) explained 36% of the variance in cycling intentions. However, the proportion of variance explained increased to 39% when the additional measures of personal norm, environmental concern, and problem awareness were included. There is clearly a considerable proportion of variance left unexplained. Several researchers argue that the inclusion of contextual factors, such as external drivers and barriers, can improve the explanatory power of pro-environmental behavioural models (Jackson, 2005; Schwanen, Banister, & Anable, 2012; Triandis, 1979). The role of habits was also not included in both the walking and cycling behavioural models; these have been found to be an important factor in several studies regarding transport mode choice (Klöckner & Matthies, 2004; Verplanken, Aarts, & van Knippenberg, 1997; Verplanken, Walker, Davis, & Jurasek, 2008). The length of the questionnaire precluded adding contextual factors and habits into the behavioural model.

5.4 Future Research

The present research has addressed an important research gap by exploring Park-and-Ride in the Wellington Region. There is, however, four main areas of further research that has arisen as a result of the findings of this thesis.

1. It could be useful, from a policy perspective, to explore the impact of cycling infrastructure at stations on transport behaviour. More specifically, a before-and-after study could be conducted to shed light on the possible effectiveness of various interventions to promote the integration of cycling and rail.

2. The influence of personal norm on walking and cycling intention was found to be insignificant in this research. It would be beneficial to not only determine whether personal norm influences intentions in a different way, but also to further explore the relationship between the underlying beliefs of personal norm

3. While this research considered mainly those constructs which are part of the Theory of Planned Behaviour and the Norm-Activation-Model; other constructs such as habits and ascription of responsibility may act as moderator or mediator to the various constructs of the behavioural model. It would be interesting to see the role of other determinants of walking and cycling behaviour in the Wellington context.

4. Finally, this research explored Park-and-Ride in the Wellington context. A comparative study, particularly to Auckland could provide insightful findings.

5.5 Conclusion

Recognising the need for transport in the Greater Wellington context to become more sustainable, the overall objective of this study was to understand the behaviour of commuters in order to inform the development of policies to increase the incidence of walking and cycling to and from railway stations. Consistent with this were three aims. The first was to provide an in-depth understanding of stakeholders' perceptions of challenges associated with the development of Park-and-Ride and to gain insight into the future opportunities for developing the Park-and-Ride concept. The second aim was to examine the psychological barriers as well as the contextual factors affecting the decision to walk and cycle to the station. The third was to explore the acceptability of Park-and-Ride pricing policies and whether the level of parking fee, revenue use, perceived policy fairness, and perceived effectiveness influence

acceptability judgements. As identified in Chapter Three, a pragmatic mixed methods approach, involving semi-structured interviews with stakeholders and an online survey, was used to address these aims.

The key conclusions for the first aim can be summarised as follows. A number of challenges were identified by stakeholders which for the most part align with those reported in international literature. Of particular concern to stakeholders was how best to manage demand for parking while at the same time ensuring an appropriate balance of parking relative to other more sustainable access modes. A framework to promote more consistent decision-making across the region, outlining criteria for when and where expansion of Park-and-Ride is necessary, and when and where regulating and pricing could be more appropriate, could resolve these concerns. As for how the Park-and-Ride concept can be developed in the future, the idea of transitioning Park-and-Ride into interchanges for motorised and non-motorised transport modes was discussed by stakeholders. The combination of shared mobility, walking and cycling facilities, bicycle-sharing schemes, and intensification of residential development around stations has the potential to reduce reliance on private cars and Park-and-Ride facilities.

In regard to the second aim, this research provides support for the application of the Theory of Planned Behaviour to walking and cycling behaviour. Additionally, in line with expectations, personal norm, environmental concern, and problem awareness augmented the predictive validity of the model. When looking at how each of the constructs could predict intentions, the results show that the processes underlying the decision to walk to the station are different from those underlying the decision to cycle to the station. In relation to walking intentions, perceived behavioural control was found to significantly improve the prediction of intentions over the contributions of attitude and social norm. In contrast, social norm was a key determinant of cycling intentions over the contributions of attitude and perceived behavioural control. At the same time, perceived behavioural control only exerted indirect effects on cycling behaviour, which contrasts with the theoretical underpinnings of the Theory of Planned Behaviour, where perceived behavioural control and intention should influence behaviour. Personal norm, at least as measured in this study, did not play a significant role in predicting walking and cycling intention. Having explored the

psychological barriers and contextual factors affecting the decision to walk and cycle to the station, it is suggested that interventions should be tailored to the behaviour being targeted and should focus on the most important factors underlying intentions.

Contextual factors are also important in influencing behaviour. The major barriers influencing respondents' decisions to walk and cycle to the train were largely based around fundamental enabling factors such as lack of walking and cycling friendly environments, limited secure bicycle storage, and inability to carry cycles on trains; however, travel distances to the station, time of travel, weather, and route steepness were also of major concern to respondents. Policies should consider the major tractable barriers found in this research and policy-makers and planners should anticipate any future issues that may arise when more people choose (or would do) to walk and cycle to the station.

In regard to the third aim, as expected, the analyses confirm the low level of inherent public acceptance of Park-and-Ride policy changes. The correlational analyses showed that perceived fairness was significantly and positively related with acceptability of Park-and-Ride policies. Policy-makers attempting to increase the acceptability of different measures would be well advised to consult the public during policy formation, as a fair decision process may enhance perceived fairness of the policy, and as a consequence increase policy acceptability. At the same time, the most acceptable Park-and-Ride policies in this thesis were evaluated as the least effective in achieving the policy aims. Ensuring that the aims and outcomes of the policy are conveyed to the public prior to implementation could enhance perceived effectiveness of the policy, and consequently increase policy acceptance. There also appears to be broad agreement between respondents that, of the policies, those with low parking charges are the most acceptable and those with high parking charges are the least acceptable. Further, results suggest that allocation of the net revenues generated from parking charges to the construction of more parking spaces is more acceptable than allocating revenues to improving walking and cycling infrastructure.

In summary, Park-and-Ride needs to be part of a policy strategy which gradually reforms the regime of automobility towards one which encourages the use of sustainable transport and promotes transit-oriented development. To ensure that Park-and-Ride achieves more measureable environmental benefits in the future,

Greater Wellington Regional Council and the territorial authorities have to overcome a number of challenges, especially relating to the management of parking facilities. Without appropriate demand management strategies, current facilities will continue to be over-utilised which will inevitably create tension between commuters, local businesses, and residents. Progress has already been made to address demand for new and established facilities through the development of a Park and Ride Strategy, but more support for economic disincentives could encourage commuters in the Wellington Region to transition to low carbon transport alternatives.

References

Aarts, H., Paulussen, T., & Schaalma, H. (1997). Physical exercise habit: On the conceptualisation and formation of habitual health behaviours. *Health Education Research, 12*(3), 363-374.

Abrahamse, W., Steg, L., Gifford, R., & Vlek, C. (2009). Factors influencing car use for commuting and the intention to reduce it: A question of self-interest or morality? *Transportation Research Part F: Traffic Psychology and Behaviour, 12*(4), 317-324.

Acharya, A. S., Prakash, A., Saxena, P., & Nigam, A. (2013). Sampling: Why and how of it. *Indian Journal of Medical Specialties, 4*(2), 330-333.

Ajzen, I. (1991). The Theory of Planned Behaviour. *Organisational Behaviour and Human Decision Processes, 50*(2), 179-211.

Ajzen, I. (2011). The Theory of Planned Behaviour: Reactions and reflection. *Psychology and Health, 26*(9), 1113-1127.

Ajzen, I., & Fishbein, M. (1975). *Belief, attitude, intention, and behaviour: An introduction to theory and research.* Reading, UK: Addison-Wesley.

Ajzen, I., & Madden, T. (1986). Prediction of goal-directed behaviour: Attitudes, intentions and perceived behavioural control. *Journal of Experimental Social Psychology, 22*(5), 453-474.

Armitage, C. J., & Conner, M. (2001). Efficacy of the Theory of Planned Behaviour: A meta-analytic review. *British Journal of Social Psychology, 40*(4), 471-499.

Arvola, A., Vassallo, M., Dean, M., Lampila, P., Saba, A., Lähteenmäki, L., & Shepherd, R. (2008). Predicting intentions to purchase organic food: The role of affective and moral attitudes in the Theory of Planned Behaviour. *Appetite, 50*(2), 443-454.

Auckland Transport. (2015). *Regional Public Transport Plan.* Auckland, New Zealand: Auckland Transport. Retrieved from https://at.govt.nz/media/1191335/auckland-transport-rptp-final.pdf.

Audrey, S., Procter, S., & Cooper, A. (2014). The contribution of walking to work to adult physical activity levels: A cross-sectional study. *International Journal of Behavioral Nutrition and Physical Activity, 11*(1), 1-8.

Bachand-Marleau, J., Larsen, J., & El-Geneidy, A. (2011). The much-anticipated marriage of cycling and transit. *Transportation Research Record: Journal of the Transportation Research Board, 2247*, 109-117.

Bamberg, S. (2003). How does environmental concern influence specific environmentally related behaviours? A new answer to an old question. *Journal of Environmental Psychology, 23*(1), 21-32.

Bamberg, S., Hunecke, M., & Blöbaum, A. (2007). Social context, personal norms and the use of public transportation: Two field studies. *Journal of Environmental Psychology, 27*(3), 190-203.

Bamberg, S., & Möser, G. (2007). Twenty years after Hines, Hungerford, and Tomera: A new meta-analysis of psycho-social determinants of pro-environmental behaviour. *Journal of Environmental Psychology, 27*(1), 14-25.

Bamberg, S., & Rölle, D. (2003). Determinants of people's acceptability of pricing measures– replication and extension of a causal model. In J. Schade & B. Schlag (Eds.), *Acceptability of Transport Pricing Strategies* (pp. 235-248). Oxford, UK: Elsevier.

Bamberg, S., Rölle, D., & Weber, C. (2003). Does habitual car use not lead to more resistance to change of travel mode? *Transportation, 30*(1), 97-108.

Bamberg, S., & Schmidt, P. (2003). Incentives, morality, or habit? Predicting students' car use for university routes with the models of Ajzen, Schwartz, and Triandis. *Environment and Behaviour, 35*(2), 264-285.

Barth, M., & Shaheen, S. (2002). Shared-use vehicle systems: Framework for classifying carsharing, station cars, and combined approaches. *Transportation Research Record: Journal of the Transportation Research Board, 1791*(1), 105-112.

Bassett, D. R., Pucher, J., Buehler, R., Thompson, D. L., & Crouter, S. E. (2008). Walking, cycling, and obesity rates in Europe, North America, and Australia. *Journal of Physical Activity and Health, 5*(6), 795-814.

Bos, D. M. (2004). *Changing seats: A behavioural analysis of P&R use.* The Netherlands TRAIL Reseach School, Delft, The Netherlands.

Bourke, B. (2014). Positionality: Reflecting on the Research Process. *The Qualitative Report, 19*(33), 1-9.

Bozionelos, G., & Bennett, P. (1999). The Theory of Planned Behaviour as predictor of exercise: The moderating influence of beliefs and personality variables. *Journal of Health Psychology, 4*(4), 517-529.

Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative Research in Psychology, 3*(2), 77-101.

Bryman, A. (2008). *Social research methods* (3rd ed.). New York, NY: Oxford University Press.

Bryman, A., & Cramer, D. (2011). *Quantitative Data Analysis with IBM SPSS 17, 18 &19: A guide for Social Scientists.* London, UK: Taylor & Francis Limited.

Cain, A., Celikel, N., & Jones, P. (2002). *Incorporating public participation into the detailed design of a congestion charging scheme for Edinburgh.* Paper presented at the 34th UTSG Annual Conference, Edinburgh, UK.

Calgary Transit. (2011). *Park and ride in Calgary: Review of parking management options*. Calgary, Alberta: Calgary Transit. Retrieved from https://www.spuryyc.org/wp-content/uploads/2016/05/LRT-Park-and-Ride-Report-2016.pdf.

Chan, L., & Bishop, B. (2013). A moral basis for recycling: Extending the Theory of Planned Behaviour. *Journal of Environmental Psychology, 36*, 96-102.

Charness, G., Gneezy, U., & Kuhn, M. A. (2012). Experimental methods: Between-subject and within-subject design. *Journal of Economic Behaviour and Organisation, 81*(1), 1-8.

Cheng, A. S., & Randall-Parker, T. (2017). Examining the Influence of Positionality in Evaluating Collaborative Progress in Natural Resource Management: Reflections of an Academic and a Practitioner. *Society & Natural Resources, 30*(9), 1168-1178.

Christiansen, D. L., Bullard, D. L., & Peterson, R. L. (1981). *Houston park and ride facilities: An analysis of survey data.* College Station, TX: Texas Transportation Institute. Retrieved from https://static.tti.tamu.edu/tti.tamu.edu/documents/205-15.pdf.

Clayton, W., Ben-Elia, E., Parkhurst, G., & Ricci, M. (2014). Where to park? A behavioural comparison of bus Park and Ride and city centre car park usage in Bath, UK. *Journal of Transport Geography, 36*, 124-133.

Cresswell, T. (2013). *Geographic thought: A critical introduction* (1st ed.). Chichester, UK: Wiley-Blackwell.

Creswell, J. W. (2013). *Research design: Qualitative, quantitative, and mixed methods approaches* (4th ed.). Thousand Oaks, CA: Sage Publications.

Creswell, J. W., & Clark, V. L. P. (2007). *Designing and conducting mixed methods research* (2nd ed.). Thousand Oaks, CA: Sage Publications.

De Bruijn, G.-J., Kremers, S. P. J., De Vet, E., De Nooijer, J., Van Mechelen, W., & Brug, J. (2007). Does habit strength moderate the intention-behaviour relationship in the Theory of Planned Behaviour? The case of fruit consumption. *Psychology and Health, 22*(8), 899-916.

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.

De Groot, J., & Schuitema, G. (2012). How to make the unpopular popular? Policy characteristics, social norms and the acceptability of environmental policies. *Environmental Science & Policy, 19-20*, 100-107.

De Groot, J., & Steg, L. (2007). General beliefs and the Theory of Planned Behaviour: The role of environmental concerns in the TPB. *Journal of Applied Social Psychology, 37*(8), 1817-1836.

De Groot, J., Steg, L., & Dicke, M. (2008). Transportation trends from a moral perspective: Value orientations, norms and reducing car use. In F. N. Gustavsson (Ed.), *New Transportation Research Progress* (pp. 2-26). Groningen, The Netherlands: Nova Science Publishers.

DeMaio, P. (2009). Bike-sharing: History, impacts, models of provision, and future. *Journal of Public Transportation, 12*(4), 41-56.

DeMaio, P., & Gifford, J. (2004). Will smart bikes succeed as public transportation in the United States? *Journal of Public Transportation, 7*(2), 1-15.

DIA. (2008). *Building sustainable urban communities: A discussion document exploring place-based approaches to sustainable urban development in New Zealand*. Wellington, New Zealand: Department of Internal Affairs. Retrieved from https://www.dia.govt.nz/diawebsite.nsf/Files/BSUCwholedocument/$file/BSUCwholedocument.pdf.

Diekmann, A., & Preisendörfer, P. (2003). Green and greenback: The behavioural effects of environmental attitudes in low-cost and high-cost situations. *Rationality and Society, 15*(4), 441-472.

Dijk, M., & Parkhurst, G. (2014). Understanding the mobility-transformative qualities of urban park and ride policies in the UK and the Netherlands. *International Journal of Automotive Technology and Management, 14*(3/4), 246-270.

Dowling, R. (2005). Power, subjectivity and ethics in qualitative research. In I. Hay (Ed.), *Qualitative Research Methods in Human Geography* (2nd ed.). Melbourne, Australia: Oxford University Press.

Duncan, M. (2010). To park or to develop: Trade-off in rail transit passenger demand. *Journal of Planning Education and Research, 30*(2), 162-181.

Duncan, M. (2017). Would the replacement of park-and-ride facilities with transit-oriented development reduce vehicle kilometres travelled in an auto-oriented US region? *Transport Policy, 2017*, 1-9.

Dunlap, R. E., Van Liere, K. D., Mertig, A. G., & Jones, R. E. (2000). New trends in measuring environmental attitudes: Measuring endorsement of the new ecological paradigm: A revised NEP scale. *Journal of Social Issues, 56*(3), 425-442.

Enbel-Yan, J., & Leonard, A. (2012). Mobility hub guidelines: Tools for achieving successful station areas. *ITE Journal, 82*(1), 42-47.

Eriksson, L., & Forward, S. E. (2011). Is the intention to travel in a pro-environmental manner and the intention to use the car determined by different factors? *Transportation Research Part D: Transport and Environment, 16*(5), 372-376.

Eriksson, L., Garvill, J., & Nordlund, A. M. (2006). Acceptability of travel demand management measures: The importance of problem awareness, personal norm, freedom, and fairness. *Journal of Environmental Psychology, 26*, 15-26.

Evans, D., & Norman, P. (2003). Predicting adolescent pedestrians' road-crossing intentions: an application and extension of the Theory of Planned Behaviour. *Health Education Research, 18*(3), 267-277.

Evans, J., & Mathur, A. (2005). The value of online surveys. *Internet Research, 15*(2), 195-219.

Fetters, M. D., Curry, L. A., & Creswell, J. W. (2013). Achieving integration in mixed methods designs: Principles and practices. *Health Services Research, 48*(6.2), 2134-2156.

Fishman, E., Washington, S., & Haworth, N. (2012). Barriers and facilitators to public bicycle scheme use: A qualitative approach. *Transportation Research Part F: Traffic Psychology and Behaviour, 15*(6), 686-698.

Ford, A. (2012). *Technical Note 5B: Rail Intercept Survey Analysis*. Wellington, New Zealand: Opus International Consultants Limited. Retrieved from https://www.gw.govt.nz/assets/Transport/Transport-models/TN5b-Rail-Intercept-Survey-Analysis-FINAL.pdf.

Ford, J. K., MacCallum, R. C., & Tait, M. (1986). The application of exploratory factor analysis in applied psychology: A critical review and analysis. *Personnel Psychology, 39*(2), 291-314.

Frater, J., Kuijer, R., & Kingham, S. (2017). Why adolescents don't bicycle to school: Does the prototype/willingness model augment the Theory of Planned Behaviour to explain intentions? *Transportation Research Part F: Traffic Psychology and Behaviour, 46*, 250-259.

Frick, J., Kaiser, F. G., & Wilson, M. (2004). Environmental knowledge and conservation behaviour: Exploring prevalence and structure in a representative sample. *Personality and Individual Differences, 37*(8), 1597-1613.

Gardner, B., & Abraham, C. (2010). Going green? Modelling the impact of environmental concerns and perceptions of transportation alternatives on decisions to drive. *Journal of Applied Social Psychology, 40*(4), 831-849.

Gärling, T., Eek, D., Loukopoulos, P., Fujii, S., Johansson-Stenman, O., Kitamura, R., . . . Vilhelmson, B. (2002). A conceptual analysis of the impact of travel demand management on private car use. *Transport Policy, 9*(1), 59-70.

Gayah, V. V., Stieffenhofer, K. E., & Shankar, V. (2014). *How can we maximise efficiency and increase person occupancy at overcrowded park and rides?* Washington, USA: Washington

State Department of Transportation. Retrieved from https://www.wsdot.wa.gov/research/reports/fullreports/830.1.pdf.

Giles-Corti, B., Foster, S., Shilton, T., & Falconer, R. (2010). The co-benefits for health of investing in active transportation. *New South Wales Public Health Bulletin, 21*(6), 122-127.

Givoni, M., & Rietveld, P. (2007). The access journey to the railway station and its role in passengers' satisfaction with rail travel. *Transport Policy, 14*(5), 357-365.

Greene, J. C. (2006). Toward a methodology of mixed methods social inquiry. *Research in the Schools, 13*(1), 93-98.

Guest, G., Bunce, A., & Johnson, L. (2006). How many interviews are enough? An experiment with data saturation and variability. *Field methods, 18*(1), 59-82.

Guibo, S., Ransford, A. A., Hui, L., & Vivian, C. P. (2015). Understanding walking behaviour among university students using Theory of Planned Behaviour. *International Journal of Environmental Research and Public Health, 12*(11), 13794-13806.

Gunzler, D., Chen, T., Wu, P., & Zhang, H. (2013). Introduction to mediation analysis with structural equation modelling. *Shanghai Archives of Psychiatry, 25*(6), 390–394.

GWRC. (1992). *Transportation Strategy for Wellington's Inner City*. Wellington, New Zealand: Greater Wellington Regional Council.

GWRC. (1994). *Transport Strategy*. Wellington, New Zealand: Greater Wellington Regional Council.

GWRC. (2010). *Wellington Regional Land Transport Strategy 2010-40*. Wellington, New Zealand: Greater Wellington Regional Council. Retrieved from https://www.gw.govt.nz/assets/Transport/Regional-transport/RLTS/RLTS2010-docs/WRLTS-2010-2040-Doco-WEB.pdf.

GWRC. (2013). *Wellington Regional Rail Plan 2010 - 2035*. Wellington, New Zealand: Greater Wellington Regional Council. Retrieved from https://www.gw.govt.nz/assets/Transport/Public-transport/Train-docs/WellingtonRegionalRailPlan2010-2035.pdf.

GWRC. (2014). *Wellington Regional Public Transport Plan*. Wellington, New Zealand: Greater Wellington Regional Council. Retrieved from https://www.gw.govt.nz/assets/Transport/Regional-transport/RPTP/WGNDOCS-1386111-v1-FinalRPTPdocWEBversion.PDF.

GWRC. (2017a). Cycle lockers and stands. Retrieved 7 July 2017, from https://www.metlink.org.nz/assets/new-content-images/Cycle-stands-and-cages-list.pdf

GWRC. (2017b). Greater Wellington Public Transport - Patronage. Retrieved 7 June 2017, from https://www.metlink.org.nz/customer-services/public-transport-facts-and-figures/patronage/

GWRC. (2017c). GWRC Web Map Viewer - Base Information. Retrieved 1 January 2018, from https://mapping.gw.govt.nz/GW/GWpublicMap_Mobile/?webmap=d4e8a3b2241045e68fd8fc9f91973b10

GWRC. (2017d). Metlink Network Map. Retrieved 20 June 2017, from https://www.metlink.org.nz/getting-around/network-map/

GWRC. (2017e). Park & Ride car parks. Retrieved 10 May 2017, from https://www.metlink.org.nz/getting-around/park-and-ride-car-parks/

GWRC. (2017f). *Wellington Rail Passenger Survey*. Wellington, New Zealand: Greater Wellington Regional Council. Retrieved from https://www.gw.govt.nz/assets/2017-Rail-Survey-report20-07-2017.pdf.

GWRC. (2018). RiverLink. Retrieved 23 April 2018, from https://haveyoursay.gw.govt.nz/riverlink

Ha, H.-Y., & Janda, S. (2012). Predicting consumer intentions to purchase energy-efficient products. *Journal of Consumer Marketing, 29*(7), 461-469.

Hair, J. F., Black, W. C., Babin, B. J., Anderson, R. E., & Tatham, R. L. (2006). *Multivariate data analysis*. New Jersey: Pearson Education.

Halldórsdóttir, K., Nielsen, O. A., & Prato, C. G. (2017). Home-end and activity-end preferences for access to and egress from train stations in the Copenhagen Region. *International Journal of Sustainable Transportation, 11*(10), 1-41.

Hamer, P. (2010). Analysing the effectiveness of park and ride as a generator of public transport mode shift. *Road and Transport Research: A Journal of Australian and New Zealand Research and Practice, 19*(1), 51-61.

Han, H., Hsu, L.-T. J., & Sheu, C. (2010). Application of the Theory of Planned Behaviour to green hotel choice: Testing the effect of environmental friendly activities. *Tourism Management, 31*(3), 325-334.

Harland, P., Staats, H., & Wilke, H. A. (1999). Explaining pro-environmental intention and behaviour by personal norms and the Theory of Planned Behaviour. *Journal of Applied Social Psychology, 29*(12), 2505-2528.

Haustein, S., & Hunecke, M. (2007). Reduced use of environmentally friendly modes of transportation caused by perceived mobility necessities: An extension of the Theory of Planned Behaviour. *Journal of Applied Social Psychology, 37*(8), 1856-1883.

Hawcroft, L. J., & Milfont, T. L. (2010). The use (and abuse) of the new environmental paradigm scale over the last 30 years: A meta-analysis. *Journal of Environmental Psychology, 30*(2), 143-158.

Heath, Y., & Gifford, R. (2002). Extending the Theory of Planned Behaviour: Predicting the use of public transportation. *Journal of Applied Social Psychology, 32*(10), 2154-2189.

Heinen, E., & Handy, S. (2012). Similarities in attitudes and norms and the effect on bicycle commuting: Evidence from the bicycle cities Davis and Delft. *International Journal of Sustainable Transportation, 6*(5), 257-281.

Holman, C., Donovan, R. J., & Giles-Corti, B. (1996). Factors influencing the use of physical activity facilities: Results from qualitative research. *Health Promotion Journal of Australia: Official Journal of Australian Association of Health Promotion Professionals, 6*(1), 16-21.

Huang, C. (2015). *An exploratory scenario for San Francisco to become a walking, bicycling and transit city*. (Master of Science in Environmental Management), The University of San Francisco, San Francisco, CA.

Hunecke, M., Blöbaum, A., Matthies, E., & Höger, R. (2001). Responsibility and environment: Ecological norm orientation and external factors in the domain of travel mode choice behaviour. *Environment and Behaviour, 33*(6), 830-852.

Islam, S. T., Liu, Z., Sarvi, M., & Zhu, T. (2015). Exploring the mode change behaviour of park-and-ride users. *Mathematical Problems in Engineering, 2015*, 1-8.

Jackson, T. (2005). *Motivating sustainable consumption: A review of evidence on consumer behaviour and behavioural change*. Surrey, UK: Sustainable Development Research Network. Retrieved from https://sustainablelifestyles.ac.uk/sites/default/files/motivating_sc_final.pdf.

Jaensirisak, S., Wardman, M., & May, A. (2005). Explaining variations in public acceptability of road pricing schemes. *Journal of Transport Economics and Policy, 39*(2), 127-154.

Jakobsson, C., Fujii, S., & Gärling, T. (2000). Determinants of private car users' acceptance of road pricing. *Transport Policy, 7*(2), 153-158.

Jakovcevic, A., & Steg, L. (2013). Sustainable transportation in Argentina: Values, beliefs, norms and car use reduction. *Transportation Research Part F: Traffic Psychology and Behaviour, 20*, 70-79.

Jansson, J., & Dorrepaal, E. (2015). Personal norms for dealing with climate change: results from a survey using moral foundations theory. *Sustainable Development, 23*(6), 381-395.

Johnson, R. B., & Onwuegbuzie, A. J. (2004). Mixed methods research: A research paradigm whose time has come. *Educational Researcher, 33*(7), 14-26.

Johnson, R. B., Onwuegbuzie, A. J., & Turner, L. A. (2007). Toward a definition of mixed methods research. *Journal of Mixed Methods Research, 1*(2), 112-133.

Jones, P. M. (1991). UK public attitudes to urban traffic problems and possible countermeasures: A poll of polls. *Environment and Planning C: Government and Policy, 9*(3), 245-256.

Kaiser, F. G., Wölfing, S., & Fuhrer, U. (1999). Environmental attitude and ecological behaviour. *Journal of Environmental Psychology, 19*(1), 1-19.

Kamruzzaman, M., Shatu, F. M., Hine, J., & Turrell, G. (2015). Commuting mode choice in transit-oriented development: Disentangling the effects of competitive neighbourhoods, travel attitudes, and self-selection. *Transport Policy, 42*, 187-196.

Kaplowitz, M. D., Hadlock, T. D., & Levine, R. (2004). A comparison of web and mail survey response rates. *Web Survey Design and Administration, 68*(1), 94-101.

Keijer, M. J. N., & Rietveld, P. (2000). How do people get to the railway station? The Dutch experience. *Transportation Planning and Technology, 23*(3), 215-235.

Kelly, S., Chowdhury, S., & Stevens, L. (2016). *The effects of the Northern Busway on surrounding land use and travel behaviour*. Paper presented at the IPENZ Transportation Group Conference, Auckland, New Zealand.

Khoo, H. L., & Ong, G. P. (2013). Understanding sustainable transport acceptance behaviour: A case study of Klang Valley, Malaysia. *International Journal of Sustainable Transportation, 9*(3), 227-239.

Kim, J., Schmöcker, J.-D., Bergstad, C. J., Fujii, S., & Gärling, T. (2014). The influence of personality on acceptability of sustainable transport policies. *Transportation, 41*(4), 855-872.

Klöckner, C. A., & Friedrichsmeier, T. (2011). A multi-level approach to travel mode choice: How person characteristics and situation specific aspects determine car use in a student sample. *Transportation Research Part F: Traffic Psychology and Behaviour, 14*(4), 261-277.

Klöckner, C. A., & Matthies, E. (2004). How habits interfere with norm-directed behaviour: A normative decision-making model for travel mode choice. *Journal of Environmental Psychology, 24*(3), 319-327.

Knussen, C., Yule, F., MacKenzie, J., & Wells, M. (2004). An analysis of intentions to recycle household waste: The roles of past behaviour, perceived habit, and perceived lack of facilities. *Journal of Environmental Psychology, 24*(2), 237-246.

Koh, P. P., & Wong, Y. D. (2013). Comparing pedestrians' needs and behaviours in different land use environments. *Journal of Transport Geography, 26*, 43-50.

Lam, W. H. K., Holyoak, N. M., & Lo, H. P. (2001). How park-and-ride schemes can be successful in Eastern Asia. *Journal of Urban Planning and Development, 127*(2), 63-78.

Langer, E. J. (1975). The illusion of control. *Journal of Personality and Social Psychology, 32*(2), 311-328.

Lemieux, M., & Godin, G. (2009). How well do cognitive and environmental variables predict active commuting? *International Journal of Behavioral Nutrition and Physical Activity, 6*(1), 1-9.

Lind, H. B., Nordfjærn, T., Jørgensen, S. H., & Rundmo, T. (2015). The value-belief-norm theory, personal norms and sustainable travel mode choice in urban areas. *Journal of Environmental Psychology, 44*, 119-125.

Litman, T. (2002). Evaluating transportation equity. *World Transport Policy & Practice, 8*(2), 50-65.

Liu, C.-P. (2017). *Understanding the factors influencing public transport mode choice in Taiwan.* (Doctor of Philosophy), University College London, London, UK.

Liu, Y., Sheng, H., Mundorf, N., Redding, C., & Ye, Y. (2017). Integrating Norm Activation Model and Theory of Planned Behaviour to understand sustainable transport behaviour: Evidence from China. *International Journal of Environmental Research and Public Health, 14*(12), 1593-1608.

Loukopoulos, P., Jakobsson, C., Gärling, T., Schneider, C. M., & Fujii, S. (2005). Public attitudes towards policy measures for reducing private car use: Evidence from a study in Sweden. *Environmental Science & Policy, 8*(1), 57-66.

Lovejoy, K., & Handy, S. (2012). Developments in bicycle equipment and its role in promoting cycling as a travel mode. In J. Pucher & R. Buehler (Eds.), *City Cycling*. Cambridge, MA: MIT Press.

Maichum, K., Parichatnon, S., & Peng, K.-C. (2016). Application of the extended Theory of Planned Behviour model to investigate purchase intention of green products among Thai consumers. *Sustainability, 8*(10), 1-20.

Marsden, G. (2006). The evidence base for parking policies: A review. *Transport policy, 13*(6), 447-457.

Marshall, W., & Truong, L. (2014). Are park-and-rides saving the environment or just saving parking costs? *Transportation Research Record: Journal of the Transportation Research Board, 2419*, 109-117.

Martens, K. (2004). The bicycle as a feedering mode: Experiences from three European countries. *Transportation Research Part D: Transport and Environment, 9*(4), 281-294.

Martens, K. (2007). Promoting bike-and-ride: The Dutch experience. *Transportation Research Part A: Policy and Practice, 41*(4), 326-338.

Mastrangelo, M. E., Gavin, M. C., Laterra, P., Linklater, W. L., & Milfont, T. L. (2014). Psycho-social factors influencing forest conservation intentions on the agricultural frontier. *Conservation Letters, 7*(2), 103-110.

McDonald, F. V. (2014). Developing an integrated conceptual framework of pro-environmental behaviour in the workplace through synthesis of the current literature. *Administrative Sciences, 4*(3), 276-303.

Meek, S., Ison, S., & Enoch, M. (2009). Stakeholder perspectives on the current and future roles of UK bus-based Park and Ride. *Journal of Transport Geography, 17*(6), 468-475.

Meek, S., Ison, S., & Enoch, M. (2011). Evaluating alternative concepts of bus-based park and ride. *Transport Policy, 18*(2), 456-467.

Mees, P. (2014). TOD and multi-modal public transport. *Planning Practice and Research, 29*(5), 461-470.

MfE. (2018). *New Zealand's Greenhouse Gas Inventory 1990–2016.* Wellington, New Zealand: Ministry for the Environment. Retrieved from https://www.mfe.govt.nz/sites/default/files/media/Climate%20Change/FINAL%20GHG%20inventory%20-%2025%20May.pdf.

Milković, M., & Štambuk, M. (2015). To bike or not to bike? Application of the Theory of Planned Behaviour in predicting bicycle commuting among students in Zagreb. *Psychological Topics, 24*(2), 187-205.

Mingardo, G. (2013). Transport and environmental effects of rail-based park and ride: Evidence from The Netherlands. *Journal of Transport Geography, 30*, 7-16.

Moran-Ellis, J., Alexander, V. D., Cronin, A., Dickinson, M., Fielding, J., Sleney, J., & Thomas, H. (2006). Triangulation and integration: Processes, claims and implications. *Qualitative Research, 6*(1), 45-59.

Morley, C. (2011). *Motivating public transport use: Travel behaviour and integrated ticketing for Greater Wellington.* (Master of Environmental Studies), Victoria University of Wellington, Wellington, New Zealand.

MoT. (2010). Travel planning toolkit: Facts and figures. Retrieved 7 May 2018, from https://www.nzta.govt.nz/walking-cycling-and-public-transport/travelling-for-business/workplace-travel-planning/travel-planning-toolkit/

MoT. (2014). Travel patterns: Household travel. Retrieved 13 January 2018, from https://www.transport.govt.nz/ourwork/tmif/travelpatterns/tp006/

Mullings, B. (1999). Insider or outsider, both or neither: Some dilemmas of interviewing in a cross-cultural setting. *Geoforum, 30*(4), 337-350.

Murphy, E., & Usher, J. (2015). The role of bicycle-sharing in the city: Analysis of the Irish experience. *International Journal of Sustainable Transportation, 9*(2), 116-125.

Nasri, A., & Zhang, L. (2014). The analysis of transit-oriented development (TOD) in Washington, DC and Baltimore metropolitan areas. *Transport Policy, 32*, 172-179.

Nisbet, E. K., & Zelenski, J. M. (2013). The NR-6: A new brief measure of nature relatedness. *Frontiers in Psychology, 4*, 1-11.

Nordfjaern, T., & Rundmo, T. (2015). Environmental norms, transport priorities and resistance to change associated with acceptance of push measures in transport. *Transport Policy, 44*, 1-8.

Nordlund, A. M., & Garvill, J. (2003). Effects of values, problem awareness, and personal norm on willingness to reduce personal car use. *Journal of Environmental Psychology, 23*(4), 339-347.

Notani, A. S. (1998). Moderators of perceived behavioural control's predictiveness in the Theory of Planned Behaviour: A meta-analysis. *Journal of Consumer Psychology, 7*(3), 247-271.

Olaru, D., Smith, B., Xia, J., & Lin, T. (2014). Travellers' attitudes towards park-and-ride and choice of park-and-ride station: Evidence from Perth, Western Australia. *Procedia - Social and Behavioral Sciences, 162*, 101-110.

Ono, Y., Silcock, D., & Gerilla-Teknomo, G. (2013). *International lessons for road safety in the People's Republic of China*. Manila, Philipines: Asian Development Bank. Retrieved from https://www.adb.org/sites/default/files/publication/30338/kps-road-safety-web.pdf.

Park, J., & Ha, S. (2014). Understanding consumer recycling behviour: Combining the Theory of Planned Behaviour and the Norm Activation Model. *Family and Consumer Sciences Research Journal, 42*(3), 278-291.

Parker, D., Manstead, A. S., & Stradling, S. G. (1995). Extending the Theory of Planned Behaviour: The role of personal norm. *British Journal of Social Psychology, 34*(2), 127-138.

Parkhurst, G. (1995). Park and ride: Could it lead to an increase in car traffic? *Transport Policy, 2*(1), 15-23.

Parkhurst, G. (2000a). Influence of bus-based park and ride facilities on users' car traffic. *Transport Policy, 7*(2), 159-172.

Parkhurst, G. (2000b). Link-and-ride: A longer-range strategy for car-bus interchange. *Traffic Engineering and Control, 41*(8), 319-324.

Parkhurst, G. (2003). Social inclusion implications of park-and-ride. *Proceedings of the Institution of Civil Engineers-Municipal Engineer, 156*(2), 111-117.

Parkhurst, G., & Meek, S. (2014). The effectiveness of park-and-ride as a policy measure for more sustainable mobility. In S. Ison & C. Mulley (Eds.), *Parking Issues and Policies* (Vol. 5, pp. 185-211). Bingley, UK: Emerald Group Publishing Limited.

Parkin, J., Wardman, M., & Page, M. (2008). Estimation of the determinants of bicycle mode share for the journey to work using census data. *Transportation, 35*(1), 93-109.

Peters, A., Gutscher, H., & Scholz, R. W. (2011). Psychological determinants of fuel consumption of purchased new cars. *Transportation Research Part F: Traffic Psychology and Behaviour, 14*(3), 229-239.

Poortinga, W., Steg, L., & Vlek, C. (2004). Values, environmental concern, and environmental behaviour: A study into household energy use. *Environment and Behaviour, 36*(1), 70-93.

Public Transport Users Association. (2016). Common urban myths about transport: Park-and-ride facilities will encourage public transport use. Retrieved 16 June 2017, from https://www.ptua.org.au/myths/parkride/

Pucher, J., & Buehler, R. (2008). Making cycling irresistible: lessons from the Netherlands, Denmark and Germany. *Transport Reviews, 28*(4), 495-528.

Quine, L., Rutter, D. R., & Arnold, L. (1998). Predicting and understanding safety helmet use among schoolboy cyclists: A comparison of the Theory of Planned Behaviour and the health belief model. *Psychology and Health, 13*(2), 251-269.

Randal, E. (2013). *What makes a commuter cyclist? A mixed methods study of behavioural antecedents and perceptions of commuter cycling in the Wellington Region.* (Master of Environmental Studies), Victoria University of Wellington, Wellington, New Zealand.

Ricci, M. (2015). Bike sharing: A review of evidence on impacts and processes of implementation and operation. *Research in Transportation Business and Management, 15*, 28-38.

Rienstra, S. A., Rietveld, P., & Verhoef, E. T. (1999). The social support for policy measures in passenger transport: A statistical analysis for The Netherlands. *Transportation Research Part D: Transport and Environment, 4*(3), 181-200.

Rietveld, P. (2000). The accessibility of railway stations: the role of the bicycle in The Netherlands. *Transportation Research Part D: Transport and Environment, 5*(1), 71-75.

Rietveld, P., & Daniel, V. (2004). Determinants of bicycle use: Do municipal policies matter? *Transportation Research Part A: Policy and Practice, 38*(7), 531-550.

Rodier, C. J., & Shaheen, S. A. (2010). Transit-based smart parking: An evaluation of the San Francisco Bay area field test. *Transportation Research Part C: Emerging Technologies, 18*(2), 225-233.

Rodríguez, D. A., & Joo, J. (2004). The relationship between non-motorized mode choice and the local physical environment. *Transportation Research Part D: Transport and Environment, 9*(2), 151-173.

Round, A., & Cervero, R. (1996). *Future ride: Adapting new technologies to paratransit in the United States*. (UCTC No 306). Berkeley, CA: University of California Transportation Center. Retrieved from https://pdfs.semanticscholar.org/092e/8429472e5d94828177023683ba3ca9cf0638.pdf.

Schade, J., & Schlag, B. (2003). Acceptability of urban transport pricing strategies. *Transportation Research Part F: Traffic Psychology and Behaviour, 6*(1), 45-61.

Schneider, R., Baltes, M., & TCRP. (2005). *Integration of bicycles and transit: A synthesis of transit practice* (Vol. 22). Washington, USA: Transit Cooperative Research Program.

Schuitema, G., & Steg, L. (2008). The role of revenue use in the acceptability of transport pricing policies. *Transportation Research Part F: Traffic Psychology and Behaviour, 11*(3), 221-231.

Schuitema, G., Steg, L., & Rothengatter, J. A. (2010). The acceptability, personal outcome expectations, and expected effects of transport pricing policies. *Journal of Environmental Psychology, 30*(4), 587-593.

Schwanen, T., Banister, D., & Anable, J. (2012). Rethinking habits and their role in behaviour change: the case of low-carbon mobility. *Journal of Transport Geography, 24*, 522-532.

Schwartz, S. (1977). Normative influences on altruism. In L. Berkowitz (Ed.), *Advances in Experimental Social Psychology* (Vol. 10, pp. 221-279). New York, NY: Academic Press.

Segelhorst, E. W., & Kirkus, L. D. (1973). Parking bias in transit choice. *Journal of Transport Economics and Policy, 7*(1), 58-70.

Shaheen, S., & Chan, N. (2016). Mobility and the sharing economy: Potential to facilitate the first-and-last-mile public transit connections. *Built Environment, 42*(4), 573-588.

Sheeran, P., Trafimow, D., & Armitage, C. J. (2003). Predicting behaviour from perceived behavioural control: Tests of the accuracy assumption of the Theory of Planned Behaviour. *British Journal of Social Psychology, 42*(3), 393-410.

Sherwin, H. (2010). *Bike-rail integration as one sustainable transport solution to reduce car dependence.* (PhD), University of the West of England, Bristol, UK.

Shoup, D. C. (2005). *The high cost of free parking*. Chicago, IL: Planners Press, American Planning Association.

Simons, D., Clarys, P., De Bourdeaudhuij, I., de Geus, B., Vandelanotte, C., & Deforche, B. (2013). Factors influencing mode of transport in older adolescents: a qualitative study. *Bio Med Central Public Health, 13*(1), 1471-2458.

Singleton, P. A. (2013). *A theory of travel decision-making with applications for modelling active travel demand.* (Master of Science in Civil & Environmental Engineering), Portland State University, Portland, OR.

Smith, B., Huang, Y., & Taplin, J. (2016). Public transport patronage success: The role of park'n'ride. In S. Biermann, D. Olaru, & V. Paul (Eds.), *Planning Boomtown and Beyond*. Crawley, Western Australia: UWA Publishing.

Sobiecki, L. (2017). *Car sharing in Wellington, New Zealand: Benefits and barriers.* (Masters in Environmental Studies), Victoria University of Wellington, Wellington, New Zealand.

Song, Y., Preston, J., & Ogilvie, D. (2017). New walking and cycling infrastructure and modal shift in the UK: A quasi-experimental panel study. *Transportation Research Part A: Policy and Practice, 95*, 320-333.

Statistics New Zealand. (2018). Subnational Population Estimates: At 30 June 2017. Retrieved 21 May 2018, from https://archive.stats.govt.nz/browse_for_stats/population/estimates_and_projections/SubnationalPopulationEstimates_HOTPAtJun17.aspx

Steg, L., De Groot, J., Dreijerink, L., Abrahamse, W., & Siero, F. (2011). General antecedents of personal norms, policy acceptability, and intentions: The role of values, worldviews, and environmental concern. *Society and Natural Resources, 24*(4), 349–367.

Steg, L., Dreijerink, L., & Abrahamse, W. (2005). Factors influencing the acceptability of energy policies: A test of VBN theory. *Journal of Environmental Psychology, 25*(4), 415-425.

Steg, L., Dreijerink, L., & Abrahamse, W. (2006). Why are energy policies acceptable and effective? *Environment and Behaviour, 38*(1), 92-111.

Steg, L., & Vlek, C. (2009). Encouraging pro-environmental behaviour: An integrative review and research agenda. *Journal of Environmental Psychology, 29*(3), 309-317.

Stern, P. C., Dietz, T., Abel, T., Guagnano, G. A., & Kalof, L. (1999). A value-belief-norm theory of support for social movements: The case of environmentalism. *Research in Human Ecology, 6*(2), 81-97.

Stieffenhofer, K. E., Barton, M., & Gayah, V. V. (2016). Assessing park-and-ride efficiency and user reactions to parking management strategies. *Journal of Public Transportation, 19*(4), 75-92.

Sue, V. M., & Ritter, L. A. (2012). *Conducting online surveys* (2nd ed.). Thousand Oaks, CA: Sage Publications.

Syed, S., Golub, A., & Deakin, E. (2009). Response of regional rail park-and-ride users to parking price changes. *Transportation Research Record: Journal of the Transportation Research Board, 2110*, 155-162.

Teye, J. K. (2012). Benefits, challenges, and dynamism of positionalities associated with mixed methods research in developing countries: Evidence from Ghana. *Journal of Mixed Methods Research, 6*(4), 379-391.

Timperio, A., Ball, K., Salmon, J., Roberts, R., Giles-Corti, B., Simmons, D., . . . Crawford, D. (2006). Personal, family, social, and environmental correlates of active commuting to school. *American Journal of Preventive Medicine, 30*(1), 45-51.

Titze, S., Stronegger, W. J., Janschitz, S., & Oja, P. (2007). Environmental, social, and personal correlates of cycling for transportation in a student population. *Journal of Physical Activity and Health, 4*(1), 66-79.

Triandis, H. C. (1979). *Values, attitudes, and interpersonal behaviour.* Paper presented at the Nebraska Symposium on Motivation, Nebraska

Turaga, R. M. R., Howarth, R. B., & Borsuk, M. E. (2010). Pro-environmental behaviour. *Annals of the New York Academy of Sciences, 1185*(1), 211-224.

Ubbels, B., & Verhoef, E. T. (2005). *Acceptability of road pricing and revenue use in the Netherlands*. Paper presented at the Land Use and Water Management in a Sustainable Network Society, Amsterdam, The Netherlands.

Vallerand, R. J., Deshaies, P., Cuerrier, J.-P., Pelletier, L. G., & Mongeau, C. (1992). Ajzen and Fishbein's Theory of Reasoned Action as applied to moral behaviour: A confirmatory analysis. *Journal of Personality and Social Psychology, 62*(1), 98-109.

Vaske, J. J., & Donnelly, M. P. (1999). A value-attitude-behaviour model predicting wildland preservation voting intentions. *Society and Natural Resources, 12*(6), 523-537.

Verplanken, B., Aarts, H., & van Knippenberg, A. (1997). Habit, information acquisition, and the process of making travel mode choices. *European Journal of Social Psychology, 27*, 539-560.

Verplanken, B., Walker, I., Davis, A., & Jurasek, M. (2008). Context change and travel mode choice: Combining the habit discontinuity and self-activation hypothesis. *Journal of Environmental Psychology, 28*, 121–127.

Verplanken, B., & Wood, W. (2006). Interventions to break and create consumer habits. *Journal of Public Policy and Marketing, 25*(1), 90-103.

Vincent, M., & Hamilton, B. A. (2007). *Park and ride: Characteristics and demand forecasting*. (Research Report 328). Wellington, New Zealand: Land Transport New Zealand. Retrieved from https://www.nzta.govt.nz/assets/resources/research/reports/328/docs/328.pdf.

Wallis, I., Ballantyne, J., Lawrence, A., & Lupton, D. (2014). *Economic benefits of park and ride*. (Research Report 562). Wellington, New Zealand: New Zealand Transport Agency. Retrieved from https://www.nzta.govt.nz/assets/resources/research/reports/562/docs/562.pdf.

Walton, D., & Sunseri, S. (2007). *Impediments to walking as a mode choice*. (Research Report 329). Wellington, New Zealand: Land Transport New Zealand. Retrieved from https://www.nzta.govt.nz/assets/resources/research/reports/329/docs/329.pdf.

Wang, S., Fan, J., Zhao, D., Yang, S., & Fu, Y. (2016). Predicting consumers' intention to adopt hybrid electric vehicles: Using an extended version of the Theory of Planned Behaviour model. *Transportation, 43*(1), 123-143.

Weinstein Agrawal, A., Schlossberg, M., & Irvin, K. (2008). How far, by which route and why? A spatial analysis of pedestrian preference. *Journal of Urban Design, 13*(1), 81-98.

Willson, R., & Menotti, V. (2007). Commuter parking versus transit-oriented development: Evaluation methodology. *Transportation Research Record: Journal of the Transportation Research Board, 2021*, 118-125.

Wiseman, N., Bonham, J., MacKintosh, M., Xu, H., & Straschko, O. (2012). Park and Ride: An Adelaide case study. *Road and Transport Research, 21*(1), 39-52.

Wright, S., & Nelson, J. D. (2014). An investigation into the feasibility and potential benefits of shared taxi services to commuter stations. *Urban, Planning and Transport Research, 2*(1), 147-161.

Ying, H., & Xiang, H. (2009). *Study on influence factors and demand willingness of park and ride*. Paper presented at the Second International Conference on Intelligent Computation Technology and Automation, Zhangjiajie, China.

Zhao, P., & Shengxiao, L. (2017). Bicycle-metro integration in a growing city: The determinants of cycling as a transfer mode in metro station areas in Beijing. *Transportation Research Part A: Policy and Practice, 99*, 46-60.

Appendices

Appendix A. Basic information of Park-and-Ride in the Greater Wellington

Railway Line	Station	Parking spaces	Bicycle Infrastructure			Network distance (km) from Wellington CBD
			Cycle Lockers	Cycle Rack or Stand	Cycle Shed/Cage	
Hutt Valley Line	Petone	194	8	Yes	-	12.7
	Melling	190	4	Yes	-	16.6
	Woburn	160	-	Yes	-	16.6
	Waterloo	647	22	Yes	-	18.6
	Taita	148	-	Yes	-	22.7
	Pomare	11	-	Yes	-	24.2
	Manor Park	44	-	-	-	24.0
	Silverstream	109	-	Yes	-	27.2
	Trentham	134	4	-	-	30.5
	Wallaceville	103	4	-	-	33.1
	Upper Hutt	322	16	-	-	33.7
Hutt Valley Total		2018	58	-	-	-
Johnsonville Line	Crofton Downs	44	-	Yes	-	6.5
	Ngaio	47	-	Yes	-	7.1
	Khandallah	17	-	Yes	-	8.3
	Johnsonville	141	-	Yes	-	10.2
	Raroa	8	-	Yes	-	10.4
Johnsonville Total		257	0		-	-
Kapiti Line	Takapu Road	80	-	Yes	-	15.4
	Redwood	136	-	Yes	-	16.8
	Tawa	174	-	Yes	-	17.5
	Porirua	802	8	Yes	12 spaces	24.7
	Paremata	298	-	Yes	-	24.8
	Mana	150	-	-	-	25.9
	Plimmerton	41	4	Yes	-	27.0
	Pukerua Bay	11	-	Yes	-	32.8
	Paekakariki	82	4	Yes	-	41.5
	Paraparaumu	581	44	Yes	-	50.8
	Waikanae	407	4	Yes	-	60.7
Kapiti Total		2742	64	-	12 spaces	-
Wairarapa Connection	Featherston	118	-	Yes	-	64.0
	Woodside	92	-	Yes	-	80.2
	Carterton	95	-	Yes	-	85.5
	Solway	54	-	Yes	-	96.4
	Masterston	76	-	Yes	-	98.9
Wairarapa Total		435	0		-	-
All Park-and-Ride stations		5516	-	-	-	-

Source: Google (2017), GWRC (2017a), and Vincent and Hamilton (2007).

Appendix B. Human Ethics Committee Approval Letter

TE WHARE WĀNANGA O TE ŪPOKO O TE IKA A MĀUI
VICTORIA
UNIVERSITY OF WELLINGTON

Phone 0-4-463 5480
Email susan.corbett@vuw.ac.nz

MEMORANDUM

TO	Nicola Ryan
COPY TO	A/Prof Ralph Chapman
FROM	AProf Susan Corbett, Convener, Human Ethics Committee
DATE	16 November 2017
PAGES	1
SUBJECT	**Ethics Approval: 25374** Where to park? The trade-off between Park and Ride and other commute options in Wellington, New Zealand

Thank you for your application for ethical approval, which has now been considered by the Standing Committee of the Human Ethics Committee.

Your application has been approved from the above date and this approval continues until 16 November 2020. If your data collection is not completed by this date you should apply to the Human Ethics Committee for an extension to this approval.

Best wishes with the research.

Kind regards

Susan Corbett

Convener, Victoria University Human Ethics Committee

Appendix C. Information Sheet for Interview Participants

TE WHARE WĀNANGA O TE ŪPOKO O TE IKA A MĀUI VICTORIA UNIVERSITY OF WELLINGTON

SCHOOL OF GEOGRAPHY, ENVIRONMENT AND EARTH SCIENCES
TE KURA TĀTAI ARO WHENUA
LEVEL 3, COTTON BUILDING, KELBURN CAMPUS, WELLINGTON
PO Box 600, Wellington 6140, New Zealand
Email geo-enquiries@vuw.ac.nz **Website** www.victoria.ac.nz/sgees

Master's Thesis: Park and Ride in Wellington

INFORMATION SHEET FOR INTERVIEW PARTICIPANTS

You are being asked to take part in a semi-structured interview as part of my Masters research at Victoria University of Wellington. The following information provides you with brief details of my project and your rights as a research participant. Please read this information before deciding whether to take part. If you decide to participate, thank you. If you decide not to take part, thank you for considering my request.

Who am I?

My name is Nicola Ryan and I am a Masters student in the Environmental Studies programme at Victoria University of Wellington. This research will form part of my thesis.

What is the aim of the project?

This research project will investigate the role of Park and Ride in increasing accessibility to public transport services in Greater Wellington, as well as determine the extent to which improvements at Park and Ride facilities could generate a change in transport mode from car-only to more sustainable transport modes, such as walking, cycling and public transport. This research project has been approved by the Victoria University of Wellington Human Ethics Committee (0000025374).

How can you help?

If you agree to take part, I will ask you a range of questions about Park and Ride in Wellington. This includes questions about your involvement with Park and Ride, the challenges of implementing policy measures to address demand for Park and Ride, and your view of the likely future developments of Park and Ride. The interview will take place at a time and public location that is convenient for you, and will take no longer than an hour. I will audio record the interview and write it up later. You will have the opportunity to read over and comment on the transcript of your interview to ensure your thoughts have been correctly presented before they are used in analysis. You can stop the interview at any time, without giving reason. You can withdraw from the study by contacting me no later than 8 weeks after the date that the interview took place. If you withdraw, the information you provide will be destroyed or returned to you.

What will happen to the information you give?

You will not be named in the final report but your organisation will be named (provided you have the authority to agree to this on behalf of the organisation). Only my supervisor and I will read the notes or transcript of the interview. The interview transcripts, summaries and any recordings will be kept securely and destroyed on 6th March 2020 or returned to you.

What will the project produce?

The data will be reported in my Master's thesis, which will be submitted for marking to the School of Geography, Environment and Earth Sciences, Victoria University of Wellington. A copy of this thesis will be publicly available through the Victoria University of Wellington library. The findings may also feature in academic reports and/or be presented at conferences.

If you accept this invitation, what are your rights as a research participant?

You do not have to accept this invitation if you don't want to. If you do decide to participate, you have the right to:

- choose not to answer any question
- ask for the recording device to be turned off at any time during the interview
- withdraw from the study no later than 8 weeks after the date that the interview took place
- ask any questions about the study at any time
- receive a copy of the transcript of your interview
- read over and comment on a transcript of your interview
- receive a copy of the final report

If you have any questions or problems, who can you contact?

If you have any questions regarding this study, either now or in the future, please email me at nicola.ryan@vuw.ac.nz or telephone +64-4-463 5233, or you can email my supervisor Associate Professor Ralph Chapman at ralph.chapman@vuw.ac.nz or telephone +64-4-463 6153.

Human Ethics Committee Information

If you have any concerns about the ethical conduct of the research you may contact the Victoria University HEC Convenor: Associate Professor Susan Corbett. Email susan.corbett@vuw.ac.nz or telephone +64-4-463 5480.

Your help is very much appreciated.

Sincerely,

Nicola Ryan

Appendix D. Informed Consent Form for Interview Participants

TE WHARE WĀNANGA O TE ŪPOKO O TE IKA A MĀUI VICTORIA UNIVERSITY OF WELLINGTON

SCHOOL OF GEOGRAPHY, ENVIRONMENT AND EARTH SCIENCES
TE KURA TĀTAI ARO WHENUA
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PO Box 600, Wellington 6140, New Zealand
Email geo-enquiries@vuw.ac.nz **Website** www.victoria.ac.nz/sgees

Master's Thesis: Park and Ride in Wellington

INFORMED CONSENT FORM

This consent form will be held for 2 years.

Researcher: Nicola Ryan, School of Geography, Environment and Earth Sciences, Victoria University of Wellington.

- I have read the Information Sheet and the project has been explained to me. My questions have been answered to my satisfaction. I understand that I can ask further questions at any time.
- I agree to take part in an audio recorded interview.

I understand that:

- I may withdraw from this study no later than 8 weeks after the date that the interview took place, and any information that I have provided will be returned to me or destroyed.
- The identifiable information I have provided will be destroyed on 6th March 2020.
- Any information I provide will be kept confidential to the researcher and the supervisor. I understand that the results will be used for a Master's thesis and a summary of the results may be used in academic reports and/or presented at conferences.
- I consent to information or opinions which I have given being attributed to my organisation in any reports on this research and have the authority to agree to this on behalf of the organisation. Yes ☐ No ☐
- I would like a copy of the transcript of my interview and have added my email address below. I understand that I can read over and comment on the transcript to ensure my thoughts have been correctly presented before they are used in analysis, no later than 2 weeks after the date that the transcript is received. Yes ☐ No ☐
- I would like to receive a copy of the final report and have added my email address below. Yes ☐ No ☐

Signature of participant: _____

Name of participant: _____

Date: _____

Contact details: _____

1

Appendix E. Information Sheet for External Organisations

TE WHARE WĀNANGA O TE ŪPOKO O TE IKA A MĀUI
VICTORIA UNIVERSITY OF WELLINGTON

SCHOOL OF GEOGRAPHY, ENVIRONMENT AND EARTH SCIENCES
TE KURA TĀTAI ARO WHENUA
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PO Box 600, Wellington 6140, New Zealand
Email geo-enquiries@vuw.ac.nz **Website** www.victoria.ac.nz/sgees

Master's Thesis: Park and Ride in Wellington

INFORMATION SHEET FOR ORGANSATIONS

Thank you for your interest in this project. The following information provides you with brief details of my project and your rights as an organisation. Please read this information before deciding whether to take part. If you decide to participate, thank you. If you decide not to take part, thank you for considering my request.

Who am I?

My name is Nicola Ryan and I am a Masters student in the Environmental Studies programme at Victoria University of Wellington. This research will form part of my thesis.

What is the aim of the project?

This research project will investigate the role of Park and Ride in increasing accessibility to public transport services in Greater Wellington, as well as determine the extent to which improvements at Park and Ride facilities could generate a change in transport mode from car-only to more sustainable transport modes, such as walking, cycling and public transport. This research project has been approved by the Victoria University of Wellington Human Ethics Committee (0000025374).

How can you help?

If you agree to take part I will request to invite members of your organisation to take part in an interview. I will ask a range of questions about Park and Ride in Wellington. This includes questions about the participant's involvement with Park and Ride, the challenges of implementing policy measures to address demand for Park and Ride, and their view of the likely future developments of Park and Ride. I will audio record the interview and write it up later. The participant will have the opportunity to read over and comment on the transcript of their interview to ensure their thoughts have been correctly presented before they are used in analysis. You can withdraw from the project by contacting me no later than 8 weeks after the date that the interview(s) took place. If you withdraw from the project, any data provided will be destroyed and will not be used in the analysis.

What will happen to the information given by the participants?

The interviews will be confidential to participants and I will not disclose the identity of the participants to your organisation, or any interview data. I will identify your organisation in publications, and will attribute comments made by these participants to your organisation. The interview transcripts, summaries and any recordings will be kept securely and destroyed on 6th March 2020.

1

What will the project produce?

The data will be reported in my Master's thesis, which will be submitted for marking to the School of Geography, Environment and Earth Sciences, Victoria University of Wellington. A copy of this thesis will be publicly available through the Victoria University of Wellington library. The findings may also feature in academic reports and/or be presented at conferences.

If you accept this invitation, what are your rights as an organisation?

You do not have to accept this invitation if you don't want to. If you do decide to participate, you have the right to:

- withdraw from the project no later than 8 weeks after the date that the interview(s) took place
- ask any questions about the project at any time
- receive a copy of the final report by emailing the researcher to request a copy

If you have any questions or problems, who can you contact?

If you have any questions regarding this study, either now or in the future, please email me at nicola.ryan@vuw.ac.nz or telephone +64-4-463 5233, or you can email my supervisor Associate Professor Ralph Chapman at ralph.chapman@vuw.ac.nz or telephone +64-4-463 6153.

Human Ethics Committee Information

If you have any concerns about the ethical conduct of the research you may contact the Victoria University HEC Convenor: Associate Professor Susan Corbett. Email susan.corbett@vuw.ac.nz or telephone +64-4-463 5480.

Your help is very much appreciated.

Sincerely,

Nicola Ryan

Appendix F. Informed Consent Form for External Organisations

TE WHARE WĀNANGA O TE ŪPOKO O TE IKA A MĀUI VICTORIA UNIVERSITY OF WELLINGTON

SCHOOL OF GEOGRAPHY, ENVIRONMENT AND EARTH SCIENCES
TE KURA TĀTAI ARO WHENUA
LEVEL 3, COTTON BUILDING, KELBURN CAMPUS, WELLINGTON
PO Box 600, Wellington 6140, New Zealand
Email geo-enquiries@vuw.ac.nz **Website** www.victoria.ac.nz/sgees

Invitation to participate in the research project Park and Ride in Wellington

INFROMED CONSENT FORM FOR ORGANISATIONS

This consent form will be held for 2 years.

Researcher: Nicola Ryan, School of Geography, Environment and Earth Sciences, Victoria University of Wellington.

Organisation:

Representative:

- I have read the Information Sheet and have had the details of the project explained to me. My questions have been answered to my satisfaction, and I understand that I may ask further questions at any time.
- I wish to receive a summary of your findings. Yes ☐ No ☐
- On behalf of the above, I give permission for this project to proceed. Yes ☐ No ☐
- On behalf of the above, I give permission for an audio recorded interview to take place. Yes ☐ No ☐
- I understand I can talk to Nicola Ryan and her supervisor Associate Professor Ralph Chapman with any questions about the research at any time. Yes ☐ No ☐
- I understand that we may withdraw from the project without providing reasons by emailing Nicola Ryan at nicola.ryan@vuw.ac.nz no later than 8 weeks after the date that the interview took place. Yes ☐ No ☐
- I understand that if we withdraw from the project, any data we provided will be destroyed and will not be used in the analysis. Yes ☐ No ☐

Signature: _____

Full name - printed: _____

Date: _____

Contact details: _____

1

Appendix G. Interview Guide

TE WHARE WĀNANGA O TE ŪPOKO O TE IKA A MĀUI VICTORIA UNIVERSITY OF WELLINGTON

SCHOOL OF GEOGRAPHY, ENVIRONMENT AND EARTH SCIENCES
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PO Box 600, Wellington 6140, New Zealand
Email geo-enquiries@vuw.ac.nz **Website** www.victoria.ac.nz/sgees

Master's Thesis: Park and Ride in Wellington

INTERVIEW GUIDE

Date:

Researcher: Nicola Ryan, Victoria University of Wellington

Interviewee:

Organisation/ Role:

1. **Introduction**

Discuss and sign the Information Sheet for Participants and Informed Consent Form.

2. **Park and Ride in Wellington**

- How are you involved – or how have you been involved – with Park and Ride in the Wellington Region?
- How long has your organisation – or how long have you – been involved in Park and Ride planning and/or management?
- What is your opinion of Park and Ride? What are the strengths and weaknesses of the existing facilities?
- What is/ should be the role of Park and Ride?
- [If appropriate] What are the major challenges your organisation is facing with regard to Park and Ride?
- What are the pros and cons of using land around train stations for parking?

3. **Policy**

- What do you consider to be the merits or otherwise of GWRC adopting policy measures to address demand for Park and Ride in the future?
- What might be the challenges of implementing these solutions (for instance cost challenges or public acceptability) and how might these challenges be overcome?

1

- Parking charges are a measure which can be used to manage or distribute demand more efficiently. What is your opinion of imposing a charge at stations where demand for parking exceeds supply?

- What issues would you see, if any, should P&R charges vary from station to station?

- Research suggests that strong push policies, e.g. limited parking availability in the city centre, and/or increasing central city parking fees, are necessary for Park and Ride to succeed in reducing car travel into the city centre. To what extent do you believe absence of these policies might preclude a successful contribution?

4. Integration with other modes of transport

- What is your opinion of the relationship between Park and Ride and conventional public transport? Do you think train stations are adequately serviced by connecting and/or feeder bus services?

- What measures/ strategies are in place already, and warranted in future, to encourage the combined use of cycling (or walking) and train?

5. Future development of Park and Ride

- In your view, what are the likely future developments of Park and Ride in the Wellington Region?

6. Conclusion

Discuss any further thoughts and other potential interviewees. Thanks for participation.

Appendix H. Information Sheet for Survey Participants

TE WHARE WĀNANGA O TE ŪPOKO O TE IKA A MĀUI VICTORIA UNIVERSITY OF WELLINGTON

SCHOOL OF GEOGRAPHY, ENVIRONMENT AND EARTH SCIENCES
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PO Box 600, Wellington 6140, New Zealand
Email geo-enquiries@vuw.ac.nz **Website** www.victoria.ac.nz/sgees

Master's Thesis: Park and Ride in Wellington

INFORMATION SHEET FOR PARTICIPANTS

Thank you for your interest in this research project. Please read the following information before deciding whether to take part in the survey.

Who am I?

My name is Nicola Ryan and I am a Masters student in the Environmental Studies programme at Victoria University of Wellington. This survey is being conducted as part of my thesis. I am an entirely independent university researcher. I have not received funding from the Council or anyone else.

What is the aim of this project?

This research project will investigate the role of Park and Ride in increasing accessibility to public transport services in Greater Wellington. We are interested in your opinion of and/or experience with using Park and Ride and how it may be improved. There are no right or wrong answers, we are interested in your opinion. This research project has been approved by the Victoria University of Wellington Human Ethics Committee (0000025374).

How can you help?

If you agree to take part, you will fill out a 10 to 15-minute survey that consists of general background questions, how you got to work or study in the last 7 days, your opinion of and/or experience with using Park and Ride, your view of a hypothetical Park and Ride pricing policy, as well as your attitudes, perceptions, intentions and habits around walking and cycling as a means of transport. You are not required to answer every question if you do not wish to. You may withdraw your participation at any time while taking the survey; however once you submit your survey it will be impossible to withdraw.

What will happen with the information you give?

All the information you provide is anonymous. This means that nobody, including the researchers will be aware of your identity. Once you submit the survey, it will be impossible to retract your answer. Access to the collected data will be restricted to me and my supervisor, and will be stored in a password-protected file for two years after the conclusion on this research project (6th March 2020), after which it will be erased.

1

What will the project produce?

The data will be reported in my Master's thesis, which will be submitted for marking to the School of Geography, Environment and Earth Sciences, Victoria University of Wellington. A copy of this thesis will be publicly available through the Victoria University of Wellington library. The findings may also feature in academic or local government publications and/or be presented at academic or professional conferences.

If you have any questions or problems, who can you contact?

If you have any questions regarding this study, please email me at nicola.ryan@vuw.ac.nz or telephone +64-4-463 5233, or you can email my supervisor Associate Professor Ralph Chapman at ralph.chapman@vuw.ac.nz or telephone +64-4-463 6153.

Human Ethics Committee Information

If you have any concerns about the ethical conduct of the research you may contact the Victoria University HEC Convenor: Associate Professor Susan Corbett. Email susan.corbett@vuw.ac.nz or telephone +64-4-463 5480.

Many thanks,

Nicola Ryan

☐ I confirm that I have read and understood the information provided and wish to continue with the survey.

Appendix I. Survey Questionnaire

Note. Questions will be viewed by respondents according to their answers. Therefore, not every questions will be viewed by all participants.

SCREENING QUESTIONS

Q1. A map of the Greater Wellington Region will load below.

Please indicate which area you live in:

- ☐ Carterton District
- ☐ Kapiti Coast
- ☐ Lower Hutt
- ☐ Masterton
- ☐ Porirua
- ☐ South Wairarapa
- ☐ Upper Hutt
- ☐ Wellington
- ☐ I don't live in Greater Wellington

If 'I don't live in Greater Wellington' is selected, the participant is directed to the end of the survey.

The following questions apply to your travel to Wellington City in the last 7 days. This is the area that extends from Island Bay and Seatoun situated south of Wellington, out to Makara in the west and Tawa and Takapu Valley in the north

Q2. Did you travel to Wellington City in the last 7 days?

- ☐ Yes
- ☐ No

If 'No' is selected, the participant is directed to the end of the survey.

SECTION 1: TRAVEL PATTERNS

Q3. What was the main mode of transport that you used to travel to Wellington City in the last 7 days?

- ☐ Bus
- ☐ Train
- ☐ Car, as the driver
- ☐ Car, as the passenger
- ☐ Car, dropped off
- ☐ Other (please specify): _____
- ☐ Bicycle
- ☐ Walk/ run
- ☐ Taxi/ Uber
- ☐ Motorcycle or power cycle
- ☐ Ferry

1

The following questions refer to your travel to Wellington City using this main mode of transport. Please keep this in mind when answering.

Q4. In the last 7 days, what was your primary reason for travelling to Wellington City?

- Work
- On employer business
- School
- Polytechnic or University or training
- Other (e.g. shopping, social, sport, recreation)

Q5. In the last 7 days, where was your main destination in Wellington? (this is the place where you spent the most hours)

- Central Wellington (including CBD, Thorndon and Te Aro)
- Wellington City (but outside the central area)
- Other (please specify suburb): _____

Q6. How many times did you travel to this destination in the last 7 days?

- Once
- Twice
- Three times
- Four times
- Five times
- Six times
- Seven times or more

Q7. Would you have been able to use a vehicle (car, pickup, SUV etc.) to travel to Wellington City in the last 7 days?

- No, I don't drive
- No, my household doesn't have a vehicle
- No, my household does have a vehicle, but it was not available for me to use
- Yes

SECTION 1A: CAR TRAVEL

Q8. In the last 7 days, where did you park your car in Wellington City? (please select all that apply)

- On street coupon parking
- On street pay-and-display
- On street residence zone
- Off street private residence
- Other (please specify): _____
- Work/ employer car park
- Polytechnic/ University car park
- Parking building
- I got dropped off so did not park

Q9. Did you pay for parking, and if so, in what units?

- Parking was free
- Hourly
- Other (please specify): _____
- Daily
- Monthly

Q10. Who paid the parking fee?

- I paid the parking fee
- A person in the vehicle
- An employer
- Other (please specify): _____
- Polytechnic/ University
- Someone else
- Don't know/ not sure

Q11. In the last 7 days, how did you complete your journey from the place you left the car to your destination in Wellington City? (please select all that apply)

- ☐ I walked/ ran
- ☐ By bike
- ☐ By bus
- ☐ Car driver
- ☐ Other (please specify): _____
- ☐ Motorcycle or power cycle
- ☐ By taxi/ Uber
- ☐ By train

PARK-AND-RIDE DESCRIPTION

The purpose of this survey is to gather information on the use of Park-and-Ride facilities in the Greater Wellington Region. A Park-and-Ride facility is a location where you can leave your car then catch the train. Park-and-Ride facilities are available free of charge at most train stations and offer an alternative to driving to Wellington City.

Q12. Have you heard of Park-and-Ride before today?

- ☐ Yes
- ☐ No

Q13. Have you used Park-and-Ride before?

- ☐ Yes
- ☐ No

Q14. How long ago was the last time you used a Park-and-Ride?

_____

Q15. What made you stop using Park-and-Ride regularly? (please give as much detail as possible)

_____

Q16. To what degree do you think the following would encourage you to drive to the train station instead of driving to your destination in Wellington City?

	Extremely unlikely to encourage	Somewhat unlikely	Nether unlikely nor unlikely	Somewhat likely	Extremely likely to encourage
Increase in parking cost at or near destination	1	2	3	4	5
More car parking spaces at train station	1	2	3	4	5
Cheaper train fares	1	2	3	4	5
Improved frequency of train services during peak hours	1	2	3	4	5
Integrated transport fares and ticketing	1	2	3	4	5
Improved station facilities, including shelter and seating	1	2	3	4	5
A secure car park with CCTV and barriers	1	2	3	4	5
Congestion charge to enter Wellington City	1	2	3	4	5

Q17. Can you think of anything else that would encourage you to drive to the train station?

_____

SECTION 1B: TRAIN TRAVEL

Q18. In the last 7 days, which rail line did you use? (If you used more than one rail line, choose the one you used the most times during the last 7 days)

- ☐ Hutt Valley Line (Upper Hutt - Wellington)
- ☐ Johnsonville Line (Johnsonville - Wellington)
- ☐ Kapiti Line (Waikanae - Wellington)
- ☐ Melling Line (Melling - Wellington)
- ☐ Wairarapa Line (Masterton - Wellington)

Q19. In the last 7 days, which train station did you use other than Wellington Station? (If you used more than one train station, choose the one you used the most times during the last 7 days)

- ☐ Ava
- ☐ Awarua Street
- ☐ Box Hill
- ☐ Carterton
- ☐ Crofton Downs
- ☐ Epuni
- ☐ Featherston
- ☐ Heretaunga
- ☐ Johnsonville
- ☐ Kenepuru
- ☐ Khandallah
- ☐ Linden
- ☐ Mana
- ☐ Manor Park
- ☐ Masterston
- ☐ Matarawa
- ☐ Maymorn
- ☐ Melling
- ☐ Naenae
- ☐ Ngaio
- ☐ Ngauranga
- ☐ Paekakariki
- ☐ Paraparaumu
- ☐ Paremata
- ☐ Petone
- ☐ Plimmerton
- ☐ Pomare
- ☐ Porirua
- ☐ Pukerua Bay
- ☐ Raroa
- ☐ Redwood
- ☐ Renall Street
- ☐ Silverstream
- ☐ Simla Crescent
- ☐ Solway
- ☐ Taita
- ☐ Takapu Road
- ☐ Tawa
- ☐ Trentham
- ☐ Upper Hutt
- ☐ Waikanae
- ☐ Wallaceville
- ☐ Waterloo
- ☐ Western Hutt
- ☐ Wingate
- ☐ Woburn
- ☐ Woodside

Q20. In the last 7 days, what travel mode did you use to get to this train station? (please select all that apply)

- ☐ Car driver
- ☐ Car passenger/ dropped off
- ☐ By car, dropped off
- ☐ By bus
- ☐ By bike
- ☐ Other (please specify): _____
- ☐ I walked/ ran
- ☐ Motorcycle or power cycle
- ☐ By taxi/ Uber
- ☐ By train

Q21. In the last 7 days, at what time did you usually board the train?

- ☐ Between 4:00 and 4:59 AM
- ☐ Between 5:00 and 5:59 AM
- ☐ Between 6:00 and 6:59 AM
- ☐ Between 7:00 and 7:59 AM
- ☐ Between 8:00 and 8:59 AM
- ☐ Between 9:00 and 9:59 AM
- ☐ 10:00 AM or later

Q22. In the last 7 days, did you park your bicycle at or near the station or did you take it onto the train? (please select all that apply)

- ☐ I parked my bicycle in the cycle stands/ racks provided at the station
- ☐ I parked my bicycle in the cycle lockers provided at the station
- ☐ I parked my bicycle near the station (but not in racks provided)
- ☐ I took my bicycle onto the train with me
- ☐ Other (please specify): _____

Q23. How satisfied are you with?

	Very dissatisfied	Fairly dissatisfied	Nether dissatisfied nor satisfied	Fairly satisfied	Very satisfied	Don't know/not sure
The cycling facilities at the train station (e.g. racks/ stands/ lockers)	1	2	3	4	5	6
The cycle ways or cycle paths to the train station	1	2	3	4	5	6
The security of your bicycle when you leave it at the train station	1	2	3	4	5	6

Q24. If you are fairly or very dissatisfied with the cycling facilities, please can you tell us what improvements you would like to see:

_____

Q25. How satisfied are you with the pedestrian access route to the train station?

Very dissatisfied	Fairly dissatisfied	Nether dissatisfied nor satisfied	Fairly satisfied	Very satisfied	Don't know/not sure
1	2	3	4	5	6

Q26. If you are fairly or very dissatisfied with the walking facilities, please can you tell us what improvements you would like to see:

_____

Q27. How satisfied are you with?

	Very dissatisfied	Fairly dissatisfied	Nether dissatisfied nor satisfied	Fairly satisfied	Very satisfied	Don't know/not sure
The frequency of the train service	1	2	3	4	5	6
The reliability of the bus service	1	2	3	4	5	6

Q28. If you are fairly or very dissatisfied with the bus service, please can you tell us what improvements you would like to see:

_____

Q29. In the last 7 days, how did you finish your journey when you got off the train? (please select all that apply)

- ☐ Walked/ ran/ skateboarded/ scooter
- ☐ Car driver
- ☐ Car passenger/ dropped off
- ☐ By car, dropped off
- ☐ By bike
- ☐ Other (please specify): _____
- ☐ By bus
- ☐ Motorcycle or power cycle
- ☐ By taxi/ Uber
- ☐ By train

Q30. Now I would now like to ask you about your parking behaviour at the main train station you used in the last 7 days. In the last 7 days, where did you park your car? (please select all that apply)

- ☐ Parked in the station's Park-and-Ride area
- ☐ Parked on street, near the station
- ☐ Parked in another location (please specify): _____
- ☐ I got dropped off so did not park

Q31. How many times, over the last 7 days, did you park your car in the Park-and-Ride area at this train station?

- ☐ Once
- ☐ Twice
- ☐ Three times
- ☐ Four times
- ☐ Five times
- ☐ Six times
- ☐ Seven times or more

Q32. How many minutes on average would you say it typically takes you to find a parking space in the Park-and-Ride area?

- ☐ 0 - found a parking space right away
- ☐ 5 minutes
- ☐ 6 - 10 minutes
- ☐ Over 10 minutes
- ☐ Don't know/ not sure

Q33. How many times, over the last 7 days, did you park your car on street, near the station?

- ☐ Once
- ☐ Twice
- ☐ Three times
- ☐ Four times
- ☐ Five times
- ☐ Six times
- ☐ Seven times or more

Q34. How many minutes on average would you say it typically takes you to find a parking space on street, near the station?

- ☐ 0 - found a parking space right away
- ☐ 5 minutes
- ☐ 6 - 10 minutes
- ☐ Over 10 minutes
- ☐ Don't know/ not sure

Q35. How satisfied are you with?

	Very dissatisfied	Fairly dissatisfied	Nether dissatisfied nor satisfied	Fairly satisfied	Very satisfied	Don't know/not sure
The number of parking spaces	1	2	3	4	5	6
The availability of parking spaces	1	2	3	4	5	6
The walking route from where you park your car to the station	1	2	3	4	5	6
The security of your car when you leave it	1	2	3	4	5	6
The lighting provided in the Park-and-Ride at night	1	2	3	4	5	6

Q36. If you are fairly or very dissatisfied with the car parking facilities, please can you tell us what improvements you would like to see:

_____

Q37. A number of different factors can be important in causing people to use Park-and-Ride facilities. Please answer by indicating the point which best explains how important the following features are to you in your decision to use Park-and-Ride:

	Not at all important	Slightly important	Moderately important	Very important	Extremely important
The cost of Park-and-Ride relative to car travel cost	1	2	3	4	5
Not having to drive in heavy traffic congestion	1	2	3	4	5
The rising cost of parking at your place of work/ study	1	2	3	4	5
The lack of parking space at your destination in Wellington City	1	2	3	4	5
The train travel time relative to car travel time	1	2	3	4	5
The reliable train schedule	1	2	3	4	5
Having non-stop train service to your destination	1	2	3	4	5
Frequent train service during peak periods	1	2	3	4	5
Convenient access to the Park-and-Ride facility	1	2	3	4	5
Security near or at the Park-and-Ride facility	1	2	3	4	5
Being able to park your car close to the train station platform	1	2	3	4	5

Q38. If you could not get a space in this station Park-and-Ride car park at your usual time of travel, which of the following other transport modes would you use to get to your destination in Wellington City? (Please select all that apply)

- Travel earlier, to get a parking spot in the station Park-and-Ride car park
- Drive all the way to Wellington City
- Get a ride in someone else's car all the way to Wellington City
- Catch a public bus to the station and then catch the train
- Walk to the station and then catch the train
- Cycle to the station and then catch the train
- Get a ride with someone else to the station and then catch the train
- Drive to another station (where I could park) and catch the train from there
- Not make the journey

Q39. What factors would have to change for you to consider walking to the train station?

_____

Q40. What factors would have to change for you to consider cycling to the train station?

_____

Q41. What factors would have to change for you to consider busing to the train station?

_____

Q42. To what degree do you think the following would encourage more car users to use Park-and-Ride facilities instead of driving to their destination in Wellington City?

	Extremely unlikely to encourage	Somewhat unlikely	Nether unlikely nor unlikely	Somewhat likely	Extremely likely to encourage
Increase in parking cost at or near destination	1	2	3	4	5
More car parking spaces at train station	1	2	3	4	5
Cheaper train fares	1	2	3	4	5
Improved frequency of train services during peak hours	1	2	3	4	5
Integrated transport fares and ticketing	1	2	3	4	5
Improved station facilities, including shelter and seating	1	2	3	4	5
A secure car park with CCTV and barriers	1	2	3	4	5
Congestion charge to enter Wellington City	1	2	3	4	5

Q43. Can you think of anything else that would encourage more car users to use Park-and-Ride facilities?

_____

SECTION 2: PARK-AND-RIDE POLICY EVALUATION

Parking is currently offered free of charge at most Wellington train stations. However, a parking charge could be introduced to: discourage commuters living in close proximity to the car parks from driving to the station; encourage commuters to consider other modes of travel to the station; reduce congestion on the arterial roads leading into Wellington City; and manage demand for parking facilities. This survey presents you with one hypothetical policy that could be implemented in the future where appropriate. We are interested in your acceptability and perceived effectiveness of the policy, even if you don't use Park-and-Ride.

NB: One of the following nine scenarios was randomly assigned to each participant to be policy that they would assess

- The cost of parking at train stations would cost $1.00 per day. Revenue collected from parking fees would go towards enhancing connecting bus services and/or the provision of new feeder bus services.
- The cost of parking at train stations would cost $2.00 per day. Revenue collected from parking fees would go towards enhancing connecting bus services and/or the provision of new feeder bus services.
- The cost of parking at train stations would cost $3.00 per day. Revenue collected from parking fees would go towards enhancing connecting bus services and/or the provision of new feeder bus services.
- The cost of parking at train stations would cost $1.00 per day. Revenue collected from parking fees would go towards improving pedestrian routes and cycling facilities/routes to and around train stations
- The cost of parking at train stations would cost $2.00 per day. Revenue collected from parking fees would go towards improving pedestrian routes and cycling facilities/routes to and around train stations.
- The cost of parking at train stations would cost $3.00 per day. Revenue collected from parking fees would go towards improving pedestrian routes and cycling facilities/routes to and around train stations.
- The cost of parking at train stations would cost $1.00 per day. Revenue collected from parking fees would go towards funding the construction of more parking spaces at the train station.
- The cost of parking at train stations would cost $2.00 per day. Revenue collected from parking fees would go towards funding the construction of more parking spaces at the train station.
- The cost of parking at train stations would cost $3.00 per day. Revenue collected from parking fees would go towards funding the construction of more parking spaces at the train station.

Q44. How acceptable would you find the policy proposed?

Unacceptable	Slightly unacceptable	Neither unacceptable nor acceptable	Slightly acceptable	Acceptable
1	2	3	4	5

Q45. To what extent do you perceive this policy to be a fair measure?

Completely unfair	Unfair	Neither unfair nor fair	Fair	Completely fair
1	2	3	4	5

Q46. How effective do you think this policy would be in discouraging commuters living in close proximity to the car parks from driving to the station?

Not effective at all	Slightly effective	Moderately effective	Very effective	Extremely effective
1	2	3	4	5

Q47. How effective do you think this policy would be in encouraging commuters to consider other modes of travel to the station (e.g. using a connecting bus service, walking and cycling)?

Not effective at all	Slightly effective	Moderately effective	Very effective	Extremely effective
1	2	3	4	5

Q48. How effective do you think this policy would be in reducing congestion on the arterial roads leading into Wellington City?

Not effective at all	Slightly effective	Moderately effective	Very effective	Extremely effective
1	2	3	4	5

Q49. How likely would this policy affect your daily transport behaviour? (i.e. how you access the station)

Extremely unlikely	Somewhat unlikely	Neither unlikely nor likely	Somewhat likely	Extremely likely	Not applicable
1	2	3	4	5	6

Q50. The government can allocate the revenues of pricing policies in various ways. How acceptable are the following types of revenue allocation to you?

	Unacceptable	Slightly unacceptable	Neither unacceptable nor acceptable	Slightly acceptable	Acceptable
Improve pedestrian routes to and around train station	1	2	3	4	5
Improve cycling facilities/routes to and around train stations	1	2	3	4	5
Enhance connecting bus services and/or the provision of new feeder bus services	1	2	3	4	5
Construct more parking spaces at the train station	1	2	3	4	5

Q51. There are a number of ways that commuters could pay for parking at the train station. Please rank the following payment methods in order of preference (most preferred method at the top)

- Daily parking charge
- Weekly parking charge
- Monthly parking charge
- Combined daily train ticket and parking
- Combined monthly train ticket and parking

Q52. Would you consider carpooling to the Park-and-Ride if carpools were guaranteed a car parking space at no charge?

- Yes
- No
- I already carpool
- I don't know

SECTION 3: BEHAVIOURAL QUESTIONS

Thank you for your responses so far.

The following questions ask you about your opinion of walking and cycling to the train station. Some of the questions are similar, this is intentional. Please read each one carefully. If you do not know, just leave your answer blank.

Q53. Please select the point of the scale below that best indicates how much you agree with the following statement about walking:

	Strongly disagree	Disagree	Somewhat disagree	Neither disagree nor agree	Somewhat agree	Agree	Strongly agree
AT1. I like to, or would like to walk to the train station	1	2	3	4	5	6	7

Q54. In your opinion, walking to the train station is/ would be:

AT2. Bad	1	2	3	4	5	6	7	Good
AT3. Unpleasant	1	2	3	4	5	6	7	Pleasant
AT4. Not sensible at all	1	2	3	4	5	6	7	Sensible
AT5. Unrealistic	1	2	3	4	5	6	7	Realistic
AT6. Foolish	1	2	3	4	5	6	7	Wise
AT7. Unsafe	1	2	3	4	5	6	7	Safe
AT8. Inconvenient	1	2	3	4	5	6	7	Convenient
AT9. Inflexible	1	2	3	4	5	6	7	Flexible

Q55. Please also click the point on the scales below:

	Strongly disagree	Disagree	Somewhat disagree	Neither disagree nor agree	Somewhat agree	Agree	Strongly agree
PN1. I feel morally responsible to reduce my car use in order to decrease the negative effects on the environment	1	2	3	4	5	6	7
PN2. According to my own values and principles, I do not feel obligated to walk to the train station	1	2	3	4	5	6	7
PN3. Regardless of what other people do, I feel obligated to walk to the train station because of my own values and principle	1	2	3	4	5	6	7
SN1. Most people who are important to me don't care if I drive to the train station	1	2	3	4	5	6	7
SN2. Most people who are important to me think that I should walk to the train station	1	2	3	4	5	6	7
SN3. Most people who are important to me would approve of me walking to the train station	1	2	3	4	5	6	7

Q56. Please also click the point on the scales below:

	Strongly disagree	Disagree	Somewhat disagree	Neither disagree nor agree	Somewhat agree	Agree	Strongly agree
PBC1. It is quite impossible for me to walk to the train station	1	2	3	4	5	6	7
PBC2. It would be very easy for me to walk to the train station	1	2	3	4	5	6	7
PBC3. I do not feel capable walking to the train station	1	2	3	4	5	6	7
PBC4. It is mostly up to me whether or not I walk to the train station instead of using a car	1	2	3	4	5	6	7

Q57. Please also click the point on the scales below:

	Strongly disagree	Disagree	Somewhat disagree	Neither disagree nor agree	Somewhat agree	Agree	Strongly agree
INT1. I intend to drive less often for commuting in the near future	1	2	3	4	5	6	7
INT2. I will consider walking to the train station in the next few weeks	1	2	3	4	5	6	7
INT3. Walking to the train station is something that is typically me	1	2	3	4	5	6	7
BEH1. I have not walked to the train station in a long time	1	2	3	4	5	6	7
BEH2. I intend to walk to the train station in the next few weeks	1	2	3	4	5	6	7

Q58. Please select the point of the scale below that best indicates how much you agree with the following statement about cycling:

	Strongly disagree	Disagree	Somewhat disagree	Neither disagree nor agree	Somewhat agree	Agree	Strongly agree
AT1. I like to, or would like to cycle to the train station	1	2	3	4	5	6	7

Q59. In your opinion, cycling to the train station is/ would be:

AT2. Bad	1	2	3	4	5	6	7	Good
AT3. Unpleasant	1	2	3	4	5	6	7	Pleasant
AT4. Not sensible at all	1	2	3	4	5	6	7	Sensible
AT5. Unrealistic	1	2	3	4	5	6	7	Realistic
AT6. Foolish	1	2	3	4	5	6	7	Wise
AT7. Unsafe	1	2	3	4	5	6	7	Safe
AT8. Inconvenient	1	2	3	4	5	6	7	Convenient
AT9. Inflexible	1	2	3	4	5	6	7	Flexible

Q60. Please also click the point on the scales below:

	Strongly disagree	Disagree	Somewhat disagree	Neither disagree nor agree	Somewhat agree	Agree	Strongly agree
PN2. According to my own values and principles, I do not feel obligated to cycle to the train station	1	2	3	4	5	6	7
PN3. Regardless of what other people do, I feel obligated to cycle to the train station because of my own values and principle	1	2	3	4	5	6	7

	Strongly disagree	Disagree	Somewhat disagree	Neither disagree nor agree	Somewhat agree	Agree	Strongly agree
SN2. Most people who are important to me think that I should cycle to the train station	1	2	3	4	5	6	7
SN3. Most people who are important to me would approve of me cycling to the train station	1	2	3	4	5	6	7

Q61. Please also click the point on the scales below:

	Strongly disagree	Disagree	Somewhat disagree	Neither disagree nor agree	Somewhat agree	Agree	Strongly agree
PBC1. It is very possible for me to cycle to the train station	1	2	3	4	5	6	7
PBC2. It would be very easy for me to cycle to the train station	1	2	3	4	5	6	7
PBC3. I do not feel capable cycling to the train station	1	2	3	4	5	6	7
PBC4. It is mostly up to me whether or not I cycle to the train station instead of using a car	1	2	3	4	5	6	7

Q62. Please also click the point on the scales below:

	Strongly disagree	Disagree	Somewhat disagree	Neither disagree nor agree	Somewhat agree	Agree	Strongly agree
INT2. I will consider cycling to the train station in the next few weeks	1	2	3	4	5	6	7
INT3. Cycling to the train station is something that is typically me	1	2	3	4	5	6	7
BEH1. I have not cycled to the train station in a long time	1	2	3	4	5	6	7
BEH2. I intend to cycle to the train station in the next few weeks	1	2	3	4	5	6	7

Q63. Please indicate to what extent you agree or disagree, with the following statements on environmental problems and car use.

	Strongly disagree	Disagree	Somewhat disagree	Neither disagree nor agree	Somewhat agree	Agree	Strongly agree
PA1. Car use is one of the main global environmental problem	1	2	3	4	5	6	7
PA2. Congestion on the motorway is easily avoided by taking the train	1	2	3	4	5	6	7
PA3. Increasing car traffic is a big problem for the protection of the environment	1	2	3	4	5	6	7

	Strongly disagree	Disagree	Somewhat disagree	Neither disagree nor agree	Somewhat agree	Agree	Strongly agree
PA4. There is an urgent need to do something about the environmental pollution caused by car use	1	2	3	4	5	6	7

Q64. Please indicate to what extent you agree, or disagree, with the following statements about human beings and the physical environment:

	Strongly disagree	Disagree	Somewhat disagree	Neither disagree nor agree	Somewhat agree	Agree	Strongly agree
NEP1. We are approaching the limit of the number of people the earth can support	1	2	3	4	5	6	7
NEP2. Humans have the right to modify the natural environment to suit their needs	1	2	3	4	5	6	7
NEP3. When humans interfere with nature, it often produces disastrous consequences	1	2	3	4	5	6	7
NEP4. Humans are severely abusing the environment	1	2	3	4	5	6	7
NEP5. The balance of nature is strong enough to cope with the impacts of modern industrial nations	1	2	3	4	5	6	7
NEP6. The so-called "ecological crisis" facing humankind has been greatly exaggerated	1	2	3	4	5	6	7
NEP7. If things continue on their present course, we will soon experience a major ecological catastrophe	1	2	3	4	5	6	7

SECTION 4: DEMOGRAPHIC QUESTIONS

Thank you! You are nearly at the end of the survey.

To finish the survey we would like to get some background information about you, to get an idea of who is answering the survey. Please remember that your responses are anonymous.

Q65. Please indicate your age:

- Under 18
- 18 - 24 years
- 25 - 34 years
- 35 - 44 years
- 45 - 54 years
- 55 - 64 years
- 65 - 74 years
- 75 years' plus

Q66. Please indicate your gender:

- Male
- Female
- Other

Q67. Please state the closest street intersection to where you live... e.g. Waterloo Rd/Birch

Closest Intersection: _____

Q68. Which of the following best describes your employment situation at the moment? (please select all that apply)

- Full time paid employment (20 hours or more per week)
- Part time paid employment (less than 20 hours per week)
- Full time student
- Part time student
- Not in paid employment
- Other (please specify): _____

Q69. Which of these categories best represents your annual income from all sources before deductions like tax or superannuation?

- Zero income
- $1 - $25,000
- $25,001 - $50,000
- $50,001 - $100,000
- 100,001 +

Q70. Please indicate your highest level of education:

- No qualification
- High school qualification
- Tertiary degree
- Tertiary other

Q71. How many cars does your household own?

- None
- 1
- 2
- 3 or more

Q72. Do you own a bicycle that is in working order?

- Yes
- No

Q73. Are there any further comments you would like to make?

Appendix J. Survey Recruitment Flyer

TE WHARE WĀNANGA O TE ŪPOKO O TE IKA A MĀUI
VICTORIA
UNIVERSITY OF WELLINGTON

PARK AND RIDE SURVEY

Thank you for taking the time to read this. I am a Masters Student at Victoria University and I am interested in how people travel to the train station and what factors influence that decision.

Would a price on Park and Ride influence your decision? What about other options such as walking, cycling or bus? I am interested in your views on these matters and would **greatly appreciate your input.**

- The survey takes less than **20 minutes** to complete
- The survey is totally anonymous
- It is not connected with Greater Wellington Regional Council

If you are interested in taking part, go to the link below for more information and to answer a short survey on Park and Ride in Wellington.

https://tinyurl.com/GWParkandRide

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School of Geography, Environment and Earth Sciences |
PO Box 600, Wellington

Appendix K. Normality Tests of Constructs

Descriptives – Walking Behaviour

			Statistic	Std. Error
Attitude	Mean		4.2134	0.11727
	95% Confidence Interval for Upper Bound	Lower Bound	3.9820	
		Upper Bound	4.4447	
	5% Trimmed Mean		4.2343	
	Median		4.33	
	Variance		2.586	
	Std. Deviation		1.60797	
	Maximum		1.00	
	Minimum		7.00	
	Range		6.00	
	Interquartile Range		2.44	
	Skewness		-0.121	0.177
	Kurtosis		-0.766	0.353
PBC	Mean		3.9220	0.81033
	95% Confidence Interval for Upper Bound	Lower Bound	3.6615	
		Upper Bound	4.1824	
	5% Trimmed Mean		3.9141	
	Median		4.00	
	Variance		3.277	
	Std. Deviation		1.81033	
	Maximum		1.00	
	Minimum		7.00	
	Range		6.00	
	Interquartile Range		2.67	
	Skewness		-0.079	0.177
	Kurtosis		-0.766	0.353
Social Norm	Mean		3.3209	0.09300
	95% Confidence Interval for Upper Bound	Lower Bound	3.1375	
		Upper Bound	3.5044	
	5% Trimmed Mean		3.2987	
	Median		3.33	
	Variance		1.626	
	Std. Deviation		1.27519	
	Maximum		1.00	
	Minimum		6.67	
	Range		5.67	
	Interquartile Range		1.67	
	Skewness		0.153	0.177
	Kurtosis		-0.333	0.0353

Descriptives – Walking Behaviour Continued

			Statistic	Std. Error
Personal Norm	Mean		3.4787	0.09773
	95% Confidence Interval for	Lower Bound	3.2859	
		Upper Bound	3.6715	
	5% Trimmed Mean		3.4500	
	Median		3.33	
	Variance		1.796	
	Std. Deviation		1.34005	
	Maximum		1.00	
	Minimum		7.00	
	Range		6.00	
	Interquartile Range		1.92	
	Skewness		0.297	0.177
	Kurtosis		-0.163	0.353
NEP	Mean		4.5152	0.06455
	95% Confidence Interval for	Lower Bound	4.3879	
		Upper Bound	4.6425	
	5% Trimmed Mean		4.5296	
	Median		4.5714	
	Variance		0.783	
	Std. Deviation		0.88501	
	Maximum		1.86	
	Minimum		6.29	
	Range		4.43	
	Interquartile Range		1.14	
	Skewness		-0.195	0.177
	Kurtosis		-0.200	0.353
Problem Awareness	Mean		5.6077	0.07832
	95% Confidence Interval for	Lower Bound	5.4532	
		Upper Bound	5.7622	
	5% Trimmed Mean		5.6939	
	Median		5.75	
	Variance		1.153	
	Std. Deviation		1.07383	
	Maximum		1.00	
	Minimum		7.00	
	Range		6.00	
	Interquartile Range		1.25	
	Skewness		-1.187	0.177
	Kurtosis		2.147	0.353

Descriptives – Walking Behaviour Continued

Walking Intention	Mean	3.0443	0.13348
	95% Confidence Interval for Mean — Lower Bound		
	95% Confidence Interval for Mean — Upper Bound		
	5% Trimmed Mean		
	Median	2.33	
	Variance	3.350	
	Std. Deviation	1.83024	
	Maximum	1.00	
	Minimum	7.00	
	Range	6.00	
	Interquartile Range		
	Skewness	0.589	0.177
	Kurtosis	-0.981	0.353
Walking Behaviour	Mean	3.0479	0.14480
	95% Confidence Interval for Mean — Lower Bound		
	95% Confidence Interval for Mean — Upper Bound		
	5% Trimmed Mean		
	Median	2.25	
	Variance	3.942	
	Std. Deviation	1.98533	
	Maximum	1.00	
	Minimum	7.00	
	Range	6.00	
	Interquartile Range		
	Skewness	0.656	0.177
	Kurtosis	-0.911	0.353

Tests of Normality – Walking Behaviour

	Kolmogorov-Smirnov[a]			**Shapiro-Wilk**		
	Statistic	df	Sig.	Statistic	df	Sig.
Attitude	0.049	188	0.200*	0.976	188	0.03
PBC	0.081	188	0.005	0.952	188	0.000
Social Norm	0.074	188	0.014	0.979	188	0.007
Personal Norm	0.072	188	0.019	0.980	188	0.008
NEP	0.049	188	0.200*	0.987	188	0.093
Problem Awareness	0.116	188	0.000	0.914	188	0.000
Walking Intention	0.195	188	0.000	0.889	188	0.000
Walking Behaviour	0.201	188	0.000	0.868	188	0.000

*. This is a lower bound of the true significance.

a. Lilliefors Significance Correction

Descriptives – Cycling Behaviour

			Statistic	Std. Error
Attitude	Mean		3.4900	0.11212
	95% Confidence Interval for	Lower Bound	3.2688	
	Upper Bound	Upper Bound	3.7111	
	5% Trimmed Mean		3.4542	
	Median		3.4444	
	Variance		2.363	
	Std. Deviation		1.53736	
	Maximum		1.00	
	Minimum		7.00	
	Range		6.00	
	Interquartile Range		2.00	
	Skewness		0.236	0.177
	Kurtosis		-0.582	0.353
PBC	Mean		3.7181	0.10973
	95% Confidence Interval for	Lower Bound	3.5016	
	Upper Bound	Upper Bound	3.9346	
	5% Trimmed Mean		3.7128	
	Median		3.7500	
	Variance		2.264	
	Std. Deviation		1.50455	
	Maximum		1.00	
	Minimum		7.00	
	Range		6.00	
	Interquartile Range		2.50	
	Skewness		0.074	0.177
	Kurtosis		-0.800	0.353
Social Norm	Mean		2.9238	0.08972
	95% Confidence Interval for	Lower Bound	2.7468	
	Upper Bound	Upper Bound	3.1008	
	5% Trimmed Mean		2.8759	
	Median		3.0000	
	Variance		1.513	
	Std. Deviation		1.23023	
	Maximum		1.00	
	Minimum		7.00	
	Range		6.00	
	Interquartile Range		1.67	
	Skewness		0.414	0.177
	Kurtosis		0.259	0.353

Descriptives – Cycling Behaviour Continued

Personal Norm	Mean		3.1241	0.08633
	95% Confidence Interval for	Lower Bound	2.9538	
	Upper Bound	Upper Bound	3.2944	
	5% Trimmed Mean		3.1017	
	Median		3.0000	
	Variance		1.401	
	Std. Deviation		1.18365	
	Maximum		1.00	
	Minimum		6.33	
	Range		5.33	
	Interquartile Range		1.67	
	Skewness		0.217	0.177
	Kurtosis		-0.360	0.353
Cycling Intention	Mean		2.6241	0.09496
	95% Confidence Interval for	Lower Bound	2.4368	
	Upper Bound	Upper Bound	2.8114	
	5% Trimmed Mean		2.5705	
	Median		2.3333	
	Variance		1.695	
	Std. Deviation		1.30198	
	Maximum		1.00	
	Minimum		6.00	
	Range		5.00	
	Interquartile Range		2.33	
	Skewness		0.463	0.177
	Kurtosis		-0.920	0.353
Cycling Behaviour	Mean		1.8670	0.09378
	95% Confidence Interval for	Lower Bound	1.6820	
	Upper Bound	Upper Bound	2.0520	
	5% Trimmed Mean		1.7228	
	Median		1.0000	
	Variance		1.653	
	Std. Deviation		1.28582	
	Maximum		1.00	
	Minimum		7.00	
	Range		6.00	
	Interquartile Range		1.00	
	Skewness		1.826	0.177
	Kurtosis		3.422	0.353

Tests of Normality – Cycling Behaviour

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Attitude	0.059	188	0.200*	0.972	188	0.001
PBC	0.083	188	0.003	0.974	188	0.002
Social Norm	0.094	188	0.000	0.959	188	0.000
Personal Norm	0.084	188	0.002	0.980	188	0.008
Cycling Intention	0.168	188	0.000	0.924	188	0.000
Cycling Behaviour	0.266	188	0.000	0.706	188	0.000

*. This is a lower bound of the true significance.
a. Lilliefors Significance Correction

Appendix L. Confirmatory Factor Analysis

Walking Behavioural Model

#	Construct	Item	Standardised factor loading	Cronbach's α	
				Total	Cronbach's α if item removed
1	Attitude	AT1	0.723	0.922	0.916
		AT2	0.796		0.910
		AT3	0.709		0.915
		AT4	0.864		0.906
		AT5	0.800		0.914
		AT6	0.820		0.910
		AT7	0.630		0.920
		AT8	0.782		0.912
		AT9	0.672		0.917
2	Social Norm	SN1	0.481	0.687	0.661
		SN2	0.584		0.611
		SN3	0.770		0.500
3	Perceived Behavioural Control	PBC1	0.742	0.816	0.728
		PBC2	0.909		0.735
		PBC3	0.731		0.746
		PBC4	0.459		0.850
4	Personal Norm	PN1	0.360	0.599	0.722
		PN2	0.759		0.195
		PN3	0.691		0.454
5	Problem Awareness	PA1	0.829	0.837	0.768
		PA2	0.481		0.870
		PA3	0.803		0.771
		PA4	0.881		0.747
6	Environmental Concern	NEP1	0.555	0.840	0.831
		NEP2	0.434		0.848
		NEP3	0.555		0.825
		NEP4	0.733		0.807
		NEP5	0.731		0.807
		NEP6	0.817		0.800
		NEP7	0.791		0.803
7	Walking Intention	INT1	0.517	0.790	0.859
		INT2	0.964		0.533
		INT3	0.793		0.677
8	Walking Behaviour	BEH1	0.793	0.870	N/A
		BEH2	0.974		N/A

Cycling Behavioural Model

#	Construct	Item	Standardised factor loading	Cronbach's α	
				Total	Cronbach's α if item removed
1	Attitude	AT1	0.472	0.914	0.921
		AT2	0.809		0.898
		AT3	0.783		0.900
		AT4	0.827		0.898
		AT5	0.710		0.906
		AT6	0.792		0.901
		AT7	0.705		0.908
		AT8	0.744		0.902
		AT9	0.775		0.900
2	Social Norm	SN1	0.372	0.578	0.710
		SN2	0.382		0.236
		SN3	0.844		0.393
3	Perceived Behavioural Control	PBC1	0.851	0.758	0.590
		PBC2	0.885		0.630
		PBC3	0.632		0.718
		PBC4	0.323		0.821
4	Personal Norm	PN1	0.422	0.525	0.588
		PN2	0.742		0.448
		PN3	0.558		0.222
5	Problem Awareness	PA1	0.829	0.837	0.768
		PA2	0.481		0.870
		PA3	0.803		0.771
		PA4	0.881		0.747
6	Environmental Concern	NEP1	0.555	0.840	0.831
		NEP2	0.434		0.848
		NEP3	0.555		0.825
		NEP4	0.733		0.807
		NEP5	0.731		0.807
		NEP6	0.817		0.800
		NEP7	0.791		0.803
7	Cycling Intention	INT1	0.223	0.545	0.194
		INT2	0.926		0.316
		INT3	0.929		0.661
8	Cycling Behaviour	BEH1	0.789	0.808	N/A
		BEH2	0.536		N/A

Appendix M. Mediation Analysis

Walking Behavioural Model

	NEP	PA	PN	SN	PBC	AT
PN	.**11***(.06)					
SN	.**15****(.06)	.**08*** (.04)				
PBC	.06(.05)	.**11*** (.05)				
AT	.**13***(.06)	.**13****(.05)	.**33*****(.05)			
INT	.**21*****(.06)	.**16****(.06)	.**49*****(.05)	.**04***(.02)	.**11*****(.04)	
BEH	.**17****(.05)	.**13****(.05)	.**52*****(.05)	.**23*****(.05)	.**33*****(.05)	.**19*****(.046)

Cycling Behavioural Model

	NEP	PA	PN	SN	PBC	AT
PN	**.20****(.05)					
SN	-.06(.06)	**.15****(.05)				
PBC	**.15****(.07)	**.11****(.04)	.02(.04)			
AT	**.17****(.07)	**.19*****(.05)	.**18*****(.05)	.02(.03)		
INT	.08(.05)	**.14***(.06)	.**34*****(.05)	.03(.03)	**.05***(.03)	
BEH	.05(.03)	**.08***(.04)	.**27*****(.07)	.**25*****(.06)	.**16*****(.04)	.**10***(.05)

Note. PN = personal norm, SN = social norm, PBC = perceived behavioural control, AT = attitude, INT = intention, BEH = behaviour. LLCI, lower limit of 95% confidence interval; ULCI, upper limit of 95% confidence interval. * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$, bolded for clarity.