



The relationship between transport and mental health in Aotearoa New Zealand

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Abbreviations and acronyms

CBD	Central business district
NEI	Newly emerging infection
NGO	Non-governmental organisation
PTSD	Post-traumatic stress disorder
SARS	Sudden acute respiratory syndrome
WHO	World Health Organization

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Executive summary

This report provides an exploration of what we know about the relationship between transport and mental health in urban Aotearoa (New Zealand). The field of transport and mental health research is a new but important area of investigation. We are seeing a rise in psychological distress in our communities, and we need to understand the role that key social institutions like transport are playing in contributing to or mitigating this distress.

In this research we have sought to identify and summarise relevant research that can help us begin to develop a local evidence base for understanding the key ways that transport and mental health interact to shape urban wellbeing. We have sought out research on the impact of transport experiences on the mental health of urban populations in general, as well as research on the specific impact on tāngata whaiora, or those who are living with mental health challenges. We summarise what the evidence tells us about the impacts of transport experiences on things like mood and trip satisfaction, as well as longer-term life satisfaction, and levels of anxiety, depression and psychological distress in communities. Women, youth, Māori, Pacific peoples, and low-income people are identified as the groups who experience the highest levels of psychological distress in Aotearoa, and we pay particular attention to what we know about the relationship between transport and wellbeing for these groups.

As well as providing an extensive literature review, this report brings together three qualitative datasets designed to explore the lived experience of transport and mental wellbeing in Aotearoa. The first dataset is based on key informant interviews with professionals, such as mental health workers and transport professionals, whose work gives them insight into the impacts of transport on mental health. We also completed secondary data analysis of two existing qualitative transport datasets – the Electric City e-biking project and the Inclusive Streetscapes project – to explore what we can learn from diverse transport users themselves about the lived experience of transport and mental health. Finally, we have included a chapter with reflections on the relationship between transport and mental health in a health emergency situation, drawing on early research findings on the impact of the 2020 COVID-19 pandemic.

There are a number of key themes that emerge from this research. We conclude that the evidence suggests that aspects of Aotearoa's current transport system are likely to be contributing to the rise in levels of psychological distress in our communities, including increased noise pollution and neighbourhood severance, and declining levels of active transport use resulting from a rise in private car use. International evidence also suggests that the changes in our commuting conditions – in particular, the increase in commute times for car and bus journeys and the increase in travel in 'high impedance' congested conditions – is likely leading to elevated levels of commuting stress in our larger cities. Finally, ongoing issues with transport poverty and inaccessible environments are also likely to be a source of psychological distress for low-income households and people living with disability in Aotearoa.

This research also identifies the transport conditions and environments that are understood to be most protective of good mental health. High-quality walking (or wheeling) environments that provide opportunities for gentle exercise as well as social interaction in low-stress traffic conditions are considered generally protective for both population mental health and the everyday mental wellbeing of tāngata whaiora. Low-cost and accessible transport systems that enable people to access essentials such as employment, medical care, food, and social support without needing to incur debt or experience financial hardship are also established as essential to mental health. People also value transport environments that make them feel included and welcomed. Participants in this study provided important insights into how public transport environments in particular could be more comfortable and 'comforting' spaces for city dwellers.

In this report we make a number of recommendations around how the transport sector can support good mental health in our cities. We suggest the need for more ongoing research and monitoring of the transport needs of the population groups with the highest levels of psychological distress, including Māori, Pacific peoples, women, youth, and people living on low incomes. We also recommend better monitoring of key sources of transport-related stress for urban populations, such as noise pollution, community severance, lengthening commutes, traffic stress amongst active commuters, and transport-related financial stress within low-income households. We recommend improving neighbourhood walkability, reducing long commutes, increasing active commuting, and reducing the cost and improving the comfort of public transport as key ways to improve urban mental health in Aotearoa.

Abstract

As a key holder of space in urban centres, the transport sector has an important influence on our ability to move, to make connections and to meet our basic needs for income, food and access to health services. These opportunities for movement and connection have important impacts on our mental health. In this report we bring together a literature review, key informant interviews with transport and mental health professionals, and interviews with transport users themselves to ask how our transport systems can optimise psychological wellbeing in our cities. We find that there are some existing problems in our transport systems, such as transport poverty and inaccessible street environments, that are ongoing sources of psychological distress in our communities. We also find that there are some new trends in our transport systems, such as rising private car use and associated noise pollution and community severance, lengthening commutes, and increasing traffic stress for active commuters, that are also likely to be contributing to worsening mental health outcomes in Aotearoa (New Zealand). This report highlights the positive contribution that walkable environments, reducing long commutes, increasing active commuting, and reducing the cost and increasing the comfort of public transport can make to mental wellbeing. It also recommends more active monitoring of the transport needs and experiences of groups with higher levels of psychological distress in our communities: Māori, Pacific peoples, women, youth, and people living on low incomes.

1 Introduction

1.1 Key objectives

In this project we explore the relationships between transport and mental health in Aotearoa (New Zealand). The study has three key objectives:

- to summarise relevant published local and international research on the relationships between land transport and mental health in urban settings
- to learn about New Zealanders' experience of urban transport (both direct experience as transport users, and the secondary effects of traffic), and to explore how this affects peoples' mental health and wellbeing
- to provide recommendations, based on the study findings, on how Aotearoa's transport system can be designed in ways that improve mental health.

1.2 Why transport matters for mental health

Despite recent improvements in many domains of physical health, psychological distress and mental illness are increasing in Aotearoa. Rates of psychological distress are rising fastest amongst youth, and distress remains persistently higher amongst key social groups such as women, young people, Māori, and Pacific peoples, and amongst the one in seven households (682,500 New Zealanders, including 220,000 children) surviving without adequate weekly income (Ministry of Health, 2019; New Zealand Council of Christian Social Services, 2019).

He Ara Oranga, the recent national inquiry into mental health and addiction in Aotearoa, understands mental distress in our communities to be a 'recoverable social, psychological, spiritual or health disruption' (Paterson et al., 2018, p. 36). In this report we explore ways that Aotearoa's current transport system may be contributing to this 'disruption', and conversely the ways that it can be configured to heal disruption and build or rebuild connection.

Transport is a mental health issue, because we are increasingly coming to understand that mental wellbeing is strongly shaped by social and physical environments (Kearns & Moon, 2002). The concept of the 'therapeutic landscape' is central to contemporary approaches to mental health. It acknowledges that environments matter: that the design of mental health spaces creates or contracts opportunities for connection, comfort, restoration and recovery (Liggins, 2016; Williams, 2007). In recent times, we have started to move away from a focus on institutions and institutional relationships in mental health care: 'The community [has become] the new therapeutic landscape' (Bryant et al., 2011, p. 613). And transport is a central part of community life. The transport sector is a key holder and shaper of space in urban centres, and transport infrastructure plays an essential role in enabling people to meet their basic needs, including income, food, medical care, recreation, physical activity and social connection.

Little is known about the effects of transport on mental health in Aotearoa at either the population level or among *tāngata whaiora*.¹ Collecting better information about the experiences and needs of diverse transport users, as well as developing a better local understanding of the impacts of transport, including relationships between transport and health, are both identified as key goals in the *New Zealand Transport Domain Plan*

¹ The term *tāngata whaiora* is used within *He Ara Oranga* as an inclusive term to describe all people in Aotearoa who are living with and seeking recovery from mental health challenges, including those who identify themselves as mental health service users or mental health consumers. Literally translated it means 'people seeking wellness'.

(Ministry of Transport, 2016). This project is designed to provide some initial exploratory research on the relationships between transport and mental health in Aotearoa. At present there is not a strong existing canon of knowledge on this topic, thus an exploratory study is an important first step to establishing a body of evidence relevant to Aotearoa. As well as a review of existing research evidence, this exploratory study relies heavily on in-depth semi-structured qualitative interviews with key experts and people with lived experiences of the ways that transport intersects with mental health in our communities. This primary data was collected in Tāmaki Makaurau (Auckland).

The effect of Aotearoa's urban land transport system on mental health is not currently monitored; however, international research shows that transport systems have the potential to contribute in important positive and negative ways to mental wellbeing. They contribute positively by facilitating access to health care, employment and economic opportunities, as well as by creating mood-enhancing opportunities for exercise, contact with nature, and social connection. High-quality transport systems are a crucial part of building and maintaining individual, whānau and community resilience.

We also know that transport systems can negatively affect mental health by restricting social and economic opportunities and creating geographical pockets of despair resulting from transport-related financial stress, 'community severance', isolation, and 'psychoterratic' stress, or the experience of being cut off from natural places of cultural significance. There are also a range of direct negative health impacts associated with our current high-speed, car-dominated transport system, including injury, air pollution, noise pollution, and insufficient physical activity, each of which are associated with poorer mental health and have the strongest negative effect on the mental health of those in low-income communities.

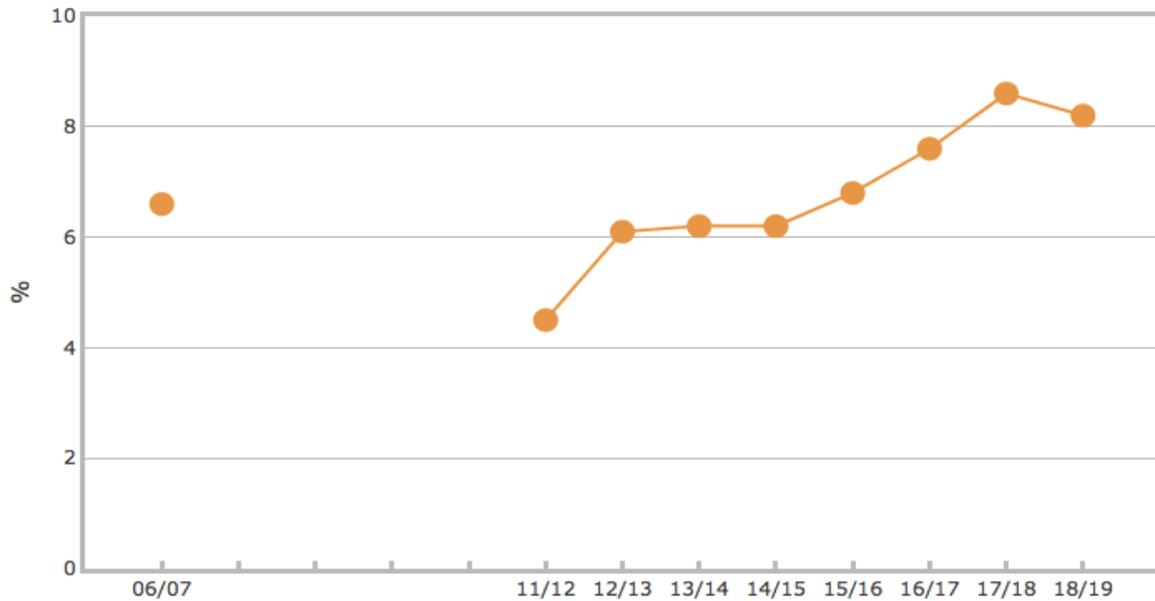
In line with global trends, Aotearoa is experiencing an increase in psychological distress and mental illness in our communities. Given these trends, it is an opportune time to reflect on how much we know about the impact of key social institutions like transport on mental wellbeing.

1.3 Background: Mental health in Aotearoa

The New Zealand Health Survey measures psychological (mental) distress in our communities using the Kessler Psychological Distress Scale (K10), which measures how frequently a person reports experiencing symptoms such as anxiety, psychological fatigue or depression in the past four weeks. People who receive a score of 12 or more have a high probability of having an anxiety or depressive disorder.

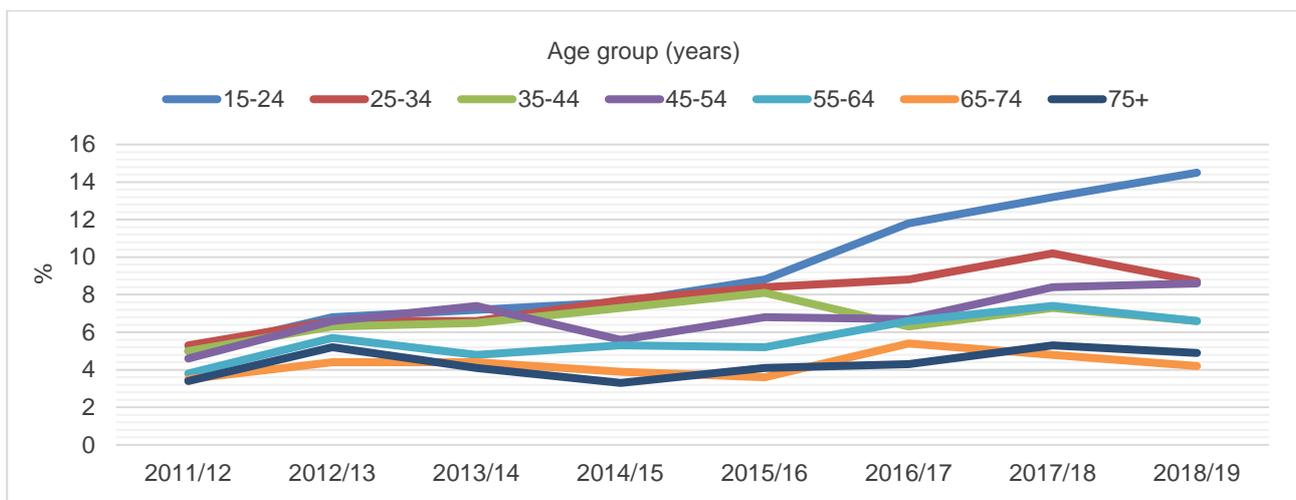
The percentage of adults who reported experiencing high levels of psychological distress (K10 score ≥ 12) in the four weeks prior to taking part in the 2018/19 survey was 8.2%, or an estimated 323,000 adults. This reported prevalence has been increasing over time: up from 4.5% in 2011/12 and then from 6.1% in 2012/13 (Figure 1.1) (Ministry of Health, 2019).

Figure 1.1 Percentage of adults in Aotearoa who reported experiencing psychological distress in the last four weeks (high or very high probability of anxiety or depressive disorder, K10 score ≥ 12), time series (Source: Ministry of Health, 2019, Indicators, Mental health, psychological distress)



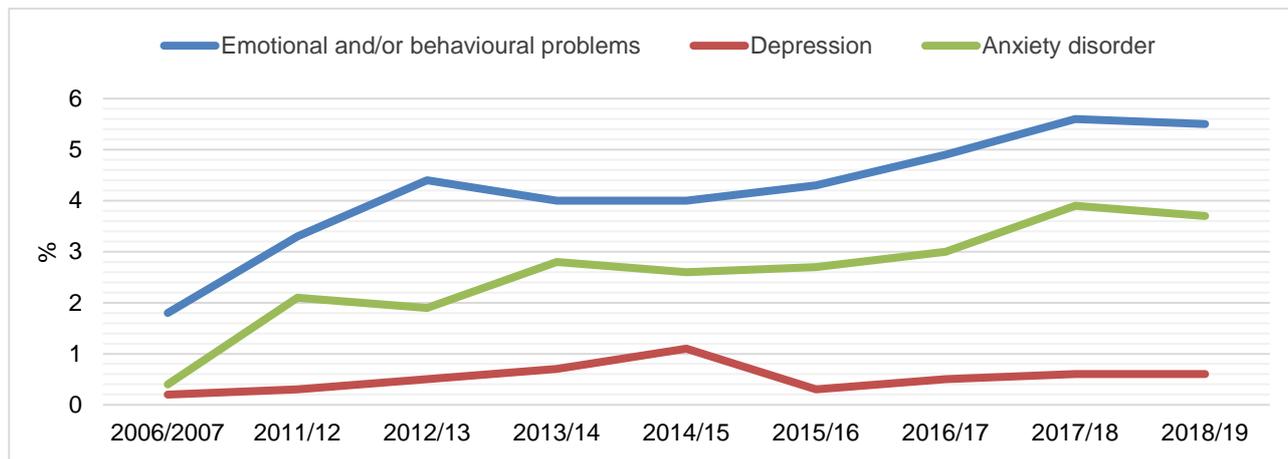
The reported prevalence of psychological distress varied by gender, age, ethnic group and level of neighbourhood deprivation. There was a higher reported prevalence of psychological distress among young adults aged 15–24 years (14.5%) than in those aged 25 and over (who ranged from 4.2% to 8.7%). The percentage of young adults reporting experiencing psychological distress is up from 5.0% in 2011/12, and has increased at a faster rate compared to other age groups (Figure 1.2).

Figure 1.2 Percentage of adults in Aotearoa who reported experiencing psychological distress in the last four weeks (high or very high probability of anxiety or depressive disorder, K10 score ≥ 12), by age (adapted from Ministry of Health, 2019)



Reported levels of anxiety disorders and emotional/behavioural problems have also been rising amongst children (Figure 1.3). This increase has also occurred in other Western nations, such as the United States, the United Kingdom and Australia (Wilson, 2020).

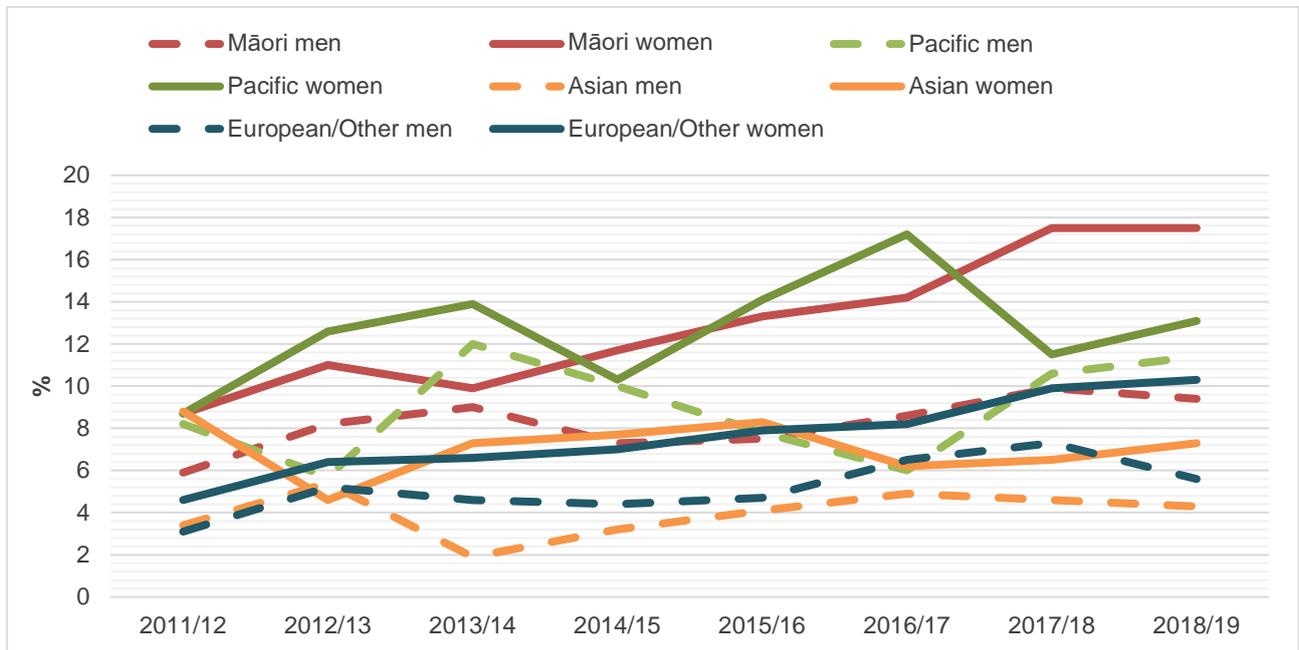
Figure 1.3 Percentage of parent-reported mental health problems amongst children in Aotearoa, time series (adapted from Ministry of Health, 2019)



In 2018/19, women were around 1.8 times as likely as men to report experiencing psychological distress in the past four weeks, after adjusting for age differences. The reported prevalence for females aged 15–24 (19.6%) was around twice that of males in the same age group (9.6%). In 2018/19, 13.7% of Māori, 12.4% of Pacific, 8.0% of European/Other and 5.8% of Asian adults had reported experiencing psychological distress in the four weeks prior to taking part in the survey. Māori adults were 1.6 times as likely to have reported experiencing psychological distress as non-Māori adults after adjusting for age and gender differences, while Pacific men were 1.8 times as likely to have reported experiencing psychological distress in the past four weeks as non-Pacific men, after adjusting for age differences.

The reported prevalence of psychological distress has increased over time in both Māori and European/Other adults (Figure 1.4). This is primarily due to an increase in distress amongst women, which has doubled in both groups since 2011/12: from 8.7% to 17.5% in Māori women, and from 4.6% to 10.3% in European/Other women. In contrast, the reported prevalence of psychological distress amongst Pacific and Asian people has not significantly changed over time. Socioeconomic deprivation was the strongest predictor of reporting psychological distress, with adults living in the most socio-economically deprived areas 2.1 times as likely to report experiencing psychological distress as those in the least deprived areas, after adjusting for age, gender and ethnic differences (Just & Bembenek, 2012)

Figure 1.4 Percentage of adults in Aotearoa who reported experiencing psychological distress in the last four weeks (high or very high probability of anxiety or depressive disorder, K10 score ≥ 12), by ethnicity and gender (adapted from Ministry of Health, 2019)

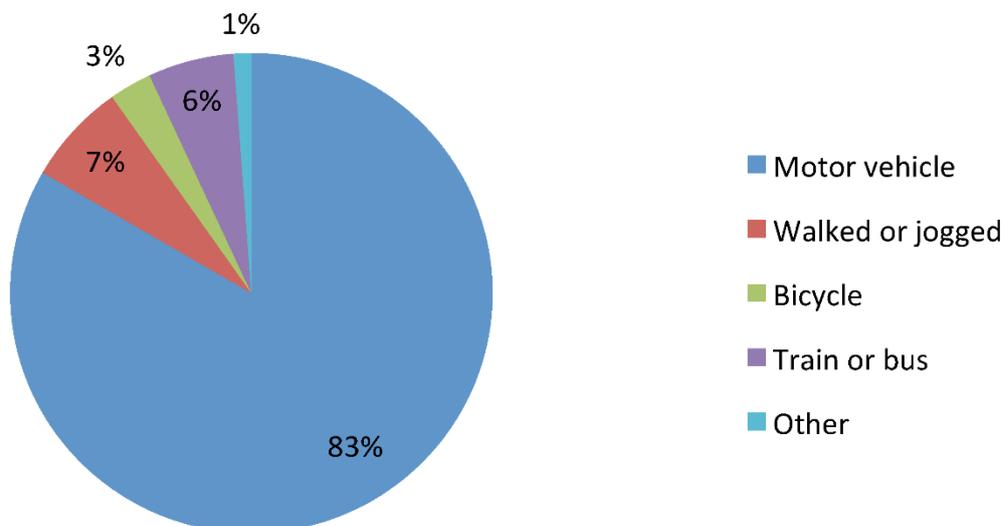


1.4 Background: Urban land transport in Aotearoa

[We are seeing] a development towards an increasingly mobile society with the car in a core position. (Fyhri et al., 2011, p. 708)

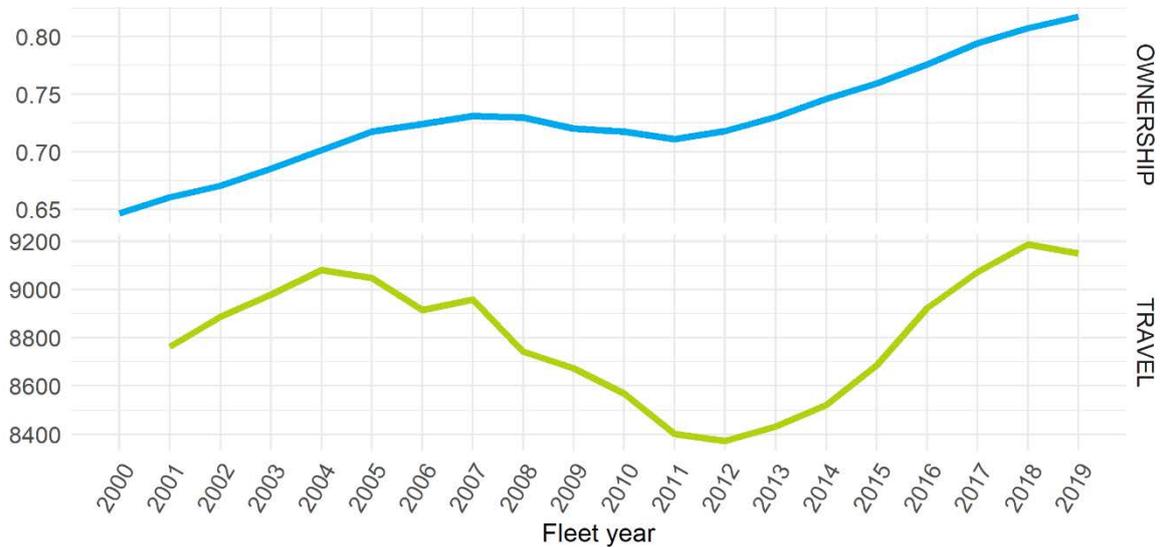
Aotearoa’s urban land transport system is characterised by high levels of personal automobile use (Figure 1.5). Levels of reported public transport and active transport use are all low by international standards.

Figure 1.5 Transport mode share, travel to work, 2013 (Source: Shaw & Russell, 2016, p. 22)



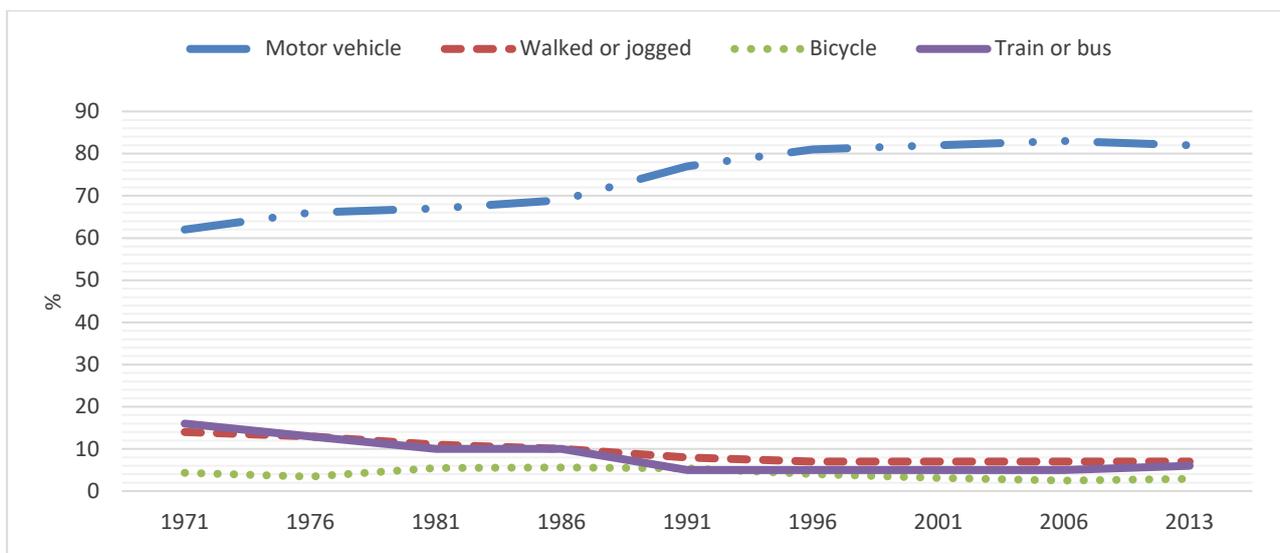
In line with mobility trends in other English-speaking Western countries, in the last 20 years Aotearoa has seen a rise in both the number of cars in use and total vehicle kilometres driven (Figure 1.6).

Figure 1.6 Annual light fleet travel (km) and ownership per capita (Source: Ministry of Transport, 2020, p. 12)



More recently, Aotearoa’s passenger vehicles have also started to get larger and heavier (Ministry of Transport, 2020). At the same time, Aotearoa has seen a decline in the reported use of active transport modes, such as walking and cycling, amongst both adults and children. Walking declined from 14% of trips to work in 1971 to 7% in 2013. Cycling declined from 4% in 1971 to 3% in 2013. There was a slight increase in reported cycling between 2006 and 2013 nationally, from 2.5% to 2.9% (Figure 1.7) (Shaw & Russell, 2016).

Figure 1.7 Trends in travel to work in Aotearoa, 1971–2013 (adapted from Shaw & Russell, 2016)



1.5 Conceptual framework

This project is underpinned by a conceptual framework that prioritises:

- a definition of mental health that values and incorporates Māori and Pacific mental health perspectives
- a focus on equity
- understanding effects across the life course
- preventative and strengths-based approaches to improving mental health.

This project utilises a holistic, strengths-based understanding of mental health, incorporating Whakawātea te Ara and *Vai Niu*, Māori and Pacific visions of mental health and wellbeing (Paterson et al., 2018). The World Health Organization (WHO) defines mental health as ‘a state ... in which every individual realizes his or her own potential, can cope with the normal stresses of life, can work productively and fruitfully, and is able to make a contribution to her or his community’. Māori and Pacific visions of mental health both emphasise the importance of holistic approaches to wellbeing. For Pacific peoples this means ‘incorporating Pacific languages, identity, connectedness, spirituality, nutrition, physical activity and healthy relationships’ into approaches to wellbeing (Paterson et al., 2018). For Māori, holistic models of wellbeing like Te Whare Tapa Whā (the four pillars of wellbeing), which incorporate wairua, hinengaro, tinana and whānau (spirit, mind, body and family), are central to effective approaches to wellbeing (Paterson et al., 2018).

He Ara Oranga, the recent inquiry into mental health and addiction, identifies four important elements of a holistic approach to mental health in Aotearoa:

Mental health is a function of meaningful work, healthy relationships with family, whānau and community, good physical health, and strong connection to land, culture and history. (Paterson et al., 2018, p. 39)

We have used this definition of mental health because it aligns fairly closely with the definition of mental health developed by the WHO. Importantly, however, it also incorporates Māori and Pacific peoples’ conceptualisations of wellbeing, thus it is a useful definition to use to explore the relationship between transport and mental health in a local context.

In this research, in line with current evidence, we utilise what is called a ‘biopsychosocial’ (Engel, 1977) understanding of mental health. This model of mental health understands psychological distress to be created by a complex mix of biological, social and individual psychological factors that we still don’t yet fully understand (Kendler, 2012). The biopsychosocial model of mental health research is slightly different to the ‘biomedical’ model of mental illness that is predominant within our health care systems. The biomedical approach tends to frame mental health challenges in terms of brain structure and function, and to focus on the diagnosis and treatment of discrete ‘disorders’ (eg, depression, anxiety, psychosis) (Andreasen, 1985).

In recent years, however, the popularity of biomedical models of mental health has waned due to:

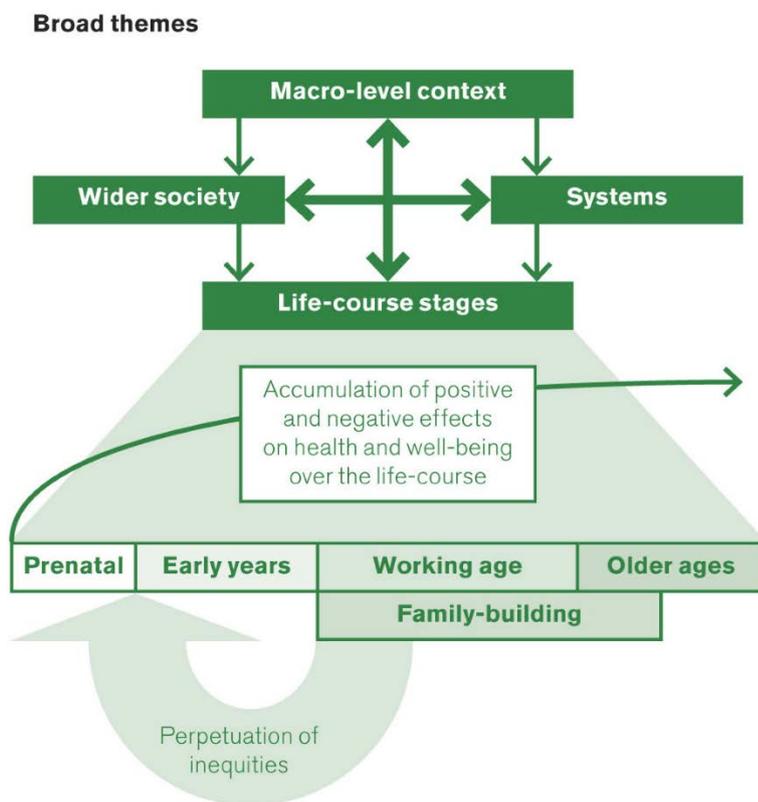
- the continuing lack of neurological evidence that psychological distress can be reduced to a simple ‘chemical imbalance’
- mounting concerns around the safety and effectiveness of pharmacological treatment on a large scale, given the rise in the chronicity and severity of psychological distress in our communities, as well as the rise of apparently ‘treatment-resistant’ psychological disorders
- the failure of biomedical models to reduce the stigma associated with mental illness – something that was initially understood as a potential strength of this model (Deacon, 2013; Gold, 2009; Pescosolido et al., 2010).

In this research we utilise a model of biopsychosocial mental health research that emphasises the value of bringing together a range of expertise and understandings of the different components of mental health (Kendler, 2012). This is reflected in our research team, which includes expertise in social psychiatry, Pacific mental health, Māori mental health, community mental health support and critical health research, as well as the mental health dimensions of transport experience.

Equity and the need to destigmatise mental distress and mental illness are also key guiding principles in this research. In particular, we support strengths-based and trauma-informed approaches to mental health that recognise that trauma and chronic social and environmental stressors make a significant contribution to mental distress in our communities (Te Pou o te Whakaaro Nui, 2018) and that there is a need to ‘reduce the pathologizing of symptomatic behaviour’ by recognising that mental health symptoms are often ‘normal reactions to abnormal experiences’ (Leitch, 2017, p. 1). We recognise that some groups in our communities are more likely to experience trauma and deprivation. In particular, we recognise that Māori may experience intergenerational and ongoing trauma/s as a result of colonisation. Consequently, these groups may be more likely to experience greater levels and frequency of mental distress, mental illness and addiction.

In line with the life-course approach to mental health utilised by the WHO (2014), we have also sought to explore the differential impacts of transport on mental health (and vice versa) across the lifespan. We recognise that there are different key mental health issues at different stages of life development, and therefore the effect of transport systems varies across our lifespan. Using the WHO life-course model of mental health (Figure 1.8), it is important to reflect on how transport systems in Aotearoa might be impacting on different critical stages of mental health development, including the prenatal environment, early childhood and attachment, adolescence and functional independence, working life and family building, and older age.

Figure 1.8 A life-course approach to mental health (Source: WHO, 2014, p. 18)



Finally, in line with *He Ara Oranga* as well as other key mental health documents and strategies in Aotearoa such as the Ministry of Health's Building on Strengths mental health promotion strategy and the Youth Development Strategy, we also recognise the importance of moving towards a more preventative, strengths-based model of mental health that emphasises connectedness; addresses causes of, and inequities in, chronic stress and trauma experienced in our communities; and nurtures protective factors that reduce mental distress, increase individual and whānau resilience, and prevent mental distress from turning into mental illness. Most of us have challenges, but some groups experience multiple challenges, and more severe challenges than others, and transport systems play an important role in promoting good mental health, as well as nurturing and sustaining the protective factors that prevent mental illness and help people to seek meaningful treatment.

1.6 Structure of the report

Chapter 2: Literature review: The emergence of a mental health and transport research agenda

We sought to draw out what has been written about theories and pathways concerning the relationship between transport and mental health. At present, in Aotearoa, the impact of the transport system on mental health is not monitored in the same way that crashes and injuries are tracked. Therefore, we have drawn on international research and to a smaller body of local literature to begin to map out the pathways of influence and relationship.

Chapter 3: 'Transport is quite literally the vehicle for all things': The key informant interviews

We conducted key informant interviews with nine participants (two Pacific and seven other participants). These interviews aimed to capture expert understandings from people who work or who have worked at the intersection of transport and mental health about the relationships between transport and mental health within urban communities. The interviews focused on the two dimensions of this relationship: the mental health of tāngata whaiora as well as population-level mental health.

Chapter 4: The everyday joys and sorrows of mobility in our cities: Insights from the Inclusive Streetscapes and Electric City projects

We also conducted secondary data analysis of two neighbourhood/transport and health qualitative datasets (Inclusive Streetscapes and Electric City). Neither of these datasets was originally designed to capture data on mental health and transport; however, both datasets provided in-depth, rich examples of the lived experience of the everyday joys and sorrows associated with moving around our cities.

Chapter 5: Transport and mental health: Insights from the COVID-19 pandemic

About halfway through the project, COVID-19 arrived in Aotearoa. As public health researchers it was immediately clear that how we organised our transport system would have an important impact on both infection control and the mental health and 'resilience' of our communities: their ability to connect, access essential services, and have opportunities for physical activity and restoration. In this chapter we explore what we know about the ways that newly emerging infections like COVID-19 affect mental health, and we examine what happened to mobility during the early stages of the pandemic in Aotearoa. During Aotearoa's five-week 'lockdown' or 'stay-at-home order', this report's lead author, Dr Kirsty Wild, worked with a local non-governmental organisation (NGO) to run a study on the experience of living in a low-traffic neighbourhood during lockdown. We have included some reflections from this study on the relationship between transport and mental health in cities during a pandemic – a time of significant stress and disruption.

Chapter 6: Discussion

We discuss the key findings from the report about the ways that our transport is likely to be contributing to psychological distress in our communities, as well as how it can be configured to support and protect good mental health in Aotearoa. We find that people with long commutes (40 minutes plus), especially long car or public transport commutes; people who have difficulty affording to use their car or public transport; people who are dependent on others for travel and feel a lack of 'control' over their mobility; and people who find transport systems physically difficult, painful and embarrassing to navigate all experience poorer mental health than those who do not face such challenges. We also find that improving walkability, reducing transport volumes and noise in neighbourhoods, making cycling safer, and making public transport cheaper and more comfortable are likely to improve the overall mental health of populations in our cities.

Chapter 7: Recommendations

We make 14 key recommendations about ways that our transport system can be configured to support the mental health of tāngata whaiora as well as urban populations. These recommendations include better monitoring of the transport needs of Māori, Pacific peoples, women, and youth. They also include reducing specific transport-related sources of psychological distress such as long commutes, transport noise, transport poverty, traffic stress amongst active commuters, uncomfortable and unsafe public transport environments, and both contemporary and historical sources of community severance.

2 Literature review: The emergence of a mental health and transport research agenda

2.1 Introduction

Until recently, in most countries like Aotearoa, the everyday transport trip, and commuting trips in particular, have been viewed in a faintly negative light as a sort of 'necessary evil', a means to achieve important wellbeing ends, including income, education, connection and leisure (Hannam et al., 2006; Jain & Lyons, 2008). Seen this way, everyday transport (as opposed to leisure travel) may have a negative effect on our mood during a trip, but this temporary annoyance is outweighed by the greater gains in life satisfaction that the trip can help to facilitate. However, recent transport research has begun to rethink our understandings of the relationship between transport and the good life. Transport psychologists in particular have challenged the ideas that transport trip effects are either necessarily temporary or that they are an uncomplicated and inevitable annoyance.

Researchers in psychology, public health, economics and geography have sought to develop a more in-depth empirical understanding of the impact different dimensions of transport trips, including travel time, travel mode, travel conditions, and travel accessibility and cost, have on mood, transport satisfaction, life satisfaction, subjective wellbeing, psychological distress, and patterns and prevalence of mental illness amongst both individual travellers and the neighbourhoods and communities they move through and help to shape. It is clear there are frequently 'spillover effects' of transport trips on mental health (Chatterjee et al., 2019). Everyday travel may have long-lasting effects on the mood of transport users, and there may also be enduring effects on broader satisfaction with life and incidence of mental illness amongst both travellers and traversed communities. Recent research has challenged the understanding of transport trips as a simple annoyance, pointing out that this not only dramatically understates the severity of psychological distress generated by aspects of our current transport system but also overlooks the fact that transport trips and systems may actually generate happiness in their own right.

We have included research on the relationship between mental health and neighbourhood where it is relevant. This an important point, in our view: the effects of transport and neighbourhood on mental health overlap. Transport infrastructure (train stations, roads etc) helps to define neighbourhoods, and the way we travel and the mode we use affects our experience of and sense of connection to neighbourhood. We have sought out relevant literature on Māori and Pacific experience of neighbourhood and transport to examine what may shape the relationships between mental health and transport for these two important groups, given that they are the most likely to experience mental health challenges in Aotearoa. Research on Māori and Pacific mental health experiences and priorities is more established, although there is only a very small body of published work on Māori transport experiences, and very little published literature on Pacific transport experiences. We have included broader research on Pacific experience of neighbourhood where relevant.

Finally, like all social impacts of transport, the relationships between mental health and transport are complex, and can be tricky to tease out (P. Jones & Lucas, 2012). For instance, is someone travelling less because they feel safer and enjoy spending more time closer to home in their neighbourhood, or is it because they don't have sufficient funds to go out, and thus may be suffering the effects of social isolation? Research on mental health and transport is an emergent field, and questions of direction of causality and the extent to which transport effects may be mediated by broader social relationships are often not entirely settled. However, there are clearly some emergent trends within the research. To better understand the relationships between mental health and transport in Aotearoa, we need to develop better data sources,

triangulate our data more, and understand how local experience fits within the emerging body of international research within this field.

As noted, we have used four important contributors to mental wellbeing identified in *He Ara Oranga* to structure our narrative review on the existing international and local evidence around the relationship between mental health and transport. Within each theme, where there is evidence available, we have sought to identify the effects of transport trips on individual transport users, neighbourhoods, and communities.

2.2 Methods

This evidence review follows conventions for the review and synthesis of theories and pathways within public health (Campbell et al., 2014; Lorenc et al., 2012; Whitehead et al., 2016). The initial review was completed in December 2019 and updated in response to peer review in September 2020. The Scopus research database was our starting point in the search for relevant academic literature. As relatively little has been published locally on transport and mental health, we also used our professional networks and wider internet searches to identify relevant grey literature. Because this is a fairly new topic without a well-established literature, we undertook a narrative literature review rather than a systematic literature review. While a systematic review involves a narrow set of precise questions and summarises primary studies on a topic, a narrative literature review explores a broader range of studies seeking to identify connections and synergies across a more diverse evidence base. A narrative review relies more heavily on the judgement and analytical skills of the researcher to create a coherent 'map' of diverse studies that provide insights into different parts of the topic under study (Gordon, 2018).

The lead researcher, Dr Kirsty Wild, has previously published in the field of transport satisfaction, one important area of literature contributing to our understanding of the relationship between transport and mental health. She has also worked extensively with people with mental health challenges, within her work in the disability sector. This expertise across both transport and mental health is considered a key strength of this narrative review. A weakness is that her background expertise is more strongly developed in active transport (and cycling in particular) than in other transport modes. Given that the topic is fairly novel, we brought together a multi-disciplinary team with research expertise across diverse aspects of transport experience (across all modes), as well as research expertise across important aspects of mental health (including Māori mental health, Pacific health, and social psychiatry), to make sure the narrative review and other aspects of the research were as comprehensive as possible.

In line with the approach used by Whitehead et al. (2016), the evidence review included the following steps:

1. We used an iterative approach to search diverse literatures to identify theories about the relationship between mental health and transport.
2. We drew on the expert knowledge of the research team and other key informant experts in the transport and mental health fields (including authors of key papers in the field, and mental health and transport professionals) to identify seminal texts in the field.
3. We used a 'pearl-growing' approach, involving hand-searching the bibliographies of key research papers to identify additional relevant papers.

2.3 Transport and meaningful work

Transport enables access to education and employment (Farber & Páez, 2009; Kenyon, 2011; Mackett & Thoreau, 2015), both of which are associated with higher levels of mental wellbeing (Bambra, 2010). Trips for work or education lead to both positive and negative effects on mental health.

2.3.1 Effects on individual transport users

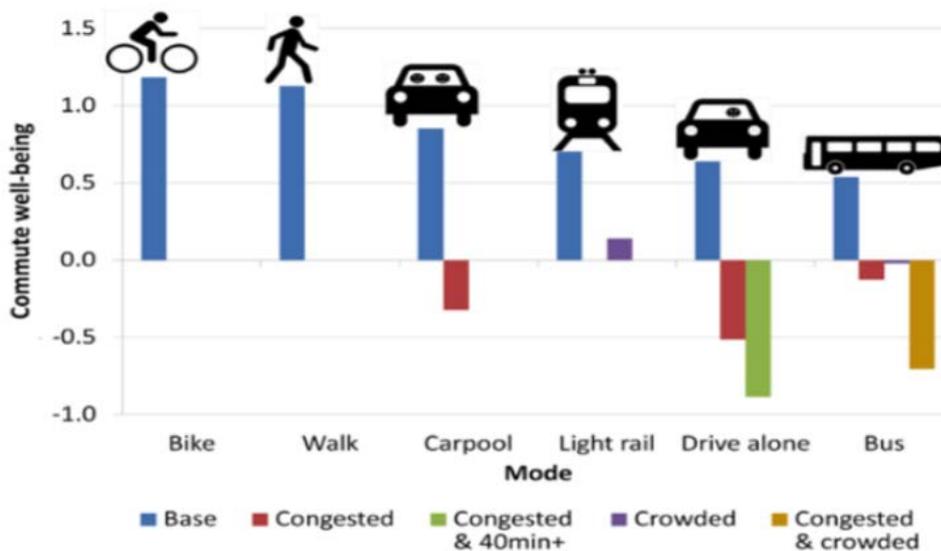
People feel typically less well when commuting than at home, and this negative difference is largest when commuting using public transport and smallest when commuting by bike. It is not per se the commuting time that depresses mood, but specific combinations of commuting time and commuting mode. Increasing commuting times can even lead to an uplift of mood when the commute is by bike or foot. (Lancée et al., 2017, p. 195)

The effect of the commute journey on psychological health is the result of a combination of time spent commuting, the commuting mode used, and the quality of social interaction during commute (Chatterjee et al., 2019; Lancée et al., 2017). Like all experiences, there are differences in travel preferences between individuals; however, there are patterns that stand out in the literature on travel satisfaction. In general, the commute journey tends to lower mood because it is enjoyed less than most other activities such as being at home or work, leisure, or other forms of travel. But the conditions of your commute also matter when it comes to its effect on mental health. As the quote above highlights, some commutes may actually improve mood and mental wellbeing.

The psychological impact of the commute journey may be evident in changes in mood, commute satisfaction, subjective wellbeing, or quality of life (Chatterjee et al., 2019). But regardless of the measures used, active modes such as walking and cycling tend to be associated with better psychological health, while public transport tends to score lowest. The effects of commuting by car tend to fall in the middle of the range, depending on factors such as levels of ‘impedance’ or congestion, and whether there is a passenger on board or not (Avila-Palencia et al., 2017; Gatersleben & Uzzell, 2007; LaJeunesse & Rodríguez, 2012; Lancée et al., 2017; Martin et al., 2014; Morris & Guerra, 2015; Singleton, 2018).

People who walk are most likely to report feeling relaxed during their commute; people who cycle are most likely to find their commute exciting; those using public transport are most likely to report feeling bored or depressed; and those driving in a car are most likely to report feeling stressed (Gatersleben & Uzzell, 2007) (see Figure 2.1). Note that while car users and public transport users generally experience both poorer mood and lower commute satisfaction, there is a good deal of variability due to factors such as the amount of congestion and the amount of crowding on public transport (Singleton, 2018; Smith, 2017).

Figure 2.1 Commute wellbeing by mode (Source: Smith, 2017, p. 253)



Both psychological arousal and psychological control differ between modes of transport. High levels of control over commute conditions seem to be a key reason for positive mood and higher levels of satisfaction and subjective wellbeing amongst active transport users (LaJeunesse & Rodríguez, 2012; Singleton, 2018). Lower levels of control over commute conditions, as experienced in many settings by car and public transport users, tend to be associated with greater psychological distress, expressed as boredom or depression by public transport users (low arousal and low control), and stress and anxiety by car users (high arousal and low control) (Gatersleben & Uzzell, 2007). Travel time unpredictability, due to congestion for bus or car users, or disruptions to services for bus and train users, contributes to a reduced sense of control and therefore satisfaction amongst commuters using these modes (LaJeunesse & Rodríguez, 2012; Singleton, 2018). These associations have been observed in different countries, with different transport systems, and findings of longitudinal research suggest cause and effect. It is not just that happy people are more likely to use active transport, but also that switching from a lower satisfaction mode (car or public transport) to a higher satisfaction mode (walking or cycling) improves mood and mental health (Avila-Palencia et al., 2018; de Kruijff et al., 2019; Martin et al., 2014; Schneider & Willman, 2019).

The amount of time spent commuting also impacts on the effect of the commute journey on mental health. In general, mood tends to decline significantly after 15 minutes of commuting, and life satisfaction declines after 45 minutes of commuting. Commuting times between 60 and 90 minutes are most detrimental to subjective wellbeing (Chatterjee et al., 2019; Lancée et al., 2017). However, commute satisfaction does not seem to be affected to the same extent by time for active transport users; instead, there is some evidence that longer commutes are associated with higher satisfaction for these modes (Lancée et al., 2017).

There is no New Zealand research available comparing travel satisfaction or mental health by commute mode; however, this should be a priority. The relationship between commute stress, commute satisfaction and deprivation should also be a priority for investigation in Aotearoa. Overseas research shows that car commuting stress tends to be strongest for women and for low-income car commuters (Singleton, 2018). Greater commute stress amongst women is generally attributed to the fact that women have a longer 'double day' with the need to fit both work and family trips into tight time budgets (Roberts et al., 2011; Singleton, 2018). Car commuting stress may particularly affect low-income workers because they are more likely to work in 'low-control' jobs with less flexible working conditions where they face greater surveillance and punishment around 'being on time' (Jacobs & Padavic, 2015). Low-control commuting adds to the effects of low-control jobs to produce greater lived experience of lack of ability to control life circumstances.

Those whose employment and accommodation are insecure face particular challenges: reliable and accessible options are especially important in these circumstances to promote mental wellbeing (Mullen et al., 2020). Also, it is important to note that the benefits from walking and cycling are sensitive to context. In places where active transport environments are unsafe and poor quality, yet people are forced to walk or cycle because they cannot afford to use a car or public transport, and/or public transport provision is also poor, active transport may contribute to higher levels of psychological distress for some groups (Bostock, 2001; Curl & Mason, 2019).

Behavioural psychologists argue that given the poor mental health outcomes involved, heavy car use in congested conditions is considered a 'paradox', or the 'stress that doesn't pay' (Stutzer & Frey, 2008). However, other factors such as habit, the location of affordable housing, other environmental constraints and declining familiarity with alternative modes may all contribute to high levels of car use, despite poor psychological outcomes. Under these conditions, drivers may become habituated to an 'inferior status quo' at least partly due to lack of experience of and ability to access more satisfactory alternatives (Lattarulo et al., 2019). Low-income workers in particular generally have less ability to reduce car use as a way to reduce commute stress because they tend to have less flexible activity routines, shaped by more rigid work hours, greater job insecurity, more dispersed employment and longer work hours (Tranter, 2010).

Overall, whether the measure is commute satisfaction, quality of life, subjective wellbeing, or prevalence of mental disorders, Aotearoa’s transport system is characterised by the high use of transport modes associated with poorer mental health outcomes. Car use is predominant, and the types of car trips increasingly being taken in our larger urban centres (15 minutes plus, in congested conditions) are associated with:

- poorer overall life satisfaction (Drobnič et al., 2010; Gottholmseder et al., 2008; Sposato et al., 2012)
- a reduction in partnership stability and satisfaction with family life (Kley & Feldhaus, 2017; Sandow, 2014)
- declining participation in community activities (Mattisson et al., 2015; Putnam, 2001)
- lower levels of employee productivity and higher levels of stress-related work absences (Navaco et al., 1990).

There is also a need for New Zealand research on the effects of transport mode and transport accessibility on the mental health of people who are living with disability, including tāngata whaiora, and seeking employment. International research shows that people with anxiety disorders often have particular difficulties using public transport due to feelings of lack of control, crowding, uncertainty, and heightened concerns about safety (International Transport Forum, 2009; Mackett, 2019; Mental Health Action Group & Anxiety UK, 2016; Posner et al., 2018). In general, making a journey requires a number of key mental skills that can be affected to a varying extent by different types of mental health conditions. Mackett (2017) argues that there are six key mental skills involved in making a journey: ability to remember; comprehension; decision making; interpersonal communication; confidence in travelling alone; and ability to behave appropriately. Table 2.1 summarises how these mental skills are employed within a journey by car, bus, or on foot. Table 2.2 indicates which of these six key travel-related mental skills may be affected by common mental health conditions.

Table 2.1 The mental skills required to make a journey, by mode (adapted from Mackett, 2017)

	Walking	Car	Bus
Ability to remember	<ul style="list-style-type: none"> • Planning the journey • Remembering the journey being made • Wayfinding • Coping when lost 	<ul style="list-style-type: none"> • Planning the journey • Remembering the route • Controlling the car • Making route changes because of congestion etc 	<ul style="list-style-type: none"> • Planning the journey • Remembering the route • Wayfinding to the bus stop • Wayfinding to the final destination • Coping with a disrupted journey
Comprehension	<ul style="list-style-type: none"> • Planning the journey • Understanding about personal safety and security • Coping when lost • Understanding information from signposts and other visual clues • Interacting with other people 	<ul style="list-style-type: none"> • Planning the journey • Understanding information from signposts and other visual clues • Controlling the car • Making route changes because of congestion etc 	<ul style="list-style-type: none"> • Planning the journey • Understanding about personal safety and security • Understanding visual clues • Purchasing a ticket • Understanding audio-visual information • Coping with a disrupted journey

	Walking	Car	Bus
Decision making	<ul style="list-style-type: none"> • Planning the journey • Wayfinding • Crossing the road • Coping when lost 	<ul style="list-style-type: none"> • Planning the journey • Making navigation decisions • Controlling the car • Making route changes because of congestion etc 	<ul style="list-style-type: none"> • Planning the journey • Wayfinding to the bus stop • Deciding on the correct bus stop • Deciding on the correct bus • Purchasing a ticket • Choosing a seat • Deciding when to alight • Wayfinding to the final destination • Coping with a disrupted journey
Interpersonal communication	<ul style="list-style-type: none"> • Interacting with other people 	<ul style="list-style-type: none"> • Communicating with others if assistance is required 	<ul style="list-style-type: none"> • Purchasing a ticket • Interacting with fellow passengers • Coping with a disrupted journey
Confidence in travelling alone	<ul style="list-style-type: none"> • Wayfinding • Crossing the road • Coping when lost • Interacting with other people 	<ul style="list-style-type: none"> • Making navigation decisions • Controlling the car • Making route changes because of congestion etc • Communicating with others if assistance is required 	<ul style="list-style-type: none"> • Wayfinding to the bus stop • Indicating to the driver to stop • Boarding the bus • Purchasing a ticket • Choosing a seat • Interacting with fellow passengers • Alighting from the bus • Wayfinding to the final destination • Coping with a disrupted journey
Ability to behave appropriately	<ul style="list-style-type: none"> • Interacting with other people 	<ul style="list-style-type: none"> • Communicating with others if assistance is required 	<ul style="list-style-type: none"> • Purchasing a ticket • Interacting with fellow passengers

Table 2.2 Mental skills used in making a journey that may be affected by common mental health conditions (Source: Mackett, 2017, p. 19)

	Ability to remember	Comprehension	Decision making	Interpersonal communication	Confidence in travelling alone	Ability to behave appropriately
Agoraphobia					•	
Anxiety	•	•	•	•	•	
Bipolar disorder	•	•	•	•	•	
Depression			•	•	•	
OCD						•
Psychosis		•	•			•
Schizo-affective disorder		•	•		•	•
Schizophrenia		•	•	•		•

OCD = obsessive-compulsive disorder

In addition, mental distress is an ‘invisible disability’ that public transport staff are often not sufficiently trained to identify or provide support with (International Transport Forum, 2009; Mental Health Action Group & Anxiety UK, 2016; Posner et al., 2018). New Zealand research on the accessibility of public transport conducted by the Human Rights Commission (2005) highlighted that mental health service users often felt unwelcome on public transport and felt that ‘some bus drivers were ... discriminatory towards people who were poor, homeless or who had alcohol and other drug addictions’ (Human Rights Commission, 2005, p. 52).

New Zealand research on the experiences of people with visual and physical disabilities has also highlighted many barriers to the use of public transport, including low-quality street environments (steep gradients, misalignment of curbs, lack of crossing facilities, inferior footpaths – cracking and obstructions). These issues can also be a source of stress for older people, with things like short crossing timings ‘creating insecurities, stress and discomfort, and ultimately reducing the likelihood of walking on a frequent basis’ amongst older pedestrians (Lachapelle & Cloutier, 2017, p. 55). Poor design of public transport terminals and stops (eg, lack of shelters, steep ramps, inadequate access to toilets) and difficulties with service quality (poor connectivity, reliability, transfer times etc) have also been raised by other groups in New Zealand who depend on using public transport, such as adolescents (Mindell et al., 2021).

Bus drivers’ attitudes and lack of awareness of disabled users’ needs were also a common concern for people with visual and physical disabilities. For people with disability there is often a considerable additional ‘mental load’ associated with making a journey: they often have to seek out a lot of information in advance about each segment of the journey because unless the entire journey is accessible, the journey cannot be made (J. Park & Chowdhury, 2018).

Studies show that for people living with impairments, attempts to use public transport often result in feelings of frustration, anger, shame and embarrassment, resulting from things like falls and struggles navigating inaccessible platforms or carriages, as well as things like ‘sirens’ going off as accessible platforms are lowered, and feeling dependent on asking for frequent help from others (Velho, 2019).

High-stress conditions, including unpredictability and lack of information on public transport, may be particularly disabling for people with mental health challenges (Mackett, 2017, 2019). Even more so for tāngata whaiora living in low-income communities, because they are less likely to be able to afford to switch to an individualised travel mode like a car or taxi.

There is some international and New Zealand evidence that active modes provide opportunities to increase the wellbeing of tāngata whaiora because walking and cycling are inexpensive, offer more control over travel conditions, and provide access to the mood-boosting benefits of physical activity (Canterbury District Health Board, 2018; C. Walker et al., 2017). Travel by taxi may also reduce the mental complexity of trips for people with both physical impairments and mental health challenges (Mackett, 2017), although even with Total Mobility subsidies² the cost is often prohibitive for these groups, who are more likely to be living on a benefit or a low income.

BuyCycles: Tāngata whaiora and transport disadvantage

BuyCycles was a Christchurch pilot programme designed to address transport disadvantage and social exclusion amongst clients of mental health services. Participants were provided with a bicycle, lock and safety gear, and supported to pay off the bicycle in very small weekly amounts (average \$5 per week). Participants in the programme listed a number of benefits associated with taking part, including 'being active', 'improved sleep', 'having something fun to do when feeling down', 'saving money', 'being able to get around more easily', and 'not having to rely on others for transport' (Canterbury District Health Board, 2018).

2.3.2 Effects on neighbourhoods

Trips to work or school generate large numbers of trip movements through neighbourhoods and communities and are responsible for a number of positive and negative effects on mental health within those neighbourhoods, depending on the mode and speed of trips taken. There are two important dimensions of the neighbourhood effects of transport on mental health:

1. social effects – the impact of traffic modes and volumes on the social opportunities available to children, adults and older people
2. physical health impacts that affect mental health.

Given that the following two sections discuss the effects on social life and physical health respectively, this is where we have placed discussion on neighbourhood effects of work trips.

2.3.3 Effects on communities

The quality of transport systems affects everyone's mental health, but the effects tend to be strongest in low-income communities for a variety of reasons, one of which is the geography of employment opportunities. People living in low-income communities experience the highest levels of mental distress in Aotearoa, and unemployment, underemployment and insecure employment are key contributors (Te Pou o te Whakaaro Nui, 2009). Unemployment and underemployment challenge wellbeing in many ways, including income stress, isolation and loneliness, social-evaluative threat, and social stigma. People within low-income communities are more likely to work in low-paid, 'low-control' jobs, as well as to be doing shift work and zero hours contract work, all of which generate distress associated with unpredictability and disruptions to family life and quality of sleep and diet (WHO, 2014). High-quality, affordable and efficient transport systems are

² The New Zealand Total Mobility scheme provides discounts on public transport and a 50% discount when using a taxi for people living with disabilities.

therefore particularly important to low-income communities because they can increase access to and choice of employment, as well as enable people to access an education that leads to higher-income, more secure, and higher-satisfaction employment.

Public transport tends to be most accessible in inner-city areas, which are increasingly popular with higher-income earners. Peripheral urban areas are less well-served, and frequently this is where lower-income populations are found (Adli et al., 2019). Increasing traffic congestion in Auckland is decreasing employment accessibility in general, and particularly in West and South Auckland, where there are relatively high levels of unemployment and deprivation (Auckland Council et al., 2018). Infrastructure for walking and cycling is generally poor throughout cities in Aotearoa, but early investments in safe paths and roads for cycling tend to be made in central city areas and nearby suburbs, thereby benefiting mostly high-income commuters.

The evidence suggests that in order to enable lower-income communities to maintain mental health, transport systems need to be low-cost or free, reliable, and flexible enough to enable people to access all types of employment, including shift work. Cost is important. Even if reliable transport systems are available, they can remain a source of psychological distress to individual low-income commuters and job-seekers who must spend a substantial proportion of their incomes on fuel and/or transport costs and are much more likely to experience fuel-related income stress (Churchill & Smyth, 2019; Mattioli et al., 2016). Changing urban environments so that low-income households have the ability to reduce their car use has been identified as an important way to reduce the financial stress of these households (Irwin, 2013). One recent Australian study found that the combination of commuting stress and fuel poverty related stress meant that people in low-income communities who travel for work by car actually have poorer psychological health than those who stay at home in these neighbourhoods, contrary to the usual pattern whereby access to employment improves mental health (Churchill & Smyth, 2019).

Research on the accessibility of Aotearoa's public transport system has highlighted the high cost of public transport as a significant barrier to community accessibility for disabled people, including tāngata whaiora (Human Rights Commission, 2005). Transport costs also have a disproportionately negative effect on the wellbeing of low-income communities because they reduce the amount of money people have to spend on other goods and services in their communities (in communities where disposable income is already low), further suppressing local economic development and employment opportunities in communities where these opportunities are most needed in order to boost mental wellbeing (Gilderbloom et al., 2016). Fuel poverty related psychological distress is likely to increase in low-income communities as carbon prices increase (Dodson & Sipe, 2008).

2.4 Transport and healthy relationships with whānau and community

The need to belong and feel part of a social group is a core psychological motivation (Baumeister & Leary, 1995), and there is good local and international evidence that adequate social connection is a key determinant of mental health (Kawachi & Berkman, 2001; Leigh-Hunt et al., 2017). A recent study using data from the New Zealand Attitudes and Values Survey found that social connectedness has a strong, positive impact on the mental health of the peoples of Aotearoa and concluded that 'the psychological resources conferred by social connectedness can act as a "social cure" for psychological ill-health' (Saeri et al., 2017, p. 365). There is evidence that the type and volume of transport movements within neighbourhoods affects both the social connectedness of the individual transport user and the quantity and quality of social connection within neighbourhoods.

2.4.1 Effects on individual transport users

Research suggests that the type of transport mode you use in your neighbourhood effects levels of social contact and connection. Experimental research by Gatersleben et al. (2013) showed that transport users who move more slowly through neighbourhoods (bus users, walking and cycling) and/or use open-air methods of transport (walking and cycling) tend to get more opportunities to gather important social information. They are able to make more detailed observations and judgements about social interactions in their neighbourhoods in ways that enable them to feel both more connected to and safer within their neighbourhoods (Gatersleben et al., 2013).

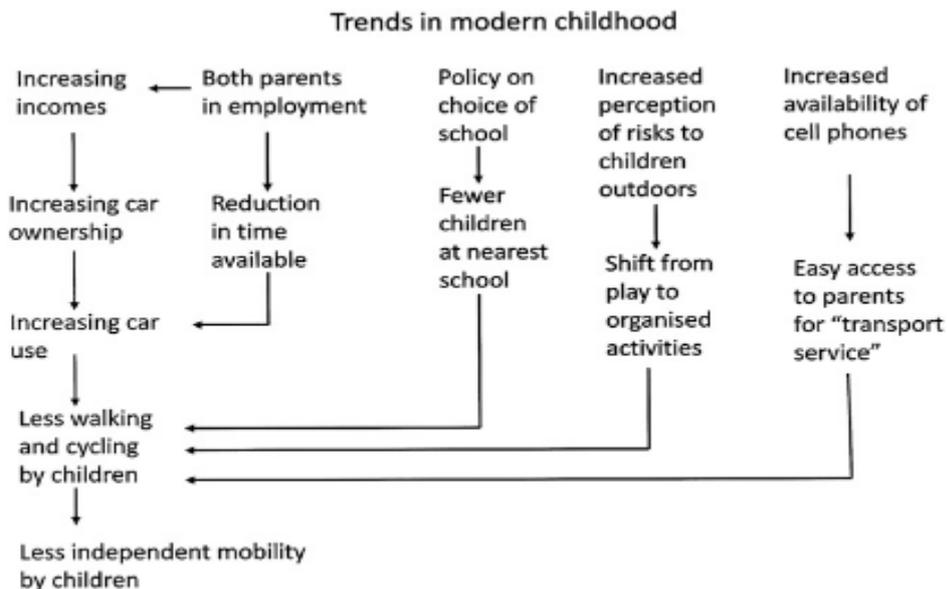
Enjoyable levels of social contact appear to improve commute satisfaction. Both public transport users and people who travel in a car with someone else are happier than when travelling alone (Lancée et al., 2017; Smith, 2017), although there seems to be an optimal level of social contact for public transport users that gives them some control over their ability to make social contact – that is, not too little, but also not too much (overcrowding and lack of personal space) (Evans & Wener, 2007). Active transport users generally report that the opportunities for ‘flexible’ social interaction – that is, control over their ability to enter and leave social interactions – are a valued part of their commute (Aldred, 2015; Wild & Woodward, 2019).

Research on the travel experiences of Māori highlighted the particular enjoyment and value associated with travelling with others, and the important role that car use currently plays in possibilities for travelling together (Haerewa et al., 2018; Raerino et al., 2013). This includes the importance of car use in enabling Māori to maintain commitments to whānau and to travel together to important places such as marae (meeting houses) and papakāinga (housing areas), both of which may be in areas not easily accessible when using public or active transport modes (Raerino et al., 2013).

The type of transport mode used has also been shown to have an impact on the social and emotional development of children. Children who use active modes gain greater opportunities for both unstructured play and independent mobility, which are both associated with better psychological outcomes for children and adolescents. In general, families with young children tend to be more car dependent than those at other stages of the life course, and this reliance on car travel appears to be becoming stronger (McCarthy et al., 2017). A recent study exploring travel and life satisfaction amongst children in Canada, Sweden and Japan found that being able to travel independently, and especially by bicycle, were found to be positively associated with life satisfaction amongst children. This study supports previous findings that active travel to school is an important source of restoration, social connection (especially when walking with friends), and stress release for children (Murray & Mand, 2013; Ramanathan et al., 2014; Waygood, 2009).

Walking and cycling to school are much less common than they used to be, while sedentary activities now dominate from an early age. In the late 1980s, 1 in 12 school children in Aotearoa rode a bike to school; in 2014 that figure was 1 in 50 (Ministry of Transport, 2015). This appears to be related to an increase in traffic volumes deterring independent travel by children, as well as changing social norms encouraging greater participation in ‘formal’ leisure activities for children that require travel outside the neighbourhood. These two trends are potentially related. Figure 2.2 highlights key factors in the decline of independent and active mobility amongst children.

Figure 2.2 Trends in childhood mobility (Fyhri et al., 2011, p. 708)



Families with young children face a number of time and space related travel constraints. Combining childcare, employment and domestic work creates tight time budgets for parents, and for women in particular (Dowling, 2015; Schwanen, 2011). Family-style housing tends to be located on the outskirts of cities where activities and workplaces are dispersed over greater distances. In Aotearoa, as in most societies, families appear to be becoming more car dependent (Fyhri et al., 2011). Children are spending more time in cars with their families, which reduces their independent mobility, but has also been shown to be an important time to connect and socialise for many families (Murray, 2008).

It is important to note that in communities with less car infrastructure and more high-quality active transport and public transport infrastructure, the same social benefits of ‘family time’ together in the car are as likely to be identified as benefits of using other modes. For instance, in societies with high car use such as Aotearoa, mothers with young children often identify car journeys to and from school or day care as an opportunity to communicate and connect with children (Dowling, 2015). However, in societies like the Netherlands with high-quality, safe cycling infrastructure that enables social and family riding, mothers are just as likely to identify the ride home with children on a bicycle as important ‘family time’ (Eyer & Ferreira, 2015; Schwanen, 2011). Thus, it appears that the opportunity for a family to travel together and communicate easily together during a trip is more important than the travel mode used (McLaren, 2016).

Finally, public transport accessibility also has an impact on the opportunities for social connection amongst those who spend the most amount of time in neighbourhoods: women and older people. Research shows that people living in more dense neighbourhoods with higher public transport accessibility have better mental health (Melis et al., 2015).

2.4.2 Effects on neighbourhoods

Research suggests that high volumes of car traffic and high traffic speeds appear to have a negative effect on social connection and cohesion in neighbourhoods. Increasing car traffic volumes create physical, visual and auditory barriers or ‘severance’ that make it less safe and less enjoyable for people to cross roads, use footpaths, and use neighbourhood streets for recreation or conversation. This ‘community severance’ restricts the ability of people to gather together and to collect and update social information about their neighbourhood. It reduces opportunities to make eye contact; recognise, greet and talk to neighbours; make and maintain friends; join community groups; and access community services. Proximity plays a primary role in enabling people, including children, to make friendships, and there are less opportunities for spontaneous social contact in neighbourhoods with higher traffic volumes (Mindell & Karlsen, 2012). The volume of car traffic on Aotearoa’s urban roads and streets is increasing, and both local and international research suggests that this is likely to be increasing rates of traffic ‘severance’, which reduces opportunities for young people and adults to make and maintain friendships and social connections (Fyhri et al., 2011; Mindell & Karlsen, 2012; Wiki et al., 2018).

Public transport accessibility and anti-depressant prescriptions

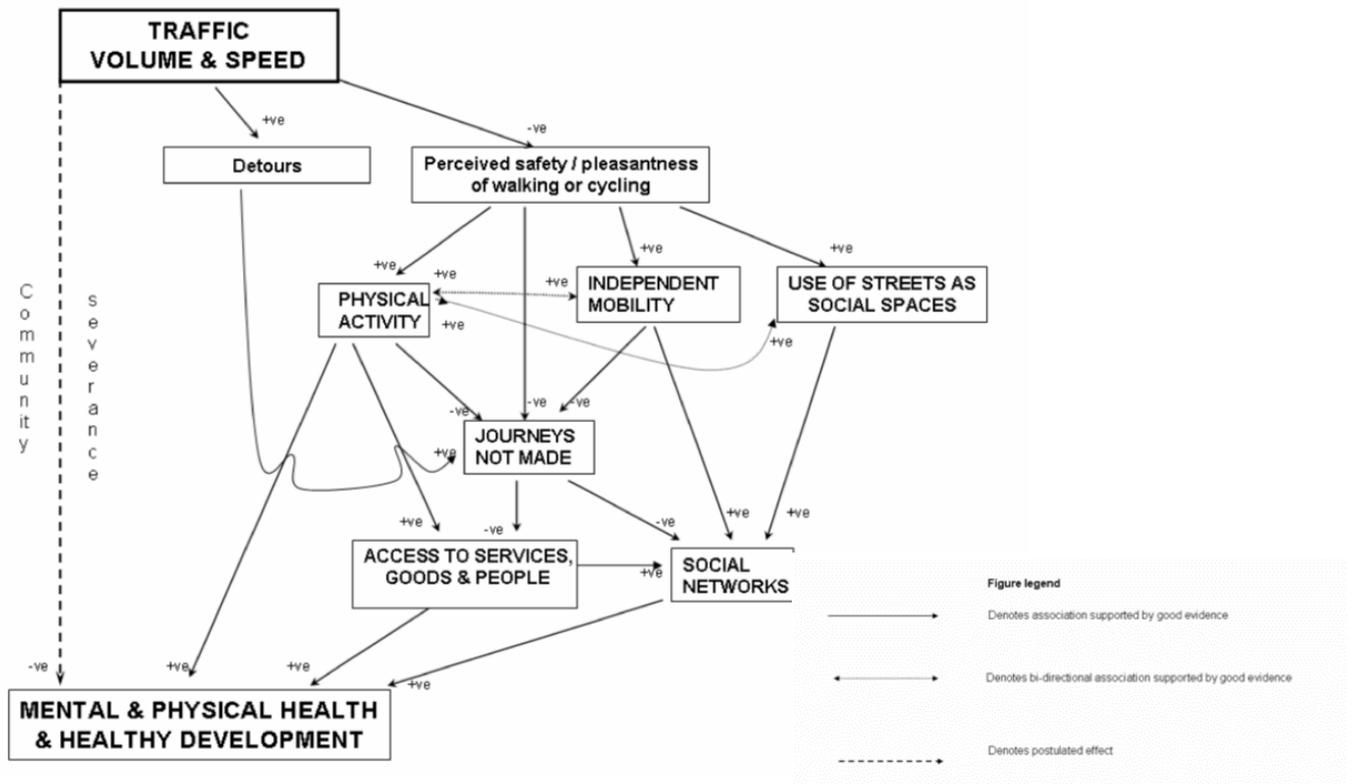
A cohort study in the city of Turin, Italy, showed that women and older people were less likely to be prescribed anti-depressants if they lived in a neighbourhood with good public transport accessibility. The study authors noted that high-quality public transport services act as a protective factor for the mental wellbeing of those who spend the most time in neighbourhoods, helping them to avoid the isolation and social exclusion that often cause depression (Melis et al. 2015).

Research shows that the effects on neighbourhoods are dose-responsive (Melis et al., 2015), so traffic-related social severance is likely to have the strongest effects on those who spend the largest amount of time in their neighbourhoods – that is, women, older people, children, and those who are not in formal employment. For children in particular, increasing traffic volumes and speeds have a number of negative effects on a range of dimensions of psychosocial wellbeing and development. Children living in high-traffic environments tend to express more frequent negative feelings (danger and dislike) about their neighbourhoods (B. Appleyard, 2017); have poorer spatial skills (B. Appleyard, 2017); have fewer opportunities to develop independence (Fyhri et al., 2011; Mackett et al., 2005); spend more time indoors and have less unstructured play (Hillman & Adams, 1992; Tranter, 2015); and have fewer friends (D. Appleyard, 1976). The reverse is true for children living in lower-traffic neighbourhoods, who tend to spend more time walking, cycling and playing in their neighbourhoods. Low-traffic neighbourhoods tend to provide richer social and play interactions and environments and are associated with better child development and higher levels of child physical and psychological wellbeing (Bates & Stone, 2015; Schoeppe et al., 2014). As Bruce Appleyard (2017, p. 39) sums up:

As exposure to auto traffic volumes and speed decreases, a child’s sense of threat goes down, and his/her ability to establish a richer cognitive connection with their community rises. Without pedestrian and bicycle facilities to provide sanctuary for a child from automobile traffic, the negative senses of danger and dislike appear to limit children’s ability to identify the qualities of their neighbourhood that are memorable, special, or even positive.

Figure 2.3 summarises what the research shows us about the relationship between traffic volume and speed, community severance and mental health and development.

Figure 2.3 Theoretical model for the health effects of community severance (Source: Mindell & Karlsen, 2012, p. 234)



In a recent local study, Wiki et al. (2018) explored the effects of traffic-related severance in Aotearoa. This study compared the experiences of people living on heavily, moderately and lightly trafficked streets in Christchurch. Consistent with overseas studies, people living on heavier trafficked streets had smaller local home ‘territories’ (ie, generally only their home felt like it belonged to them) compared to people who lived on streets with lower traffic volumes, who felt a sense of ownership of a larger space, including local streets. People on the heavily trafficked streets also had more negative perceptions of their neighbourhoods, felt a weaker overall sense of belonging to their neighbourhood, and were less likely to know people in their neighbourhood. In the heavily trafficked areas, residents had an average of 2.1 neighbourhood connections, compared to 5.1 in the lightly trafficked areas (Wiki et al., 2018).

For all groups, a century of car-centred planning has dispersed families within cities, making it more difficult to maintain wider family or friendship relationships without using a car. Car-centred planning has fostered a pattern of car use that enables people to make less frequent, longer trips to maintain relationships over longer distances while creating a form of traffic severance that makes it more difficult to make friends closer to home in local neighbourhoods, where there are opportunities for more frequent and spontaneous social contact (Kim et al., 2018). Time spent in a car also reduces time available for recreation and participation in family and community activities (Tranter, 2010).

2.5 Transport and good physical health

Research shows that Aotearoa’s transport system currently generates a number of positive and negative impacts on physical health in ways that can affect mental health. In general, poor physical health, chronic

illness, and disability are all strongly associated with elevated risk of mental distress and mental illness. The relationship between physical health and mental health is also bidirectional, with poorer mental health also contributing to poorer physical health outcomes.

2.5.1 Effects on individual transport users

In general, use of a car is associated with poorer physical health, while use of active modes or public transport is associated with better physical health. Inactivity is independently associated with poorer mental health (Callaghan, 2004; Saxena et al., 2005). High levels of car use within our transport system are contributing to inactivity-related chronic disease, air and noise pollution, and traffic injury and death for both individual transport users and others in the neighbourhood using urban streets (Mizdrak et al., 2019). The Ministry of Transport (2019) estimates that between 2015 and 2017 there were 57,287 vehicle crashes on Aotearoa's urban roads, resulting in 266 deaths, 6,248 serious injuries and 62,063 minor injuries.

Vehicle crashes are a significant cause of physical disability, and it is estimated that between 21% and 57% of car occupants admitted to hospital following a motor vehicle crash will experience disability and/or health problems in the long term (Ameratunga et al., 2004). As well as the physical disability associated with transport injury, motor vehicle crashes have also been shown to be a significant and prevalent cause of psychological distress (Blanchard et al., 1995; Craig et al., 2016; R. Guest et al., 2017). The mental health effects of Aotearoa's comparatively high rate of traffic injury (Briggs et al., 2015) require further research. A meta-analysis examining the extent of psychological distress associated with motor vehicle crashes showed that around half of people experience elevated levels of psychological distress after a motor vehicle crash, with many still continuing to experience distress after 12 months. It also showed that injuries such as traumatic brain injury and spinal cord injury result in significant levels of psychological distress that remain elevated for at least three years following a crash. These rates of distress are higher for older people, those with more severe injury, and those living with higher levels of psychological distress (Craig et al., 2016).

Active transport modes (walking, cycling and public transport) tend to have a protective effect on mental health, both because exercise boosts mood (Cooney, 2013; Ekkekakis & Murri, 2017) and because the physical activity involved helps to maintain physical health and protect against chronic disease. Research by Shaw et al. (2017) showed that New Zealanders who walk or cycle to their main activity are 76% more likely to meet physical activity guidelines than people who drive. A recent large cohort study of the whole New Zealand working population over a 15-year period using census data found commuting by cycling (but not walking or public transport use) was associated with a 13% reduction in all-cause mortality (including suicide) (Shaw et al., 2020). Another New Zealand study estimated that 40 deaths are avoided annually through the use of active transport (Briggs et al., 2015). Improving rates of active transport use is a priority for reducing inactivity-related disease in Aotearoa. It is estimated that moving just 5% of vehicle kilometres to cycling would avoid an additional 116 inactivity-related deaths in Aotearoa each year (Lindsay et al., 2011).

In recent years we have seen significant advances in our understanding of the mechanisms by which physical activity acts on the brain and helps to maintain good mental health, especially as we age. For instance, we now know that there are plasma-borne factors, generated by exercise, that help re-shape the brain, improve mood and lead to cognitive gains (Ansere & Freeman, 2020; Contrepois et al., 2020). Imaging studies show the effects are localised in parts of the brain that are particularly important for building memory and modulating emotional responses. These functions are key to mental wellbeing in old age and have been shown previously in trials to be influenced by physical activity (Leckie et al., 2014). For this reason, it is claimed 'regular physical exercise is arguably the most consistently effective health-enhancing strategy to attenuate the age-related deterioration in brain structure and function' (Ansere & Freeman, 2020, p. 144).

Another aspect of the new literature relevant to this report is the interaction between physical activity and cognitive challenge. Well-demonstrated previously in laboratory animals, this is now reported in humans. For instance, cross-country runners who train outdoors have greater connectivity between regions of the brain than adults of the same age who are healthy but active only indoors (Leckie et al., 2014). In the last 12 months, papers have been published that find active commuting is associated in Aotearoa (Shaw et al., 2020) and the UK (Patterson et al., 2020) with a reduction in mortality from all causes of about 20%, that those who are genetically predisposed to depression are more likely to stay well if they are physically active (Choi et al., 2020), and that aerobic exercise leads to memory gain in older individuals in a dose-dependent fashion (more gain with more intense activity) (Ahmadi Azari et al., 2013). Longitudinal studies find that improvements in cardiorespiratory fitness halve the incidence of dementia in subsequent years (Tari et al., 2019). Additionally, regular physical activity is the main reason that shifting car trips to walking and cycling has been estimated to lower health care costs in Aotearoa by millions of dollars a year (Mizdrak et al., 2019).

Would such a shift truly increase the total amount of exercise? Some have argued that active commuting may replace discretionary physical activity, so the net health benefit is unchanged. However, recent studies do not support this view. Notably, active commuting has been associated with less sedentary behaviour in discretionary time amongst a range of different groups (Louise et al., 2019; Mendoza et al., 2011; Yang et al., 2012). For instance, those who walk or cycle to work log less screen time than those who commute in other ways. This relationship is apparent in both cross-sectional and longitudinal analyses.

2.5.2 Effects on neighbourhoods

In addition to road injury deaths and serious injuries, New Zealand research estimates that we have an additional 283 deaths as a result of air pollution, and 59 from noise pollution resulting from motorised vehicle use (Briggs et al., 2015). Traffic noise is the main source of environmental noise pollution in neighbourhoods, and noise pollution related deaths are essentially a form of mental health related transport mortality because these deaths result from the overactivation of our threat-detection arousal systems, which causes cardiovascular disease. Recent New Zealand research showed that noise pollution is a significant source of annoyance within our cities, with about a third of urban residents reporting that they were 'very' or 'extremely' annoyed by road traffic noise (Humpheson & Wareing, 2019). Chronic traffic noise stress has also been shown to affect sleep, psychological health, and child development and learning (Evans et al., 2001). This fits with what we know about the effects of aircraft noise on stress responses, mental health and cognitive performance (Haines et al., 2001). In general, environmental sources of noise (including vehicle traffic) are not well or consistently monitored in Aotearoa (Briggs et al., 2015). It is estimated that approximately 600,000 New Zealanders experience road traffic noise at levels that damage health, according to noise guidelines set by the WHO (Allan & Humpheson, 2019).

2.6 Transport and a strong connection to land, culture and history

Regular contact with the natural environment, or 'green' and 'blue' spaces, is recognised as important for maintaining cognitive functioning and good mental health amongst adults and children (Bratman et al., 2012; Flouri et al., 2014; Gascon et al., 2015). Contact with nature in urban settings reduces psychological stress as shown by salivary biomarkers (Hunter et al., 2019), and mobile electroencephalography (EEG) measures show real-time changes in brain wave patterns associated with reduced arousal and frustration when moving on foot into green spaces (Aspinall et al., 2015). Connection to and care for Papatūānuku (mother earth) as kaitiaki (guardians of nature) is particularly identified as a central part of good mental health for Māori (NiaNia et al., 2017).

As tāngata whenua and Kaitiaki we have responsibility for the environment and those that share the environment. Kaitiakitanga (guardianship) is ... an inherited commitment that links mana

atua, mana tāngata and mana whenua: the spirit realm with the human world and both of those with the earth and all that is on it. (Selby et al., 2010, p. 1)

Collectivism, as well as a sense of connection to culture (including language), history and spirituality, are also all identified as important to maintaining mental health and treating mental distress amongst both Māori and Pacific peoples (Kopua et al., 2019; NiaNia et al., 2017). As Kopua et al. (2019, p. 378) summarise:

Māori culture is socio-centric and puts a very high priority on dealing with problems at the whānau level, always understands personal struggles in relation to whakapapa (genealogy) and refuses to treat te taha wairua (the spiritual realm) as something apart from the rest of existence.

Resilience for Māori and Pacific peoples is understood as a collective resource to 'cherish, take care of, and nurture' (Tiatia-Seath, 2018, p. 8). As noted, research on the transport needs of Māori has highlighted the importance of travelling together and transport systems that enable Māori to maintain commitments to whānau, to access their marae, and to live on their papakāinga (Haerewa et al., 2018; Raerino et al., 2013). Family – the 'aiga, kaiga, magafoa, kopu, tāngata, vuvale, or famili – is also understood by Pacific peoples in Aotearoa as central to good mental health (Ministry of Health, 2014). Research shows that connections with culture and genealogy are valued and experienced differently by diverse groups of Pacific New Zealanders (depending on things like where they were born, and whether they have constitutional rights as New Zealanders) (Ataera-Minster & Trowland, 2018), but that protecting and cultivating a strong sense of Pacific identity is central to Pacific mental health and mental health interventions (Taumoefolau, 2013). *Vai Niu*, a Pacific vision for mental health and wellbeing, is grounded in the following worldview:

I am not an individual; I am an integral part of the cosmos.

I share a divinity with my ancestors, the land, the seas and the skies.

I am not an individual, because I share a tofi (an inheritance)

with my family, my village and my nation.

I belong to my family and my family belongs to me.

I belong to my village and my village belongs to me.

I belong to my nation and my nation belongs to me.

This is the essence of my sense of belonging. (Paterson et al., 2018, p. 87)

2.6.1 Effects on individual transport users

In general, people in Aotearoa have fairly high levels of green space in their neighbourhoods, even in low-income neighbourhoods (Day et al., 2010). However, in line with international research, local research has shown that mental health is improved for New Zealanders with greater access to urban green space (Mavoa et al., 2019). In general, access to nature appears to play an important role in urban mental health because it provides opportunities for stress-relief, relaxation and 'attention restoration', which can be particularly important for people living in highly stimulating urban environments (Grahm & Stigsdotter, 2010). Transport plays an important role in mediating nature contact in cities: high traffic volumes, high speeds, noise and air pollution all tend to degrade the quality of urban green spaces and make them more difficult to access.

Open-air transport users such as cyclists and pedestrians, and public transport users who use active transport for part of their trips, generally have higher levels of nature exposure than those who use a car (Pretty et al., 2005; Rogerson et al., 2016). Greater sensory activation and nature exposure are identified as important components of higher transport satisfaction amongst active transport users (Jungnickel & Aldred, 2014; Wild & Woodward, 2019). Research suggests that for Māori using active transport, opportunities to both connect with and care for nature can be a valued part of using these modes (R. G. Jones et al., 2020). Research on Māori cycling promotion and events has also highlighted the role that cycling can play in learning about natural environments, places, and plants of cultural significance to Māori, as well as providing important opportunities for cultivating togetherness and whanaungatanga (relationship through shared experiences and working together, which provides people with a sense of belonging) (Corrigan, 2017; R. G. Jones et al., 2020).

Adolescents, greenspace and mental health in Aotearoa

Adolescent mental health is a key area of concern in Aotearoa. Mental distress is increasing for both children and teenagers, and researchers have expressed concern about the role that declining levels of active transport may be playing in this increase. As well as physical activity and social benefits, one of the key benefits of active transport is daily exposure to green space. Recent New Zealand research based on data from 4,575 adolescents who participated in the 2012 wave of the Youth2000 survey series showed a significant relationship between reduced depressive symptoms, neighbourhood greenness, presence of native vegetation, and having a higher nature-availability index. These results were adjusted for sex, age, ethnicity, household deprivation, and neighbourhood deprivation (Mavoa et al., 2019).

As noted, research on the transport experiences of Māori has highlighted the ways in which shared mobility and journeying together are particularly valued by Māori as a part of maintaining connections to community and culture. As Haerewa et al. (2018, p. 233) summarise:

Shared mobility provides an appropriate and comfortable environment for people to share vital and sacred information and to strengthen social bonds. It also reflects the desire of tribal members to retain cultural practices that benefit the collective.

2.6.2 Effects on neighbourhoods

Just as individual transport trips can play an important role in maintaining connection to land, identity, language, and culture, they can also play a role in disrupting these relationships at the neighbourhood level. As discussed earlier, roads and high traffic volumes can create barriers or 'severance' that makes it difficult for people in neighbourhoods to maintain connections with neighbours and whānau and to access important places like churches, marae or papakāinga. Māori may be particularly vulnerable to 'psychoterratic' stress (Tiatia-Seath et al., 2018) – that is, traffic-related severance that disrupts relationships with key natural environments, including plants of cultural or medicinal value, food gathering grounds, and places of spiritual significance.

2.6.3 Effects on communities

There is no local research in Aotearoa available on the levels of transport accessibility for Māori and Pacific peoples in general, but research suggests that there are aspects of transport accessibility that are likely to be particularly critical to protecting and improving the mental health of these two groups. Access to kaupapa Māori mental health services for tāngata whaiora and their whānau (Bush et al., 2019; Taitimu et al., 2018) and access to culturally appropriate Pacific-centred mental health services for Pacific peoples are identified as critically important (Ataera-Minster & Trowland, 2018; Tiatia-Seath, 2018). Access to sites of cultural

significance, including marae, urupā (burial sites), papakāinga, churches, and community centres are also likely to be important aspects of transport accessibility for these two groups.

Although there is a small amount of research literature on Māori transport needs, less has been written about Pacific transport priorities. In *Island Time: New Zealand's Pacific Futures*, Damon Salesa (2017) discussed a number of aspects of Pacific urban development and experience that have implications for transport accessibility and the relationship between transport and mental health for Pacific peoples. Salesa notes that Pacific people experience the highest levels of neighbourhood ethnic concentration or segregation within Aotearoa, and that this segregation acts as both an important protective resource and a source of deprivation. He notes that many Pacific families practise 'educational migration', sending children across town to higher decile schools in an effort to mitigate the effects of neighbourhood deprivation, with high public transport costs involved. Another notable aspect of Pacific transport experience identified by Salesa is the desire for services and amenities close by in neighbourhoods, due to less frequent access to the internet, less trust in internet shopping and services, and a greater desire to use face-to-face services.

This desire for access to face-to-face community services may mean that measures of transport access may look different for Pacific peoples. Also, the reduction in local branches of banks etc on local high streets potentially increases the importance of low-cost accessible public transport services to enable Pacific families to access essential goods and services. Salesa (2017) points to the presence of home shopping trucks selling food at inflated prices, as well as high-interest unsecured loans to purchase it with, as evidence of difficulties Pacific families have accessing essential services like banks or food stores. The fact that many Pacific families have high public transport costs associated with their children's education, combined with the evidence that they are much more likely to experience income deprivation and to be more vulnerable to predatory lending due to difficulties accessing goods and services stores, suggests that Pacific families are more likely to be experiencing psychological distress related to travel-cost financial stress.

2.7 Discussion

This research highlights the importance of good transport systems as a protective factor in reducing mental distress and increasing individual and community resilience when faced with challenges. The evidence review suggests that transport systems that do the following are likely to maximise mental health in our cities:

- increase opportunities to access education, employment and health services
- reduce transport costs
- maximise opportunities for social connection and cohesion
- decrease stressors such as congestion, injury and air and noise pollution
- provide opportunities for physical activity.

High-quality transport systems that provide access to opportunity, social connection and exercise while minimising psychological distress related to travel time, travel conditions and transport poverty are likely to make the strongest contribution to improving mental health within our cities. Reducing travel times (15–20 minute maximum commute) and improving travel conditions (reducing car use in high-impedance conditions, and increasing rates of active transport) are likely to improve the mental health of all groups; however, those living in lower-income outer suburbs with longer journeys and higher levels of car dependence would particularly benefit. Reducing levels of transport-related poverty and debt is particularly important to improving the mental health of this latter group.

The literature review points to a number of reasons why the transport experiences and priorities of Māori and Pacific peoples require particular attention: both transport accessibility and transport severance may look

different for these groups, because the types of places, connections and services they value may be different. There is not much research currently available that explores the impact of our transport system across the lifespan for Māori; however, what is available suggests that shared mobility and the ability to uphold and maintain relationships of care and connection, and to access sites of community and cultural significance, are important to Māori mental health across the life course. There is a particular need for more research on the transport experiences and priorities of Pacific peoples in Aotearoa.

3 ‘Transport is quite literally the vehicle for all things’: The key informant interviews

3.1 Introduction

The key informant interviews were designed to gather expert understandings of the lived realities of the relationships between transport and mental health within urban communities. The interviews focused on two dimensions of this relationship: the mental health of tāngata whaiora (people who live with mental health challenges) and population-level mental health. We recruited key informants through our professional networks. Dr Jemaima Tiatia-Seath led the Pacific data collection. The remaining interviews were conducted by Dr Kirsty Wild. We had originally also aimed to undertake interviews with Māori participants, but this data collection was severely disrupted by COVID-19 and therefore wasn’t able to be included in this report. This is an important priority area for future research. The interviews were semi-structured and explored the key themes identified in the literature review in ways that were likely to be culturally meaningful for each group of participants. Ethics approval for the interviews was provided by the University of Auckland Human Participants Ethics Committee.

3.2 Pacific voices

This section is written by Dr Jemaima Tiatia-Seath and K Dee Maiai.

3.2.1 Context

We interviewed two Pacific participants (Samoan and Tongan) – both tertiary students, South Island-based and high users of public transport.

Participant 1 identifies as *afakasi* (mixed Pacific and New Zealand European heritage). He is Tongan on his mother’s side and New Zealand European on his father’s. He spent his entire early education in the South Island and is now in his third year of university. He does not have a driver licence and therefore regularly uses public transport (namely buses).

Participant 2 also grew up in the South Island. His mother’s side of the family are originally from Scotland and his father was born in Samoa. He has worked in mental health policy and advises on health research spend and mental health priority areas. He is also a frequent user of buses. He prefers the train, but the infrastructure is not in place in his region. He has lived experience of depression.

3.2.2 Responses

In response to thinking about examples where transport systems have had a negative impact on mental health, the link was made to a lack of a Pacific presence.

Transport is one of those areas where we haven’t seen a lot of Pacific embedding of anything yet.

More specifically, when referring to bus drivers, and in this case, a reckless driver, caution around the mental wellbeing of bus drivers should not be overlooked, particularly where public safety is concerned.

I was actually going to make a complaint to [local body] about this particular bus driver that I had to keep catching every day because he was driving like a madman. He would slam the brakes and we would stop so fast and oh my gosh, it was really scary. And I feel like attitude

and driving are so correlated that you need to be careful that if you're not looking after the mental health of the driver, then the driving is going to reflect that.

It was considered important to maintain healthy relationships between commuters and bus drivers, and a means of facilitating good mental health in transport systems.

I think the huge thing for me when it comes to mental health and transport is just how interconnected it is ... Like just me when I'm catching a bus ... I always have a process in my head where it's like, because obviously I like listening to music, but I also you know, kind of try to carry the values that my mum and dad have taught me. You know, take my headphones off, look to the driver, say 'Hello. How you doing?' And then keep moving. If I kind of get shrugged off then [that] definitely changes how I feel about it, you know, because I want to have good interaction with this person who's doing his nine to five. You know what I mean? Him or her, or they. And it's the other way as well. You know, if the bus driver is being a fantastic person and the customers aren't you know, they're not reciprocating that, then it's not a healthy relationship. It's actually, it's um ... It's not good for everybody. So I think it's just as important that both sides ... the people who take these transport methods and the people who are working, to sort of develop a healthy relationship.

When asked to reflect on the positive aspects that transport systems have had upon one's mental health, the comfort and the headspace to think, and be, was alluded to.

Just being able to sit down in a place and not have to worry about steering the wheel and just kind of being able to listen to music and gather my thoughts.

While it was recognised that the impacts of COVID-19 may now have significant impacts on the way people interact with each other on public transport, prior experiences of engagement were believed to positively connect people and may be of particular benefit for someone who has little interaction with others.

There were a couple of times where I would sit down on the bus and there were, you know, you often sit next to someone you don't know, but the willingness to talk because you know you probably will never see this person again. It's that helpful conversation, which is nice, but also not too intimate ... Whereas, I've noticed, more particularly, now post-COVID, we aren't doing that at any extent ... but those kind of small things that might be one of the only interactions someone has might be something that's totally not stressful.

Transport systems and leveraging upon major community and sporting events was believed to positively contribute to mental health, as described in the following sentiment.

And there's noise and there's excitement. I've been to a few rugby games where people have caught the buses before or afterwards from a few concerts and yeah community events and it's a totally different vibe. That's nice, actually.

When asked to share regarding the impact of the current transport system upon the mental health of various age groups, participants touched upon the effects on children, youth and older people. Wi-Fi connectivity on buses was a recommended strategy in keeping children and their parents connected. The following refers to a myriad of issues that all impinged upon this participant's own mental wellbeing and experiences of the transport system as a rural secondary school student.

Yeah, I was just thinking about, like, when I was at high school, busing home was like a living hell sometimes because ... I lived out in the country, but the closest towns to me was [town] which is like where the last stop is, and I obviously didn't have a job because I was a high school student, you know, I was in my first couple of years of high school and my parents

weren't exactly giving me texts or data or anything to kind of contact them. And so when I catch [sic] these buses and miss them, they'll come out here and pick me [up] at the wrong time, so they wouldn't come get me. And they wait around and it was so bad ... the communication aspect was the part that was so bad because it wasn't like I could just pick up a car and go straight home, like it was a process of taking the bus from school, getting off at the stop, waiting for my parents to pick me up, parents would come to pick me up, then I'd be able to finally go home and this was all after I woke up at 6am going to school 36 kilometres away from my house. So for me, Wi-Fi, or the lack of it should I say, at least here in [city], you know today is terrible ... How are these young kids that aren't made of money supposed to communicate with their parents about what's going on? Like they're expected to be in certain places at certain times and conform to the way you know a time systems work. They don't have the tools to be able to contact them, they can't afford these things. Some families can't even afford these things, let alone young people who aren't in the workforce yet ... like it's such a catch 22. It's like, you know, it makes tension between the relationship between parent and the child or wherever their going ... it makes it even more stressful than it needs to be. I had so many instances of that in high school and it drove me mental and I would just hate getting on the bus because of that.

It was felt that in relation to older people, there is a lack of consultation, and the 'experts' appear to be out of touch.

I think of my Nana, who's in her 70s. She lives in [region] and they recently just changed the bus route, and so she can no longer go to her local shops because they decided to go the opposite way. So now for her to go somewhere, she has to go to town. So her ability to buy a lotto ticket, to see her friends in that area that she's been [in] for the last 30 years ... her wellbeing is deeply compromised by that, and then the city planners never care about her story, or maybe they do but they never asked for her story or ... like their whole planning is just so technocratic. It's not human-centred. The language they use doesn't ... feel you want to be heard.

Furthermore, for older people, it was maintained that there should be some leeway given for bus drop-offs that not only demonstrates the value placed upon our older people but also much more accommodating to their needs. For instance:

Why are the stops, like if we have an elderly passenger. Why is it that we can't stop in front of their house. If it's five metres from the bus stop, and there's no cars there.

In light of gender differences and the ways our transport systems impact upon mental health, there were reflections shared more specifically around the safety of females and the rainbow community.

Well I guess one thing I'm acutely aware of, is that I've never felt unsafe on a bus and I know that's not the case with family members of mine who are women or women that we know generally. I suppose, if I see something that's not appropriate, I know it's my responsibility to do something, regardless of whether it feels comfortable or not.

This same participant drew upon the success of an all-female school bus, which provided his family with peace of mind.

I'm just thinking specifically about my sister, she goes to school in [city] and they have a bus system that only really takes in like all girl high schools ... so it's a very safe space for young girls to take that bus and it's really successful because it means that my mum doesn't have to kind of be worried about what my sister is up to because she's taking a bus that is sort of safe

guarding her. You know what I mean? Like she doesn't have to feel the need to be afraid about anything, which I think is awesome.

Concern for safety of the Pacific rainbow community in particular regarding public transport was also highlighted in response to gender differences and one that should be considered.

And definitely for fa'afafine [Samoan term for a transgender male] and fakaleiti [Tongan term for a transgender male] our rainbow and queer transgender Pacific communities ... that's another experience.

In response to the question asked around the intersection of income, the transport system and mental health, one participant was quick to point out the cost for older students who were still attending high school.

And that's one thing that will affect children quite a bit and affected us ... we're quite fortunate that they changed it, so that it wasn't based on age, because there were 19-year-olds who are still doing high school and so they should still be entitled to a child's fare because they're still going to school.

Participants were asked to think about the ways in which the transport system may impact the mental health of diverse ethnic groups. The invaluable contribution of Māori wardens to society was raised and considered an underutilised resource that has the potential to add value to our public transport system, particularly when dealing with tāngata whaiora.

I don't think Māori wardens are really considered an essential piece of infrastructure. Yeah, I mean, I suppose it's really telling when you ring the police, rather than you bring someone who's good at de-escalation. And actually, people can see themselves [referring to Māori wardens as ordinary citizens].

One view referred to the unconscious racism that exists for certain populations and the importance and necessity to hear the voices of the people, of tāngata whenua and Pacific peoples specifically:

Stuart Nash and his horrible decision what he said last week about how the Police don't have unconscious racism but you know the Ministers of Transport agree that there is an unconscious racism in how transport is designed – Who has a voice in that? What, and how and where are all those things? That acknowledgement, and then bringing different people to the table as a big part of that. And that NZTA board being overhauled. These things have to be done in partnership with iwi, I mean with this like, what we see with the colonial statues in [region], they've come to a really good decision, and I only say that because that's what the iwi wanted to do. And that was, you know, in so many of these other situations, it's all led by what people feel is the right thing but if iwi's voice isn't actually heard and then following our voice, Pacific peoples' voices, then how is it any different?

We are reminded of the special relationships Aotearoa has with our Pacific neighbours as well as the Treaty of Waitangi, and that transport policy should reflect these partnerships.

Transport policy also has to be cognisant of our constitutional relationships and the realm of New Zealand and the Treaty of Friendship with Samoa, not just the Treaty of Waitangi and the partnership that guarantees. And I think in all our policies that's the second part that yeah that's the 'poor cousin' of the Treaty.

In relation to the design of transport systems and supporting good mental health in our cities, a poignant comment was made regarding more of an injection of a Pacific and indigenous presence and the value of meaningful engagement with these groups.

Seeing yourself in the drivers is great, seeing yourself in designs and the physical layout is great. Yeah, all of that stuff can make a difference. I mean, we see that in all other areas, like with education, Pacific education strategies and other things. I'm not yet sure and maybe this is because we haven't had that moment of imagination about what the true impact could be, if we had considered what Pacific public transport looks like in urban environments and in non-urban environments. How is that indigenous knowledge being drawn in to add value?

A Pacific presence may be considered more visible by including art on buses. Such art resonates with Pacific and Māori and stresses a sense of belonging.

I would love to see Pacific art on a bus or you know what I mean, or like Māori art on a bus, that would be incredible ... I think it was last year when the New Zealand Police started rolling out, um, police cars with Pacific art, and it was like, pretty cool. I won't lie you know just from an aesthetic perspective and, you know, like, you know, think about whakapapa and lineage and your culture. It's like, it's awesome to be able to share that in the mainstream because I feel like whenever I think of Pacific oriented or Māori orientated things in New Zealand, it's never quite in the public eye. And it needs to be more normalised. It genuinely does, it doesn't need to be something that we just keep to ourselves. It can be something that we can share and appreciate and that would be fantastic ... Especially since I've seen so many Māori and Pacific bus drivers and Uber drivers as well. Like it's not like they're nowhere to be seen.

The suggestion was made that interactions on public transport could coincide with Pacific Language Weeks. For example:

Work on our Pacific greetings and things like that and obviously, you think of things like Samoan Language Week you know? Niuean Language Week, Tongan Language Week, Te Reo Māori Language Week, you know – Hey everybody, suddenly start springing up deals of like free coffee if you say hello in te reo. Why can't things like that be implemented in a bus system or why are Pacific bus drivers or Māori bus drivers afraid to say hello in their own language? You know what I mean? It's something I definitely try to encourage in my workplace because my demographic in my workplace is majority Pākehā, Pālagi people, but why can't I say 'Fakaalofa lahi atu' [Niuean for greetings]? So why can't I say 'Aloha' [Hawai'ian greeting]. You know, like there's nothing stopping me from actually doing it. When somebody asks me how you're doing. Why can't I say 'Ka pai'? [Māori, meaning good].

Functionality and aesthetics of seating on buses was believed to be less accommodating for diverse body types and also linked to mental health.

How transport could operate in a way that would increase everyone's mental health could be something around ... the design of buses for a start. I see some of our [Pacific] communities squash onto the seats beside other people, you know, they're not made for our people to begin with.

The blue lighting when travelling on a bus in the evening was considered soothing.

It's not too bright that it like blows your eyes up, but it's not just like completely dark that you can't see anything. It's like perfect, it's just cool and you just get to like look at the city view and it's just the most relaxing [light] that you have.

Furthermore, the suggestion was made around music being played on buses to contribute to positive mental wellbeing.

Can we have a place where we can enjoy ... you know, Pak'nSave has allowed people to choose the music that's played in Pak'nSave and you sort of make a collective playlist or whatever. Why aren't we doing some of those things?

There was also discussion around the harm associated with alcohol advertising on buses.

I wrote to [regional bus service] because there was some alcohol lobbyists buying up advertising ... but choosing the route that went past at least 10 schools and through the central city, to [location], one of the kind of really popular beaches areas then through to [city], where the university is, and then out to the airport. Probably one of most influential advertising spaces. And they just keep putting all this alcohol advertising, and so I complained to the council and they decided that they would change the policy and take it off.

3.3 Further key informant interviews

3.3.1 Methods

There was much discussion within the project team about whom to interview and whether to do key informant interviews with professionals or to interview tāngata whaiora directly. Some in the team felt that tāngata whaiora are a vulnerable group and there are risks associated with interviewing them directly. Others felt that the ethical principle of 'nothing about us without us' should apply. We have sought to strike a balance here. Mental health consumer advocates were seen as a key priority for key informant interviews. These are people who have lived experience of mental health issues, but who also work as mental health professionals. Mental health social workers were also identified as a key interview priority because they are the mental health professionals who spend the most amount of time supporting and advocating for consumers around challenges of daily living like transport and mobility.

Our initial experience talking to people about the project was that the topic of 'transport and mental health' was perceived as a novel topic. This is consistent with the fact that it is also a fairly new field of research. It was also clear that there were no professional roles specifically devoted to work on transport and mental health. So, as well as prioritising mental health social workers and mental health consumer advocates, we used our professional networks to identify people who had some experience of working in both sectors (ie, mental health *and* transport).

This section outlines the results of further key informant interviews with seven participants: one mental health social worker; three people working in youth mental health, two of whom have lived experience of being a mental health consumer; one person working in the homelessness sector, who had previously evaluated transport projects; an active transport planner with previous experience working with people with mental health challenges; and a disability and transport advocate. The inclusion of experts on homelessness and disability and transport was in recognition of the higher levels of mental health challenges experienced by these groups. The interviews were recorded and transcribed. Thematic analysis (G. Guest et al., 2012) of the interview data was completed using a mix of inductive and deductive coding based on the initial themes identified in the literature review. The interviews were analysed using NVivo 12.

3.3.2 Crisis and recovery

Crisis and recovery are key concepts within the mental health world, and they came up frequently in the interviews. They are consistent with an understanding of mental health challenges as temporary and recoverable rather than a 'fixed', permanent experience or 'condition' more consistent with biomedical understandings of mental health as a disease. It is useful to consider what role transport systems can play in preventing crises and supporting recovery, and we used these terms to shape the analysis of the dataset.

3.3.3 Challenges and crisis

Tāngata whaiora are considered to experience a number of transport-related challenges. Many of these transport challenges were also considered to be wider sources of stress for urban populations in general. These challenges were considered to be accumulative and most acute for tāngata whaiora living on low incomes. People who are accessing mental health services were considered to be more likely to be living on a benefit, which is identified as creating severe financial hardship, which becomes the 'key stress' in people's lives. It was common in these interviews, for instance, for an inability to afford \$10 for a public transport card (HOP card) to be identified as a key barrier to using public transport. The key transport challenges experienced by tāngata whaiora were identified as financial hardship, anxiety, physical health challenges, and isolation. When tāngata whaiora experience more than one of these challenges, and/or when these challenges are persistent and accumulate over time, these transport challenges were considered to contribute to experiences of 'crisis' amongst this group. We explore these challenges below.

3.3.4 Financial hardship

Poverty and financial stress were considered to be a key source of stress for people living with mental health challenges.

That's the, probably the number one thing we would have, other than the psychosocial things, we would be trying to help work with people around, is financial stuff. ... Even with a HOP card transport is certainly cheaper, but it's still, that still would be a barrier for people, they're not going to prioritise filling up a HOP card when they haven't quite got the money to go around, when their other bills come in or they need food. (Participant 1)

With transport, whether it be topping up your HOP card, or filling, you know, putting gas in your car, if you get to that point in the week where you have to make a decision about whether you're going to buy groceries, or whether you're going to fill up your car or your HOP card, that is extremely stressful. (Participant 5)

This discussion was consistent with findings from the study by Rose et al. (2009) based on interviews with budget advisors that reported that it was common for low-income people in Aotearoa to need to forego food in order to afford transport costs to get to work. Tāngata whaiora are amongst a range of lower-income people in Aotearoa who are forced to trade off food and essentials against opportunities for mobility. Transport-related hardship was considered to be particularly acute for people living further out from the central city in lower-income suburbs.

The further out you live the more you pay, and that's the more you pay travelling by car or travelling by bus, and, you know, the further out you live, usually the less money you have to begin with, so you see that inequity sort of play out in our public transport system. (Participant 7)

Transport was identified as a key issue for tāngata whaiora who are homeless because opportunities to meet their daily needs are spread out over different places – for example, rather than having a central place where they shower, eat, sleep, and socialise, they often need to move around to many different places to meet their needs. The high proportion of homeless people in the central city in Auckland was identified as partly due to the frequency of public transport services, as well as the intensity of development providing 'eyes on the street' to help people stay safe. However, despite living in the central business district (CBD), many of these people were identified as originally from West and South Auckland, thus public transport fees were identified as a key barrier for homeless people to connect or reconnect with whānau living in lower-income communities on the outskirts of the city.

3.3.5 Anxiety

Anxiety was a key theme in the interviews. People with higher levels of anxiety were considered to have particular challenges navigating the stresses within our transport systems. Walking was identified as a key transport mode for tāngata whaiora due to financial barriers to car ownership and public transport use, but also due to perceived anxiety associated with driving, using public transport and cycling. This was considered to be valuable because walking provides opportunities for gentle physical activity, and feelings of self-efficacy and control, but also limiting in that the very small transport radius of walking was considered to restrict opportunities to socialise, find work, and access medical appointments.

Efforts to increase the transport radius of tāngata whaiora often centred on supporting people to use public transport more. Providing access to a public transport card and mentoring and 'companion rides' on buses were identified as key support interventions for tāngata whaiora. However, public transport was considered a fairly high-stress environment for many people because of their anxieties about route planning, crowding, waiting, and interacting with staff.

I think there's a number of reasons that some, that will be a challenge for some of our client group, for some people going out in public is difficult for a start, so if they need to get on public vehicle or a public bus or something, I think that's another challenge, they have to interact with the bus driver, and potentially people inside the bus, or they just might feel a bit trapped inside the bus with other people. So anxiety, but also probably also people who might be experiencing some sort of psychotic process of delusional process, that would be more challenging for them to jump into the bus, some of those people might walk a bit easier. (Participant 1)

Harassment on buses was considered to be an additional source of stress for women, including women experiencing mental health challenges.

Just the safety, I think, of women feeling safe, you know, we hear stories about young women who've had men sit next to them, even though there were empty seats and you know, we've all intervened when we had to, when we've noticed that women are looking uncomfortable. (Participant 6)

One of the participants said that it often took a long time, sometimes years, for women to get back on a bus after incidents of harassment.

One woman I've worked with probably for two to three years finally she is using, we funded her HOP card, using the HOP card to come up to see us because she has to do that regularly, well once a month for medication and stuff. And she will do that off her own bat now, which is fantastic. ... She was harassed on a bus once, some years ago, and fair enough, that totally put her off. So I did work really closely with her support worker, but it took yeah when I offered it myself to do it with her over a couple of years, she wasn't up for it, but then eventually we got the support worker to do a few runs with her, and actually she, and I think if she'd got on the bus sooner, she probably would have been using it much quicker, but you know, she couldn't face it. (Participant 1)

Feeling safe waiting for and using public transport as well as using public spaces was considered to be a source of anxiety for all women – anxiety that was even more acute for women living with mental health challenges.

Yeah, I just think the general level of safety and anxiety that women experience being outside their house, or inside their house even, just existing, just breathing and moving. (Participant 2)

Racist harassment was also seen as a source of anxiety for non-Pākehā³ people in Aotearoa using public transport:

If you already feel reasonably safe in society, public transport is probably sweet, and I think ethnicity plays along the same lines you know. If you've got reason to feel that you aren't going to be accepted on public transport, or in the rest of your life, you'll feel less safe on public transport. We've all heard of racist tirades, and we've heard of stuff coming up even in response to COVID, you know, making comments about Asian people on buses. (Participant 7)

3.3.6 Physical health and exercise

Living with mental health challenges was reported to have a range of negative impacts on physical health, including reducing physical and cognitive functioning, and making movement and physical activity more difficult. These challenges were seen to be particularly acute for people who are trying new medications, including during an experience of 'crisis' where medication dosages may be different or higher in order help people stabilise their health. Once again, walking was considered to be a key goal to help people access some of the benefits of gentle physical activity, as well as the restorative effects of natural spaces close to home. The fact that tāngata whaiora may have a more restricted mobility radius means that they will be particularly reliant on the availability of high-quality local green spaces that can be easily accessed on foot.

Safer, lower-stress environments for pedestrians were seen as a key way to support the mobility needs of tāngata whaiora.

Interviewer: *And what sort of support do people need with getting walking?*

Participant 1: *Quite a lot. Heaps, actually. That's a real challenge for people, particularly if they've never been, you know super active in their lives before, it's a really, and if they're suffering from some depression, to get out and do it is really difficult, or if they're again facing some of those anxiety issues, or negative symptoms of a psychotic illness, they've got big barriers ahead of them to actually do it. ... I think a lot more pedestrian friendly streets would be great – where the pedestrians sort of have the right of way really ... I think it might encourage people to walk a bit more. I mean a few people I see in Queen St and that's a bit of a nightmare really, for them stepping out into all of that.*

Reducing traffic stress was considered to be important for opening up the restorative possibilities of walking (or biking).

I think of hierarchy of needs, you're not just constantly at that safety level like oh is everything ok, is everything ok? But you're able to build something, yeah, more meaningful. You know, how much anxiety relief is there in, you know, biking or walking to your park and listening to how many birds can you hear, or, you know, listen to the sound of the waves. What are the things that people could experience, if they've got, yeah, ways of getting around and getting to places, that could add to their experience rather than be a kind of negative take away from it. (Participant 2)

Another participant summed up the effects of traffic stress well. Poor design and cost, she notes, can often mean that the stress associated with the journey can outweigh the restorative benefits of the destination.

We do know that being outside and exercise are positive for mental health, [but] if people live in areas where, you know, the footpaths aren't great ... you don't feel that safe, it's not that

³ The term *Pākehā* refers to New Zealanders of European descent.

attractive, you can't easily get to a park, or you can't easily get to the waterfront, or you can't easily get somewhere where it's really nice to be able to, and safe to exercise ... if the way of getting from your place to somewhere better is not easy ... the stress of getting somewhere is going to offset the benefits of getting somewhere. So if getting to the Domain for a walk is really stressful and difficult and expensive, you know you're not going to benefit from that being outdoors as much. (Participant 7)

The disability and transport expert whom we interviewed for the project also saw high-quality pedestrian environments as a critical way to support the mental health of people living with disability. This participant noted that people with impairments often find it difficult to get enough exercise, and yet becoming physically frail can further curtail mobility and independence and make it more difficult for people to maintain their confidence and sense of self-efficacy. She argued that high-quality footpaths and low-speed traffic environments help people with disability to maintain their resilience – to look after their bodies, keep participating, and keep feeling functional and in control of their lives.

We talked a lot about the mental health challenges people face when adjusting to acquired disability in particular. Depression, fear and anxiety are all common responses and ongoing risks associated with living with disability. For this participant, high-quality pedestrian spaces, high-quality public transport and the exercise that combined walk/public transport trips provide are critical for preventing people becoming 'afraid of the world' when they acquire a disability. Too often, this participant noted, daily transport trips for people with disability can be physically uncomfortable, embarrassing and stressful, forming part of the accumulation of 'small knockbacks' that degrades their mental health.

I associate mental health with impact on people's dignity, and confidence and self-worth. For me if you've got depression and, and you had a life of, or lots of experiences of knockbacks to your confidence, none of them might be intentional, but if they're knockbacks to your confidence, knockbacks to your independence, and some people might get so dispirited and depressed. There's quite a high suicide rate [amongst people with disability] too. (Participant 4)

3.3.7 Isolation

Home was identified as an important site for tāngata whaiora – both as a valued refuge and as a place of potential isolation and exclusion. Mobility decisions amongst many tāngata whaiora were considered to be influenced by a desire to avoid spending too much time in public, and too much time away from home.

Yeah, transport would have a huge impact on people's employment because, and maybe for some of our people is that, starting back to work if they haven't had work for a long time, is quite stressful to start with of course ... [and] if they're going to be working somewhere quite far from home, you know, if you're then having to sit on a bus, yeah so you can spend a lot of time trapped on your transport getting there. I think that makes it even harder for them to have to do that whole commute thing ... because of the length of time that they're away, they're out in public ... away from home ... Yeah a bit of a safe haven definitely. And ... I think people would find it difficult hanging around at bus stops too, for some people that would be hard, they would feel a little bit exposed or, so that's another issue I think, waiting around for a bus. (Participant 1)

Being in crowded spaces with other people for long periods of time was perceived as stressful for everyone, but as particularly anxiety-provoking for tāngata whaiora, and was seen as leaving them at risk of 'retreating' and spending too much time alone at home. Phrases like 'hiding away' or 'shrinking her world' were used to describe understandable but not always ideal levels of self-isolating associated with transport environments

being too stressful. Isolation was also seen as a particular risk for women, because threats to physical safety restrict opportunities to access social activities in evenings.

Because we're being told oh you shouldn't be out alone or at night or whatever. Again, choice and control, what do women have? If something's at an odd time of day or night, how comfortable do they feel: oh I'll just wait at the bus stop by myself, or hey it's the middle of winter, it's dark at 6pm, you know, oh don't be out late, yeah, at 6 o'clock. (Participant 2)

Loneliness and difficulties connecting with others due to restrictions on mobility were also considered to be a particular risk for people who did not drive, including older people, and teenagers. The disability and transport expert discussed the case of a teenage boy she knew who was blind and who began to feel isolated and left out when boys his age began to drive. She noted the strong sense in our culture that driving is a rite of passage into adulthood for young men in particular, and she relayed how he struggled to feel functional or successful socially or romantically without access to this key rite of passage into adulthood and manhood.

I can think of a 21-year-old that I did know ... he had low vision, he was a really nice guy, but he had difficulty getting girlfriends, he had all sorts of difficulties because his, all the males in his group drove cars. And one morning he was found hanged in the garage, the family garage. Now people would say other things were going on, and that may be the case, but not being able to drive, for young men is a major issue. And so they have to find other ways of building their self-esteem, and their egos, than just being able to drive. (Participant 4)

This story speaks to a theme that was recurrent in the interviews, the role that transport plays in making people feel like successful, functional adults that 'belong' in their communities. The theme of driving as a key part of becoming an 'adult' came up several times, and it was often around the sense that driving gives you 'control' over your life, and using other modes – particularly public transport – can leave you feeling more dependent and less 'adult'. To feel successful and feel proud of yourself is to be in control of your movement, and not to feel like you are at the mercy of others. Another participant discussed this issue in relation to the way that car-centred planning restricts feelings of independence and inclusion amongst adolescents and sends them a message that they 'don't exist' or that they are a burden.

It's this funny age [adolescence] because maybe you're not old enough to, you're not old enough to drive, so there's one avenue of independence. Have you got enough money for a bus? [If not] that's not independence. But if not can you grab a bike or a skateboard, or roller skates and just you know take off with your mates, do what you want, having that level of freedom and autonomy? You're growing into this whole new person – Imagine being dropped off by your mum somewhere, you know, like, oh stink! So, you know, can they get around safely? ... Does a space feel like it's for them, or is it not, actually 'no you're not, when we design the space we don't really think about, you're not part of our society or our community, your voice isn't important, you kind of don't exist'. I wonder how much people are probably not even conscious of that, but those messages are being sent. You know how often kids, oh don't sit here, don't hang around there, oh you're loitering, oh you're trouble, we don't like, you're unsafe, you know, kind of how often are they being pushed out of spaces, and how often do they feel actually included and like they're part of something? But yeah when we think about the transport system, how often do we think about that kind of age group, ever, when we're designing things. (Participant 2)

The issue of the transport system making some people more dependent and reliant on regularly asking for help came up several times as a theme. Dependence was seen as unpleasant and 'embarrassing' for many. Instead of making the transport system easy to use, as one participant noted, people with impairments in

particular often have to make a 'spectacle' or a 'fool' of themselves in order to get where they want to go. If we made transport environments easier to use, participants argued, people wouldn't have to 'stand out' so much.

You know we talk about mental health, well you can't tell whose, maybe you can, maybe you can't by looking at someone, what kind of challenges or issues [they experience]. Well then if we just made it easier for anybody it wouldn't matter, you wouldn't have to wear a big sticker and a siren and a badge, saying I need help with this thing. (Participant 2)

The transport and disability expert within the study provided an excellent discussion about the challenges of help-seeking for people with disability, and the ways in which changes in both pedestrian environments and public transport systems are affecting the ability of people with disability to use these systems independently. She highlighted how increased crowding on footpaths, including the use and storage of micromobility devices, as well as increased traffic noise and the automation of public transport systems are affecting the ability of people with disability to do things like walk to a bus stop safely, identify the correct bus, and get information about the correct stop to get off at.

She also noted that automation was designed to speed public transport services up by reducing interaction with drivers; however, people with disability often needed to talk to drivers to get information, as few public transport systems had accessible announcement systems or route-planning systems. She felt that the push to reduce interaction with drivers meant that people with disability were often made to feel 'a fool' for needing to ask for information and help.

So Auckland Transport tries to run a ship where there's minimum interaction with the driver, or the staff that they have to deal with, and the reality is there are heaps of passengers who need to be able to communicate with the driver... And it's not their fault [the bus driver] that the number of blind people who rock up and say is this, is this route number such and such? And they nod or shake which is a fat lot of use for a blind person, so you try again, and then you give up, and then one of the other passengers intervenes and you're made to feel a fool. And so if you're made to feel a fool because you have to ask a question, to which you cannot possibly find the answer without asking it, because the Auckland Transport won't tell me which bus is slowing down, you know, is coming along the road, and where is that bus going, and Auckland Transport won't tell me so I have to find out from a fellow passenger, or the bus driver, who will shake or nod if I'm lucky, or do nothing. (Participant 4)

Further, she noted that the increased 'busyness' of transport systems, including greater road noise and greater noise within train stations, meant that it has become harder to hear a bus coming or to hear things like the beeps associated with tagging on and off HOP cards successfully. Increased noise pollution, she noted, is making transport systems more confusing for many people with disability, and increases the chance that they will need to ask for help. Finally, she noted that a desire to avoid this 'busyness' often meant that people with disability tried to travel outside of peak times. However, this adaptation, she noted, makes it harder to form regular relationships with people who will help you.

If you're going to and from work you are more likely to be travelling every day, with people who know what bus you want to catch, and so you're much more likely to get help from fellow passengers, help which you actually shouldn't need to get. ... So people even if it's not obvious that people are blind or whatever, once passengers get to know you, they will, you know, encourage and help and be useful, because that's the way New Zealanders are. But if you are a middle of the day traveller, because you choose to go at a different time, maybe it's more convenient for you, but you might think that actually during the middle of the day, there's kind of less problem with traffic, and ... it's just a safer time to go – you're not going to be colliding with

kids on their bicycles on footpaths, or whatever the poor youngsters might be doing – but you won't get help from fellow passengers. Because especially if you're out in the suburbs, you want to get into town to maybe go and see a film with a friend of yours, or whatever you want to do, you won't get any help from a fellow passenger. (Participant 4)

In general, having transport systems that rely so heavily on people with disability having to ask for help means more anxiety for people with disability about whether they will be able to successfully make journeys. As one participant summed up, constant anxiety about whether you will be able to get help or be 'accommodated' wears away at the mental health of people with disability.

What if that was your experience every day, you know, because I think that somebody said oh this lockdown thing, we're suddenly getting to see the people who are not used to being told no. You know, no, you can't go there, no you can't come in the supermarket without wearing a mask, 'What, you can't tell me!' You know the first time in life maybe you're being told no. But what if every day of your life, no you can't do that, no you can't go there, you know no that's not for you. Oh no sorry we don't have a bus that can get a wheelchair on, no, sorry, the supermarket doesn't have quiet hours. What are they being told about their place in society or community? They're not important, they don't belong: 'It's really hard I guess we'll try and get wheelchair access, yeah I don't know, we'll see, we'll see if we can accommodate you.' ... You know it's like, oh, so I can come along? Or I can't come? You know, what are we telling people? (Participant 2)

3.3.8 Wellbeing and recovery

The participants were clear that transport systems play a critical role in recovery and efforts to create and maintain a meaningful life for people living with mental health challenges. As one participant summed up, 'transport is quite literally the vehicle for all things' that matter to people.

Accessibility is a massive one, the biggest one I think, and that's not only accessibility to services, or you know mechanisms that you have in place for your recovery, but everything else that, you know, everything else that encompasses human life, whether that be you know, social, so you're going out to meet your friends, you know you don't want to be on a bus for two hours trying to get there, or maybe it's going to the gym, or maybe it's going to darts, I don't know. You know, transport is quite literally the vehicle for all things, and yeah, especially in such a widespread city like Auckland, where you know, design-wise it's not the greatest, in terms of urban sprawl and things like that, but yeah, definitely, definitely very important. (Participant 5)

Walking, especially in green or natural spaces, was identified as important to maintain good mental health, but also to recover from periods of unwellness, as one youth mental health consumer explained:

I think for me recovery has always involved active transport, and usually that's encompassing some form of nature walk into my commute, because if it's part of your commute you do it every day, you've got no choice, you can't back out of the Domain, you have to do it. And it lets you have that time for reflection, so that's always been essential for me managing my mental health. (Participant 6)

Providing high-quality spaces where people can get to easily on foot and 'hang out' was also seen as important for preventing people with mental health challenges from self-isolating. This was considered especially important for tāngata whaiora who are living alone and living in small homes or apartments.

I'm thinking you're living in a tiny flat alone or something it's easy to hide away, but if there are places that as a person you can go and be in a space, it's not just four lanes of traffic and all

that, but an actual place where humans can go and move, which tend to be safer for people walking and cycling, then that's, you know, that's really positive. (Participant 2)

Increasing the use of public transport was identified as a key way to expand the transport radius of tāngata whaiora who walk; but, as noted, there were a significant number of stresses identified as currently associated with using public transport, and buses in particular. Three of the participants mentioned cycling and felt it also held potential for expanding the transport radius and opportunities of tāngata whaiora. However, there was a sense that the busyness and unsafeness of street environments for pedestrians was even more acute for cyclists, and this traffic stress was off-putting for most people, and particularly people already living with high levels of anxiety.

And in terms of people who do use other methods, walking and cycling, that's not always a really good experience for them either. People who have maybe had an unsafe experience, or have been hit or injured or something like that, that can be really off-putting, and then think oh actually I might have to change the way that I use transport, because the way that I was using doesn't feel very safe. (Participant 2)

Where people did take up cycling, there were several stories that highlighted the ways that it can provide the physical activity and 'control' benefits of walking while also enabling people to travel slightly longer distances and potentially access more activities. However, as this story from the mental health social worker about a client highlights, the greater physical fitness required to use a pushbike compared to walking can potentially make it harder to maintain the habit during or after periods of crisis:

Participant 1: *She got quite fit by using her bike, because she could go places ... she was tending to crisscross a bit around the city so, bus-wise it was not so easy, and biking was much quicker obviously if you don't have to jump up and down off different buses. So I think the bike was good for that, and she could come and go when she wanted to, which was really good, and she got about and did a varying number of things. Her life's shrunk considerably since, and she's someone who used to struggle with weight too and that was, I think that's why she took up a bike initially, and she also was quite motivated to go places, but she stopped using the bike for a while and now can't get back going. I mean that's like for any of us if we go to the gym and then we stop going to the gym for a while, it's quite hard to get ourselves back up and running.*

Interviewer: *So do you find it easier to get people into walking?*

Participant 1: *Yeah, yeah and you know I think the roads have got so much busier, you know, and I think the cycleways coming, I think that, maybe that will make it more doable for a lot more people, because it's you know potentially a bit scary out there on a bike: a lot of activity, a lot of noise, a lot of stuff happening around them I think.*

Increasing the safety of street environments for active transport users, making public transport free, and improving the quality of public transport environments, including creating 'zero tolerance environments' for harassment, and increasing ease of use and accessibility for people with disability were seen as key ways to support tāngata whaiora to stay connected and access support.

Despite the challenges associated with using public transport for tāngata whaiora, there was a sense that when it goes well it can open up people's worlds. The mental health social worker whom we interviewed talked about a client whom she supported for several years to start using public transport:

She's doing a te reo class, and so she will take the bus to do that now. And I mean she, that's opened doors, a lot of doors for her, it's fantastic, it's given her some independence, and she's not dependent on me or the support worker to get her places. (Participant 1)

Turning 65 and becoming eligible for free public transport via the Gold Card was also identified as an important life stage because it finally reduced the financial barriers to using public transport for tāngata whaiora. As one participant noted, while movement and mobility may become more difficult as tāngata whaiora age, 'At least that's one really good thing is they no longer have to worry about the charges [on public transport].' Other participants also talked about the importance of public transport to older people in enabling them to feel part of their communities and contribute to their families.

Despite this potential, however, there was a consensus that public transport environments are still too often scary, unpleasant and anxiety-provoking for many tāngata whaiora, and it should be a priority to improve the comfort of public transport users. One of the youth mental health workers in the study provided a thoughtful discussion about the need to think about how we turn transport environments into places that support, rather than act as a stress upon, people's mental health and journeys to recovery:

Well I mean you take a bus or a train you've got a, essentially what is, can act as a billboard or a new environment for someone, for maybe two hours a day possibly. I think the advertising that's inside transport systems and around stations could be public-health focused, maybe more ... and creating environments where people feel, not only safe but, you know, it promotes wellness. So in some of the work that we do with young people, we ask them what would your ideal service look like, and we talk about that down to physically what would the waiting room look like, so colour, lighting, music, just you know, are the seats comfortable, so really those super detailed things, and, you know, you've got a canvas there that, and you could really, I mean imagine if you got on a bus and it was like bright yellow inside, and the seats were like super comfortable and you just had calming music playing you know, it would be a completely different experience.

Even like in terms of the actual stations, you know, like, the train station in Auckland can be a scary place when there's no one there, and it's like really late, the same with bus stations you know, not just stops but yeah they're just not, I don't find them to be particularly pleasant or uplifting environments. One really great example is the Lightpath in Auckland, you know you don't, like you only hear good things about it, right. Because it's whimsy it's just the most perfect piece of whimsy. Just like the new bus shelters on K Road with all of the random glass and everything on them, they just make you smile. Yeah so it's not you know, I know its inspired design, but it's not that, you know, it's not ground breaking it's just someone taking an opportunity to do something really nice. (Participant 5)

Finally, there was some interesting discussion around the issue of transport, noise and mental health. One of the participants who is a mental health consumer and works with other young people with mental health challenges noted that in her experience, transport noise – especially sudden, loud traffic noises – can be 'triggering' for people who have experienced trauma, and can put tāngata whaiora off walking. As well as the discussion about how increasing traffic noise is making streetscapes more confusing and stressful for people with disability, there was also an interesting discussion with the homeless expert about the restorative effects of a reduction in noise pollution during the COVID lockdown. She noted that while there were significant concerns about an increase in mental health challenges for homeless people during lockdown, in fact the reverse had been the case, and this had in part been identified as due to a decrease in traffic (and construction) noise in the CBD, which had made the environment much calmer. The mental health social worker who participated in this project also echoed these comments, saying that while some of her clients had experienced an increase in anxiety about the virus, others had found lockdown to be a restorative time where they felt more comfortable going outside, in part due to less noise and less traffic stress.

3.4 Discussion

This chapter contains a number of key findings. Walking is identified as an especially important form of transport for tāngata whaiora, who are considered to have difficulties affording public transport or a car. Public transport is often the focus of efforts to increase the mobility of tāngata whaiora, although the participants identified a number of challenges involved with this goal, including crowding, lack of personal space, long journeys away from home, harassment, and tiredness, frustration and embarrassment associated with trying to navigate inaccessible spaces. Improving the comfort and safety of pedestrian and public transport environments was seen as critical to opening up opportunities for restoration and connection for all urban dwellers, but particularly for tāngata whaiora. The issue of the ways in which transport systems disempower youth was also an important theme. There was a sense that youth, and particularly low-income youth, lack choices and a feeling of 'control' over their transport experiences. One participant spoke at length about the ways that our transport systems send messages to youth that they 'don't belong here'.

The participants made the following suggestions for how the transport system could contribute to improving mental health in the community.

- Create more uplifting and physically comfortable public transport environments that showcase Māori and Pacific languages and art.
- Provide more training to bus drivers in how to interact with people with disability and tāngata whaiora, and utilise the skills and experience of the Māori wardens in working with these groups.
- Provide more support for tāngata whaiora to learn to navigate public transport systems successfully.
- Reduce traffic stress for pedestrians and cyclists. (Reducing traffic volumes, creating pedestrian-priority crossings and areas, and improving the quality of footpaths were seen as important for supporting tāngata whaiora and ensuring that they can get exercise, access appointments, make social connections, and travel to green spaces for restoration and relaxation.)
- Reduce the cost of public transport for youth and make active transport safer and easier for youth, to provide them with low-cost forms of independent mobility that make them feel more in control of their transport experiences.

4 The everyday joys and sorrows of mobility in our cities: Insights from the Inclusive Streetscapes and Electric City projects

4.1 Introduction

In this chapter we provide an overview of some of the key themes related to transport and mental health that emerge from two existing recent transport/neighbourhood research projects: Inclusive Streetscapes and Electric City. Neither of these projects was originally designed to collect data on mental health, but as in-depth qualitative studies they have both produced rich, detailed accounts of the lived experience of using our transport systems, including many valuable insights into the everyday impact of transport on mental health. Here we provide original secondary analysis of these datasets based on the development and use of new coding frameworks designed specifically for this project. These coding frameworks were developed using the literature review and conceptual frameworks identified in chapters 1 and 2.

There are strengths and weaknesses associated with undertaking secondary analysis of qualitative datasets. Because this project was relatively short (10 months), the use of secondary transport datasets, some of which required substantial funding and large multi-disciplinary teams to develop over several years, has significantly expanded the range of transport experiences and the diversity of transport users that are represented in this report. The weakness is that the datasets were not originally developed with the specific purposes of this project in mind. However, as noted, the fact that both the datasets were designed to collect fairly open-ended in-depth data on everyday transport experience means that there is, in our opinion, enough data that touches on aspects of mental health to make secondary data analysis meaningful and valuable. Another key strength of this secondary qualitative data analysis is that it was undertaken by, or with involvement from, members of the original research teams – thus retaining knowledge and understanding of the context of the original data collection process and participants (Irwin, 2013; Irwin & Winterton, 2012).

In many ways, Inclusive Streetscapes and Electric City are two quite different transport research projects. The Inclusive Streetscapes study, which ran from 2017 to 2020, was a community-based participatory research project funded by the Health Research Council. The project used go-along interviews to explore the lived experiences of 62 participants who are differently challenged by urban streetscapes or transport systems. The key transport modes for these transport users were walking, wheelchairs or other mobility devices, public transport, or travelling in a car as a passenger. The participants were living in four geographically diverse case study sites (Howick, Glen Innes, Māngere, and West Auckland) and included Māori (33%) and Pacific peoples (35%); people living with chronic health issues, including cognitive and psychological difficulties; and people living in low-income neighbourhoods. Each of these groups is known to experience a higher burden of mental distress compared with the general population, and analysis of this dataset points to a number of ways in which transport options and experiences contribute to both mental distress as well as to mental wellness or flourishing amongst study participants.

The Electric City study was a smaller, qualitative, interview-based study that examined the experiences of 21 electric bicycle (e-bike) users in Auckland in 2018. This study was funded by the Ministry of Business, Innovation and Employment (MBIE) through the Healthy Future Mobility Solutions project. The Electric City project was designed to explore the possibilities for, and barriers to, e-bike use in Auckland. This project collected a large amount of in-depth data on the lived experience of cycling in our cities. It also generated a lot of broader transport biography. Because in this study participants were asked to reflect on why they decided to 'switch' to a novel transport technology like the e-bike, participants talked quite a lot about their wider transport experiences and histories and the way that these histories had shaped their current transport

behaviours. The participants in this study were generally younger (30–50 years old) than the Inclusive Streets participants and were more likely to be middle-upper income earners, Pākehā, and commuting as a substantial part of their travel. They were also more likely to have current lived experience of driving in addition to their cycling experience. Many were also public transport users.

4.2 Transport infrastructure and wellbeing: Findings from Inclusive Streetscapes

This section is written by Mythily Meher, Julie Spray, Janine Wiles, Anneka Anderson, Esther Willing, Karen Witten, and Shanthi Ameratunga on behalf of the Inclusive Streetscapes project team.

4.2.1 Introduction

The Inclusive Streetscapes study explored links between transport sector decision making and experiences of health and wellbeing for older and disabled people whose experiences tend to be marginalised in the transport sector. In the present analysis undertaken with funding support from Waka Kotahi, researchers from Inclusive Streetscapes revisited the dataset of qualitative interviews with 62 people living with disability and/or aged over 60 years old in four Auckland sites. We aimed to review participants' mental and emotional experiences as they are enmeshed in, and therefore hindered or enhanced by, transport infrastructure. By setting aside 'mental health' as an explicit frame, our analysis attends to nuances of emotional and energetic dynamics that infrastructure brings about and uses this to reflect on when and how transport infrastructure facilitates or fails people's wellbeing.

4.2.2 Methods

This community-based participatory research study was approved by the University of Auckland Human Participants Ethics Committee, and all participants provided written informed consent. The qualitative interview data examined in this report was gathered primarily by research assistants who were members of the communities approached, and fluent in eight languages spoken by study participants (te reo Māori, English, Samoan, Tongan, Tuvaluan, Tokelauan, Kiribati and Mandarin). Most interviews incorporated a go-along component (Carpiano, 2009; Gardner, 2014) where interviewers accompanied participants on a journey they would usually take (or like to take) where participants narrated, with prompting, their thoughts as they moved across (or were not able to move across) their neighbourhoods. Some interviews were with participants who were not mobile or had limited mobility (eg, their go-along being a walk to their letterbox). Participants were also invited to talk about their everyday routines, challenges, pleasures, familial and community supports, and their health (Table 4.1).

Table 4.1 Demographics of participants in the Inclusive Streetscapes study

Site	Participants	Relationship to interviewer	Journeys
Glen Innes	15 people (12 women, 3 men). Varied ethnic identities: Māori (7), European or NZ European (8), Cook Islands (2), Samoan (1) and Niuean (1).	Research assistants conducting the interviews were members of a community engagement organisation in Glen Innes that worked in partnership with the university research team. They recruited participants through their networks, other community organisations, and the local marae.	Most participants took the researchers on journeys by foot, wheelchair or scooter to the Glen Innes town centre. Journeys also included rides in cars (2), trains (2) and a bus (1).

Site	Participants	Relationship to interviewer	Journeys
Howick	17 people (11 women, 6 men), including two married couples and a pair of friends interviewed together. Ten identified as NZ European, 8 as Chinese, 1 as both.	Two research assistants conducted interviews and Chinese translations. Most Chinese participants were friends of one researcher's grandmother. Other participants were recruited through a local church. One participant contacted the research team directly having heard of the project through a friend participating in Glen Innes.	The go-along interviews were largely walks around the local neighbourhood and reserves. One go-along included a bus ride.
Māngere	14 people (12 women, 2 men). This site centred on a group of kaumātua (elderly Māori) living in a block of flats opposite Te Puea Marae. Two participants had no direct connection to Te Puea.	Recruitment was largely facilitated through networks (family or neighbours) of a co-investigator who lived at the kaumātua flats. Two participants were parents of the research assistant. One participant was recruited through a local disability organisation.	Due to logistical challenges, only 9 journeys were taken at this site, 4 of which comprised a short walk around the kaumātua flats.
West Auckland (primarily Henderson/Rānui)	16 people (9 women, 7 men). One participant was neither older nor disabled but was a community support worker for people with mental illness. All identified with Pacific ethnicities: Samoan (5), Tongan (6), Tuvalu (4), Tokelau (1) and Kiribati (1). Two identified with more than one ethnic group including NZ European.	We recruited most participants through community groups. Tuvalu, Tokelau and Kiribati participants all belonged to a Tuvalu community group that meets every week. Most Tongan participants belonged to a Tongan group. Consequently, most participants at this site were people accessing at least one community activity. The remaining participants were recruited through one of the research assistant's personal networks.	Most participants undertook journeys by foot. Four journeys included a car ride. Most journeys traced the participant's usual daily walk for exercise, to the bus stop, to the shops, to school pick-ups, or to the mailbox.

4.2.3 Findings

4.2.3.1 What joys, pleasures and delights does mobility enable?

Outings are a source of important positive emotional experiences. Interviewees in every site noted the satisfaction of being able to move about and encounter beautiful sights. 'Beautiful, oh, the sun comes out. I think you will get happier after a walk outside,' said Yuan⁴ in Howick. Mario in Glen Innes connected the perception of a lovely scene to a mental experience: 'I see the sea view ... it stimulates the brain.' Mario also noted the importance of keeping moving to stay hopeful and open to opportunities for social encounters and connections, how circular and contingent this is, and the importance of being attuned to it. He said he went out even when in pain, if the pain permitted him to move, in order to prevent depression, which he knew would in turn prevent him from going out.

Mobility allowed people social links and opportunities for community living in a range of ways. These included those planned, like the cultural group meetings many participants in West Auckland frequented, or

⁴ Inclusive Streetscapes participants are referred to by pseudonyms in this report.

incidental and hoped for, like Mele's encounters with other electrical wheelchair users, which Mele described as 'the happiest time for me ... we have coffee ... we talk for hours before I come back', and Lose's delight in meeting other Tongan people when out walking. 'As always, when we meet and greet each other, we feel happy,' Lose said, 'because when we get to go home, we don't see each other anymore. At least something.'

At a local level, proximity to community created a sense of belonging for Mele and Lose. Participants valued being able to move about outside of their homes and houses, especially as a respite from focusing on their own discomforts and pain. One agoraphobic participant described learning to enjoy their excursions for a coffee in a mall, and another tried to visit their local charity shop to browse when their pain levels allowed them to so as to keep mentally open and connected to the world. What belonging *means* varies, but it is explicitly enabled by opportunities to move around one's surrounds outside one's home.

4.2.3.2 Emotional and mental burdens of navigating inaccessibly designed places

Most participants expressed deep desires to be out and about. Yet when out walking with them and preparing to go out, the emotional costs and mental labours of outings, even banal ones, were striking. Those with restricted mobility in particular offered vivid accounts of the mental energy and cognitive load required to hold detailed geo-local journey information and plan several steps ahead. Eleanor in Glen Innes uses a mobility scooter. She relayed some of the details she stores mentally of infrastructural features she is preparing herself to encounter, or seeking to avoid, on her walks: the severely cracked path on Maybury Street, which she has 'no choice but to go over'; the lips of curbs that get more pronounced further up the street and wear out and can puncture her scooter's tyres when she tries to move between the road and sidewalk to avoid the hedges; and cobbled sidewalks in the town centre that, however pretty, are 'rocky' to ride over. She described a shorter route to Glen Innes village that she cannot use because of tree roots pressing through and warping the sidewalk.

These accounts indicate the micro-details people like Eleanor are accumulating over trips and holding in their minds in order to keep moving about, sometimes at great peril. As Rose observed:

The mental side of it is really exhausting. I can't just go to a shop and think I'm going to go into that shop. I've got to negotiate the parking, finding a park. Then I've got to think about: Is that shop accessible? Can I get into that shop? Then once I'm in that shop I've got to think: Can I move around this shop? Can I reach the things on the shelf? ... It's mentally tiring.

4.2.3.3 Poorly connected infrastructure forces participants into dependencies they dislike

Many interviewees described independence as an ideal, but poor transport infrastructure and accessibility oversights, even if located at just one point on a journey of many points, heightened dependencies that people already have and that they disliked having. Lester, who uses a wheelchair, talked about how the possibility of independently travelling between where he lives and a shopping mall is inhibited by the especially broad gap between the train and the platform at the station at one end of the journey and the stepped effect where trains are slightly higher than the platform at the other, forming 'a huge lip ... like a step or a curb [to] go over'. Consequently, getting on and off trains at both stations was 'not possible' without somebody to push him and make sure he does not get stuck in the gap or tip over on the step. Lester recalled seeing people on wheeled devices get trapped in the gap and having to call on train attendants or rely on other commuters to help them get unstuck. Like many of the participants, he disliked having to rely on or even ask others – especially strangers – for help.

Participants talked about only accepting rides and help if they were 'desperate', preferring to walk or move about alone to avoid making others wait for them, and preferring not to trouble their busy adult children for rides, even in highly supportive family structures. Several even talked about letting trains or buses 'go by' during busy periods so as not to inconvenience other public transport users when it would take them time to

negotiate access to the train or bus. While emotions like shame and guilt were not explicitly named in relation to asking for help, participants expressed consistent aversion to asking for and receiving assistance.

4.2.3.4 Safety is a mental wellbeing issue

Our analysis calls attention to how pedestrian infrastructure that is poorly connected results in concerns about safety that lead participants to take on onerous risks and stresses when moving around, or avoid such journeys altogether. Eleanor expressed herself as ‘taking my life into my own hands’ as she was navigating her mobility scooter on the narrow path running alongside a highway, and while negotiating overgrown hedges that compel her off the sidewalk and onto the road for stretches of her journey. Many other study participants also found themselves forced to move from the sidewalk to the road to avoid soft and hard structural interruptions. These included obstructions to public footpaths, overhanging tree branches, and cars carelessly parked in driveways. In the absence of concreted sidewalks on the road near where Moana lived in West Auckland, she was forced to walk in a ditch. Participants in Glen Innes and West Auckland frequently commented on cracks in the pavement that are not tended to by local councils, noting that to journey regardless meant putting one’s body in harm’s way. They saw the situation as a matter of choosing between the fear of a wheel on a mobility vehicle catching in a crack on the footpath and getting stuck or tipped over, or venturing onto the road and being struck by a vehicle.

Crossing roads could also be stressful experiences, particularly in West Auckland where busy, wide, high-speed roads had few pedestrian crossings, which were spaced far apart. ‘It’s just like a cat running across the road,’ Ruru said, laughing, ‘you think, gotta go now!’ Francine described how the stress of crossing the road without a crossing on the journey to the hospital shot her blood pressure readings ‘sky high’, and the doctors ‘don’t realise, it’s all the stress of getting [to the hospital]’. Some participants like Francine, Ruru and others absorbed the mental strain these factors imposed in their determination to go about their lives, somehow. But for many others, these factors were reason enough not to go out. In West Auckland, especially amongst women participants, fears and anxieties around traffic and personal safety meant participants made few journeys or exercised great caution doing so.

While safety is often conceptualised in the transport sector in terms of injuries and fatalities, these findings demonstrate how living with mobility impairments can change perceptions of risk and generate safety concerns that may go unseen by others (including transport professionals) for whom these are not lived experiences. Yet these ‘unseen’ obstacles trouble older and disabled people on routine walks and significantly constrain their opportunities for mobility. This suggests a need to shift from a deficit-based approach to safety, which focuses primarily on the avoidance of deaths and injuries, to an approach focusing on appraising and remediating features of built environments that create forms of risk for disabled or older people that are highly burdensome. Importantly, much greater attention is required to ensure that efforts to reduce risks of injury do not limit the freedom, capabilities, opportunities and choices that disabled or older people have to enjoy the benefits of mobility.

4.2.3.5 Historical infrastructural inequity shapes possibilities for mobility-based wellbeing

Historical social and wellbeing inequities map onto landscapes, shaping the person–environment relationships that are possible from one place to another, and compounding layers of privilege, place and health. Wellbeing experiences at either end of the spectrum are mediated not just by the characteristics of local infrastructure mentioned above (gaps on trains, cracked sidewalks, etc) but also by built infrastructural histories of place that heavily shape people’s lives. We see this in the following examples.

4.2.3.6 Pursuits of exercise in Howick compared to in West Auckland

The capacity to move through one's environs, for fitness or otherwise, is not equally distributed. Among Howick participants, Chinese women appeared particularly health conscious and would take numerous walks (up to three times a day) for exercise. Most Chinese participants lived in close proximity to reserves or beaches and highlighted their appreciation of the natural environment in their daily walks. The capacity to walk for fitness can be challenged by health conditions: Pākehā/New Zealand European participants in Howick were less likely than the Chinese participants to walk regularly, often due to injury, although several expressed an ambition to walk more. The capacity to walk is also thwarted, noticeably, by place. Participants in West Auckland valued exercise and good health, much like those in Howick, but their suburb – a hilly and historically industrial area that has been retrofitted as residential – was characterised by several multi-lane arterial main roads and streetscapes that were challenging to walk or navigate using mobility aids.

In contrast to the neighbourhoods encountered in Howick (a suburb that was historically socio-economically better off, and originally developed as a residential area for retired soldiers and family), the topography and urban build in West Auckland posed many varied challenges. Many participants struggled with the slopes in West Auckland and described feeling 'asthmatic to the knees' (Anna) or, as Lose put it, 'I can't catch my breath.' They also reported poor quality or obstructed pavements and rare/sparsely-distributed, unsafe road crossings (see section 4.2.3.4 above), all of which detracted from the capacity to enjoy wellbeing through exercise.

4.2.3.7 Capacities for sociality in Glen Innes and Māngere

Glen Innes and Māngere offer an interesting comparison: both are historically lower-income working-class suburbs that are ethnically diverse and have longstanding Māori community presence and local marae. However, they have quite different built histories.

Glen Innes was developed as a state housing area for people, most of whom were Māori, who were displaced from their homes in Ōrākei in the 1950s. Alongside housing, the development included a town centre featuring a network of shops and amenities, a marae, and proximity to moana (the sea). The local marae is very inclusive of different cultures and gave participants who were connected to it a lot of support. Participants from the area generally expressed great appreciation for the shops and considerable care for, and a sense of connection to, local community. For many who had lived in the area most of their lives, other local sites like the pub and the McDonald's restaurant were steeped with history and warm memories of community, gatherings and organising. To live in and be able to move around places to which interviewees expressed abiding attachment inspired fond and nostalgic reflections of the past and potential for future connectivity. At the time of the research, rapid (and contested) infrastructural regeneration in Glen Innes affected some participants' mobility, and many anticipated being displaced. Yet the possibility for collective protest was evident in the energy surrounding this community, and the built environment was discernibly conducive to people gathering to discuss their misgivings and being visible about them.

Māngere is a suburb where road infrastructure, rather than suburban infrastructure, has been intensively built up over past decades, particularly in the community surrounding Te Puea Memorial Marae – the small area of Māngere on which this study focuses. In the 1970s, State Highway 20 was erected across the edge of Māngere to facilitate travel to the airport from more centrally located inner-city suburbs. It has been expanded several times since. Almost all participants in this site commented on losing access to places of cultural significance as well as unwanted exposure to increased traffic, noting how this has affected air quality and has polluted the ocean, local soils and plant life. Significantly, the motorway has also isolated the kaumātua living in the flats attached to the local marae, who constituted the Māngere community this project engaged with. The motorway severed the road that the flats were once connected to, isolating the flats and the marae from the Māngere township. The flats are now only easily accessible to vehicles turning in from

the highway. The pedestrian route to town involves walking a narrow path alongside the busy motorway and taking a pedestrian bridge over it – a route both unpeopled and involving a ramp that, for people of advanced age, is forbiddingly steep, with gaps in the side railings providing a daunting perspective of the motorway below. At the time of the interviews, there were no bus stops nearby and only one resident at the flats had a car and was able to easily move between the flats and the rest of the world.

One of the Māngere participants savoured her scheduled visits with a community carer, who drove her to doctor's visits and up the road for shopping. Many waited for family members and community to make time for them. Their ability to access the joys, pleasures, social participation and fitness of being out and about was completely disrupted. Many of these participants remained deeply invested and engaged in continuing the work of their ancestors who protested the motorway build, despite the ongoing feeling that their experiences were unseen and unheard by those who could possibly make a change.

4.2.4 Conclusion

In summary, our findings highlight the interactions between people's efforts to pursue wellbeing and the infrastructure they encounter when doing so, demonstrating how their choices are shaped by the built environment and transport services. It recognises that transport infrastructure and transport design can do much to mitigate challenges and enable wellbeing. Our findings also reinforce the need to shift from a deficit approach to road safety that focuses primarily on avoiding deaths and injuries, to one that identifies and remediates features of built environments that create burdensome risks and limit the freedom, capabilities and opportunities of disabled or older people.

The research design and community engagement processes embedded in the Inclusive Streetscapes project helped us appreciate the critical need to be sensitive to the nuanced and oblique ways people refer to wellbeing. This is particularly important in a public policy context where 'wellbeing' is provided a more central position, as evident in the Ministry of Transport's (2018a) Transport Outcomes Framework. We cannot assume that pre-defined terms will have meaning for people's diverse, located experiences. The conceptions of wellbeing that come through in the empirical data do so in ordinary, lay language, and we pay attention to these in ways that highlight the need to take a broad and ordinary lens on mental, emotional and psychological experiences of disability and diverse mobilities in place. To these ends we recommend the uptake of meaningful, targeted, and culturally responsive consultation processes (rather than processes situated around complaints or open calls for community feedback).

Importantly, the challenges to kaumātua wellbeing that have arisen from the motorway-related community severance in Māngere speak to the significant risks that arise when colonial conceptions of urban and transport design are misaligned with the lived contexts and cultural values of indigenous people. This speaks to the imperative to recognise and redress the consequences of institutionalised privileging of Western paradigms. Study participants and community stakeholders identified the following specific recommendations:

- Implement a bus route with a bus stop close to the marae that serves kaumātua and other residents, whānau and manuhiri (visitors) accessing the marae and neighbourhood.
- Provide a community van to transport people to and from the town centre and other places in the neighbourhood, because not everyone has access to cars or can use buses.
- Integrate traffic calming measures to mitigate concerns about traffic noise and road safety.
- Measure and address the impacts of degraded air quality, dust, pollution, car exhausts and emissions in the area.

Finally, our findings allow us to imagine the kinds of transport systems that support caring, nurturing, inclusive mobility for people differently challenged by built environments. We emphasise the value of attending to how experiences are created between people and places. We advocate for infrastructural reform and infrastructural equity if aspirations to promote community wellbeing and transport equity are to be realised.

4.2.5 Acknowledgements

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4.3 Electric City: Active transport, happiness and wellbeing

This section is written by Dr Kirsty Wild and Professor Alistair Woodward.

4.3.1 Introduction

The Electric City project was the first academic study in Aotearoa on the experience of using an e-bike. E-bikes are still a fairly novel transport technology in Aotearoa. They represent a type of so-called 'middle modalism' (Chisholm & Healy, 2018): in many ways the experience of using an e-bike is similar to using a pushbike (it is a small, open-air, slower, 'active' mode), but e-bikes also tend to support trip behaviours that are more 'car-like' (ie, longer trips, carrying more stuff, and doing more 'trip-chaining' – trips where you make multiple stops). We do not know how many people use e-bikes in Aotearoa yet (the Household Travel Survey has recently introduced an e-bike question), but imports of e-bikes have been rising rapidly. In 2019, e-bike imports reached 63,855, a 35% increase on 2018 (Stats NZ, 2020a).

We conducted two e-bike studies within the Electric City project: 1) in-depth interviews with 'expert' e-bike users (ie, people who had gone out and bought their own bike) and 2) a small e-bike trial at Auckland Hospital. In this small exploratory trial, we examined the question of what it is like for motorists to make the switch from a car to an e-bike for a month. In this secondary data analysis, we have focused on the experience of the expert e-bike users in our first study. While not the 'earliest' of early adopters, this latter group of e-bike users were generally keen to talk about why they took a 'leap of faith' to try out a novel transport technology. As a result, they provided quite a lot of transport biography. They explained how their transport histories and experiences had shaped their decision to try something new. Generally, their decision to switch to an e-bike was generated at least in part by a motivation to improve their psychological health. They wanted to avoid the perceived stress of car commuting, the tiredness and/or traffic stress of pushbike commuting, and/or the lack of control associated with using public transport.

The early adopters of e-bikes tend to be middle- or higher-income earners. The poor provision of dedicated infrastructure for cycling in Aotearoa means that as a transport mode, e-bikes are unlikely to be able to completely replace car use. As a result, early adopters of e-bikes tend to be people who can afford to own at least two transport technologies (eg, a car and an e-bike), which means they are more likely to have higher incomes. Due to housing inequalities, these higher-income earners are also more likely to be able to live closer to the CBD and to have the shorter commutes and more flexible working conditions that make cycling more feasible – all of which provide higher-income earners with more transport choice. In terms of a hierarchy of needs, wealthier people also tend to have greater opportunities to think beyond survival needs to prioritise their psychological health. For all these reasons, the narratives of the e-bikers in this study are

interesting because they represent one group of people who tend to have the choices, ability and desire to prioritise their mental health when making transport decisions. As a result, their narratives provide useful insights into the types of understandings people have of the impact that different transport modes have on their mental wellbeing.

4.3.2 Findings

4.3.2.1 Commuting stress

The desire to reduce commuting stress was identified as a key reason why many of the participants switched to e-biking. Car commuting was identified as a particularly stressful way to get to work in Auckland.

Driving a car into Auckland is a desperately stressful experience, even when it goes well, and when it goes badly it is really dreadful. (E-cyclist 7)

So much of Auckland driving is irritating so I have just attached irritation to driving. (E-cyclist 23)

I was just like I need to do this because the commute drive is killing me. (E-cyclist 13)

Switching from car commuting to cycling was seen as useful because it simultaneously reduced commuting stress while also providing access to the mood-boosting benefits of exercise.

I hated when I was having to do the drop offs, because the girls aren't locally at school, I was just hating it, I don't get to kind of move, you know, and [you] sit ... in little air conditioned bubbles. I just hate it, it starts making me a bit grumpy, whereas you feel quite happy when you have a bit of a cycle to work. (E-cyclist 21)

That combination of the commute being so bad and wanting to get a little bit of fitness without having to get a gym membership. (E-cyclist 8)

4.3.2.2 Keeping open opportunities for exercise and physical health

The opportunities for gentle physical activity provided by e-biking were valued by a range of people who were at different stages of the life course where we experience restrictions on our ability to exercise for different reasons. For parents, time and energy available for exercise was in short supply, and a pushbiking habit was becoming harder to maintain.

After about six or seven months of just riding ... it's a long way. It's about 17 k's and you do that and I'm a bit tired and doing that a lot. And then I've got commitments with my children and family and stuff, that gets a bit difficult. (E-cyclist 13)

E-bikes also make it easier to carry kids on your bike, which women in particular valued because of the opportunities it provided to expand their active transport radius with their kids.

Getting the kids on a bike as opposed to anything else is fun and in that sense it gives us a little bit more freedom as opposed to walking. We are able to go to places where I wouldn't walk because it would take too long to get there. Okay we could get there but then by the time you walk back it is too late or I am too tired or whatever. (E-cyclist 22)

Women were also more likely to comment on the ways that e-biking enabled them to 'trip-chain' more efficiently using a healthy form of transport, making it easier to escort kids to school and then get to work while also still getting some much valued exercise. As one woman who escorts her two older kids with her baby on her e-bike explains, for working parents, every minute counts:

It is not so much helping with the baby because I have to ride at the pace of the four- and the six-year-old anyway, but it does mean that once I am at day care I can leave straight from day

care and I am gone. ... Otherwise I probably couldn't take them, I would end up in the car. I thought about not buying a bike seat for the e-bike because of the battery, my existing one wouldn't fit so I had to buy a brand new one. And I thought about not doing that and riding with them on my regular bike, then riding home and getting on the e-bike and going but it is an extra probably 10 minutes. (E-cyclist 5)

For those who had experienced injury or disability, e-biking also provided an important new form of low-impact exercise.

I've had a couple, or a few serious accidents in the last 10 years – broke my back eight years ago, badly broke my leg skiing six years ago, broke my arm and dislocated my shoulder three years ago. ... So, in actual fact my exercise options were dwindling because of different issues that I have, and I've found the cycling to be perfect. (E-cyclist 12)

I used to run when I was younger and as a result my hips won't allow me to run or walk that far, but cycling is fine. So cycling was an obvious way of doing it. I am not fit enough even now to get up most Auckland hills without a bit of help, so the idea of having an extra set of legs for the hills was very appealing. (E-cyclist 7)

E-cycling was also identified as an important way to keep moving if you are managing a chronic condition or if you are managing the fluctuations in energy associated with ageing, because the exertion required is more 'adjustable'. Pushbiking was identified as too difficult to do every day and in all conditions, especially if your health is 'variable'.

So, the best thing about an e-bike is I can go for a ride even if I'm not feeling particularly well or energetic, I can still enjoy the ride. You know if I get up and I feel terrible I can still go for a ride cos I know I can rely on the electricity.

If I get up and I feel great, well I don't rely as much on the electricity. It just depends how you are. As you get older, each day is a bit different. (E-cyclist 2)

I cycle more than three or four times more than I would have before. And I go out in more conditions, like windy conditions. ... like certainly it has [improved my] fitness [in] my legs, but also because I am an asthmatic, which was part of the reason I wanted to do more exercise, so I was using my lungs a bit more ... If I don't use them then I do have more trouble. The more I use my lungs the less trouble I have with my asthma. So definitely I think my asthma is better. (E-cyclist 23)

4.3.2.3 The traffic stress of active commuters

As well as enabling commuters to avoid the stresses of car commuting and to keep exercising, one of the key things that people liked about e-biking was the way it helped them manage traffic stress associated with biking in unforgiving road conditions. The e-cyclists talked about the work that is involved in managing anxiety, frustration and fear associated with experiences of injury, close-passing or other scary experiences on the road. As one e-cyclist put it: 'Car drivers scaring me is the worst.' She described the work she does to be seen, to keep safe, and 'be accommodated':

If there's nowhere to pull over you've just got to hold your ground. I've had a few like where I've been a bit nervous, but yeah it's sort of like no don't move, don't wobble and stuff, so I try to be extra careful though, and always, you know, watch out for vehicles, listen out for them and all of that. And if I can avoid them like ... if there's any side roads anywhere I go there. [And] I do make a point when I am cycling that I attempt to get eye contact and a smile – an exchange of smiles – with every driver that might otherwise pull out in front of me. (E-cyclist 7)

A number of studies have highlighted the psychological effects associated with repeated experience of road trauma, including close-passing, on cyclists. In general, the e-cyclists felt using an e-bike compared to a pushbike helped to reduce some of this trauma by giving them greater control and equality as a road user, and making them feel safer.

I can probably afford to be a little bit more aggressive in terms of merging with the traffic. So, when I come into the peninsula at Te Atatu there, I can get up to speed a lot quicker and so I know I can cross a road faster. So, if it was just my normal power, obviously I don't have that speed to get up so quickly. So, I can merge into traffic quicker. I can get onto a roundabout quicker. All of those things. I know that I can get to the front of traffic and I'm not gonna be holding them up. I'll beat a car off the intersection. So, I feel a lot more confident to actually get up to the front of the traffic and be seen. (E-cyclist 13)

I think it's amazing for commuting. It puts me on much more of a par with the cars. I feel like I am able to manage the volume of traffic, particularly with the throttle where I can take off in front of the traffic confidently and comfortably. (E-cyclist 11)

4.3.2.4 Time, flexibility and control

The theme of feeling more 'in control' of your commute came up frequently. Because they are relatively nimble, active transport users tend to experience the highest levels of feelings of control of their commute. Worsening congestion tends to have the most negative effect on the mental health of car and bus users, primarily because it reduces their arrival time reliability and feelings of control and self-efficacy when they make a journey. E-cyclists talked about how much they valued feeling in charge of their transport experiences:

Anything involving where there is lots of traffic [it makes it better] because you have access to the cycle ways or bus lanes, it is just quicker. Quicker around town. Like getting from here to the ferry – which I don't do that often – but there are ways you can get there. (E-cyclist)

I just like the flexibility of being able to travel when you like, so not waiting for a bus. And I live on a bus route, it is one of the best in the city because it is all buses that go west out to Titirangi and Henderson and New Lynn – there are thousands. So I never have to wait more than 10 minutes which is as good as it gets in Auckland. ... but at the same time, sometimes I am waiting 10 minutes and a busy working mum; 10 minutes is sometimes ... you have busted your arse to get out of the house on time, you miss your bus and that just puts you that much further behind for the day when you are already behind. So I love the fact that when I want to leave, I leave. And then I am not bound at the other end to take a bus that gets me home with a useless 10 minutes of downtime, when I would much rather get on my bike and be where I need to be. (E-cyclist 22)

Well first of all I love not having to be in traffic. I like the fact that it is a bit of exercise – it's not huge but for someone of my age its good stuff. They are the main things and it is quick and convenient. (E-cyclist 4)

4.3.2.5 The social benefits of cycling

Getting more social interaction was also identified as a key benefit of switching from car commuting, in particular, to e-cycling. Using a slower, open-air form of transport provides more opportunities for conversation and social interaction.

Yeah me and my friend we had a lovely ride last week, we just meandered along and talked, and all these different people were out there, someone was walking a dog and someone was jogging, and you just say hello. (E-cyclist 3)

But you know like when I'm going to work now, because you go partly on the cycleway, there's so many people on bikes, and there's more and more e-bikes but people are usually quite friendly and say hi, yeah you sort of recognise people after a while, leaving at sort of around the same time as you do. (E-cyclist 18)

And it's actually quite social if you want it to be, and I often chat to people at the lights because I'm chatty, but you don't have to if you don't want to, and you can also go fast or not go fast depending on how you're feeling, like it's quite adjustable. (E-cyclist 16)

4.3.2.6 The mental health benefits of e-cycling

The majority of the participants identified improvements in psychological health as a key benefit of switching to an e-bike. This was identified as partly due to feeling more in control of their commute, partly due to the mood-boosting benefits of exercise, and also due to enjoying having more time outdoors.

I think possibly cardio, it's possibly helped a little bit ... Considering I'm exceedingly unfit. But, ... serious mental health benefits. Yeah. It's weird cos I'm not really in the nature but I feel like I'm in nature. I'm going past a tree and I'm just like, 'oh so pretty'. (E-cyclist 19)

I really like the sensation of cycling. It is something that I hadn't done in years properly and it is that I actually come to work and am feeling energised as opposed to when I was driving and I just felt tired by the time I got here. And that is even with having to battle my way down half of Great North Road and splitting between lines of trucks and buses and ... that feeling of coasting along the cycleway is really the best version of commuting I have found in Auckland. (E-cyclist 8)

And it's also been good for fitness. Even though I've got the assist I'm still pedalling an hour each way. So, I'm fitter, I'm getting fresh air, I'm not sitting in traffic, and just generally happier. (E-cyclist 9)

Yeah, general wellbeing of being out in the sun and in the wind, and you know that kind of thing psychologically ... it does feel good yeah absolutely on a nice day, it feels good. (E-cyclist 15)

Well, it's nice getting away from sitting inside a car, it's lovely, riding down from the peninsula is very nice actually ... I've got all the sun rising, it's nice, it's just like getting out on the water. So I really enjoy the open air, it's much healthier and I'm not, you get a bit frustrated when you're just sitting there, sometimes in the car it's taken me 50 minutes to get to work here by car, and I could actually run here quicker than that. (E-cyclist 14)

4.3.3 Discussion and conclusion

The e-cyclists within this study provided important insights into the relationship between psychological health and commuting. Consistent with existing research, they identified car commuting in congested conditions as a source of stress due to the inactivity, isolation and lack of control associated with getting to work this way. Also consistent with previous research, they identified the reasons why switching to active commuting can improve psychological health: through the mood-boosting benefits of physical activity, feeling more in control of their mobility, having more social contact, and having more time outdoors in green spaces. They also talked about the ways that switching from pushbiking to e-cycling can help to reduce the stresses associated with biking in unsafe traffic conditions. Pedal-assist doesn't eliminate these stresses, however. As one

participant noted, the fear of injury 'is always on your mind' when you ride. This study provides useful examples of the reasons why switching to active commuting tends to improve psychological health, and it highlights how these gains could be further strengthened by reducing the road stress and trauma experienced by active commuters in Aotearoa.

5 Transport and mental health: Insights from the COVID-19 pandemic

5.1 Introduction

In this chapter we explore what we are learning about the relationship between transport and mental health during a health emergency: in this case, the early stages of the COVID-19 pandemic in New Zealand. While in previous chapters we explored the ongoing everyday relationships between transport and mental health in our cities in Aotearoa, in this chapter we look at what happens to this relationship when there is a sudden ‘shock’ or disruption created by extraordinary events like the implementation of emergency infection control measures. One of the transport outcome goals of Waka Kotahi is ‘resilience’, and emergency disease situations like a pandemic provide important insights into the ability of our transport system to protect community resilience, including mental health resilience, during times of stress and sudden change.

It is likely that there will be profound mental health challenges associated with the COVID-19 outbreak. Mental health researchers warn that

mental health services should brace themselves for a ‘mental health tsunami’ in the months and potentially years to come, as the question of secondary mental health epidemic is not a matter of whether it will happen, but rather to what extent will it happen. (Hisham et al., 2020, p. 5)

So far (we are writing in early September 2020), New Zealand has had relatively low numbers of people infected with COVID-19, compared with other high-income countries. Nevertheless, the fact that newly emerging infections (NEIs) like COVID-19 are ‘novel’ (ie, effects are uncertain), highly infectious and potentially fatal means that the spread of the virus in a community generates high levels of fear and uncertainty.

As well as the direct mental health effects of infection or fear of infection, pandemics also have an impact on many aspects of social and economic life, including transport systems – with additional flow-on effects on the physical and mental health of communities. Figure 5.1 illustrates links, direct and indirect, between COVID-19 and human health. Important mediating factors include social isolation, loss of employment, restricted movement, difficulty in accessing services (including schools and health care) and economic hardship. It should be noted that this diagram primarily identifies negative health impacts associated with pandemic-related changes to the transport system, particularly increased car dependence resulting from infection-related concerns about using public transport. However, in this chapter we also discuss some of the positive health effects that can result from temporary or longer-term reductions in motorised traffic that can occur during lockdowns and beyond.

February 2020. On 11 March, the WHO declared the disease a global pandemic. By 19 March, 28 cases had occurred in New Zealand, and gatherings of more than 100 people were cancelled. On the same day, the country's border was closed to anyone who was not a New Zealand citizen or permanent resident.

On 21 March 2020, Prime Minister Jacinda Ardern introduced a four-level plan of restrictions to control the spread of the virus. At this point the number of new cases of COVID-19 was doubling every two days, and the Prime Minister announced that the country would be moving into Alert Level 3 restrictions immediately. This meant that everyone except essential workers had to stay at home, and schools and non-essential businesses were closed. More stringent Level 4 restrictions followed 48 hours later. On 25 March, a state of emergency was declared, signalling a national lockdown for a minimum of four weeks. International flights ceased, apart from a small number of mercy flights, and travel within New Zealand was banned. The population was confined to home, with exceptions for essential workers, as well as for trips for exercise, attending medical care, and visits to the few shops that remained open to purchase basic supplies. Social contacts with those outside the household bubble were discouraged. Police enforced limits on travel and social gatherings. Essentially, the whole country was put in quarantine. This had never happened before in New Zealand's history.

The daily number of new cases in New Zealand peaked in the last week of March 2020 and fell steadily through April. The much-feared surge of severely ill patients in hospital intensive care units did not occur. On 28 April, the country moved to Level 3 restrictions, and further relaxation of activity occurred on 14 May, when the country moved to Alert Level 2. On 18 May, most schools and workplaces opened, although there remained restrictions on the numbers who could gather in one place, and people were encouraged to continue to practise social distancing. After almost three weeks in which there were no new cases, the country went to Alert Level 1 on 8 June.

This meant the end of restrictions on gatherings, and there was no need, the Prime Minister declared, for social distancing to continue. International travel was still much reduced, and passengers who arrived from overseas were isolated for two weeks and tested for the virus. During June, occasional cases of COVID-19 were identified in travellers in quarantine, but there was no evidence of infection spreading into the community. On 11 August, the Prime Minister announced that four new cases of COVID-19 had been detected in the community in Auckland, and Auckland went back into Level 3 lockdown on 12 August. At the time of writing, Auckland is at a new level – Level '2.5' – while the rest of Aotearoa is under Level 2 restrictions.

5.3 What happened to mobility during Aotearoa's first lockdown?

Mobility is the aspect of day-to-day life most affected by a lockdown or 'stay-at-home' order. New Zealand was unique, internationally, in its decision to 'go early and go hard' in the response to COVID-19. It is the only country to commit to eliminating local transmission rather than suppressing disease peaks and spreading the burden of infections over time. The New Zealand experience has also provided an opportunity to observe the part transport may play in supporting mental health resilience at a time of lockdown.

Compared with some other countries (eg, China), transport arrangements in New Zealand were relatively liberal. Public transport services ran throughout, though on a limited timetable, to ensure those without access to private transport could reach services and employment and shops. People were permitted to use their own vehicles for the same purposes, but were discouraged from travelling 'without good reason'. While the police did step in and enforce restrictions on occasion, the alert levels operated mostly on a trust basis. Courier systems ran to support home delivery of supplies.

Motorised traffic declined in most neighbourhoods; people stayed 'local' more and spent more time using active modes, often in family or intimate groups or 'bubbles'. In the early stages of the COVID-19 pandemic

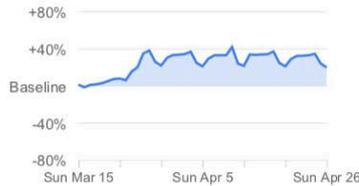
in New Zealand, we saw a dramatic decline in all forms of mobility (Figure 5.2), as well as an associated drop in traffic congestion in our cities (Figure 5.3).

Figure 5.2 COVID-19 Community Mobility Report – New Zealand, 15 March to 26 April 2020 (Source: Google, 2020)

Residential

+20%

compared to baseline

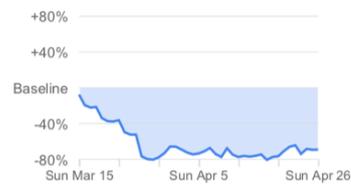


Mobility trends for places of residence.

Parks

-69%

compared to baseline



Mobility trends for places like national parks, public beaches, marinas, dog parks, plazas, and public gardens.

Retail & recreation

-88%

compared to baseline



Mobility trends for places like restaurants, cafes, shopping centers, theme parks, museums, libraries, and movie theaters.

Grocery & pharmacy

-37%

compared to baseline



Mobility trends for places like grocery markets, food warehouses, farmers markets, specialty food shops, drug stores, and pharmacies.

Transit stations

-82%

compared to baseline

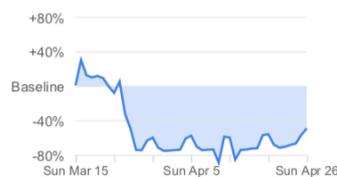


Mobility trends for places like public transport hubs such as subway, bus, and train stations.

Workplaces

-49%

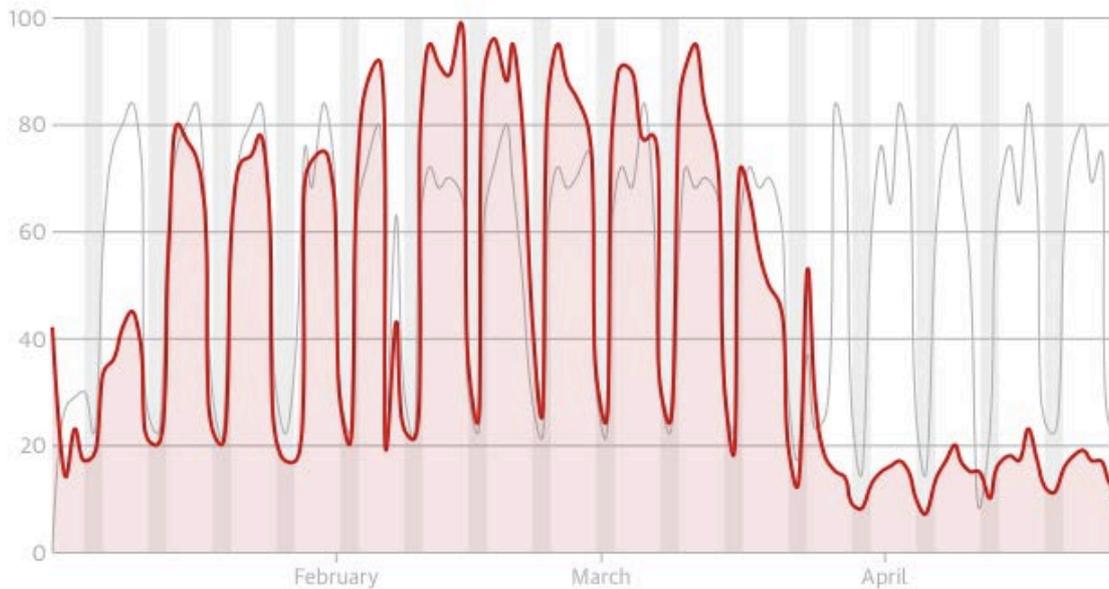
compared to baseline



Mobility trends for places of work.

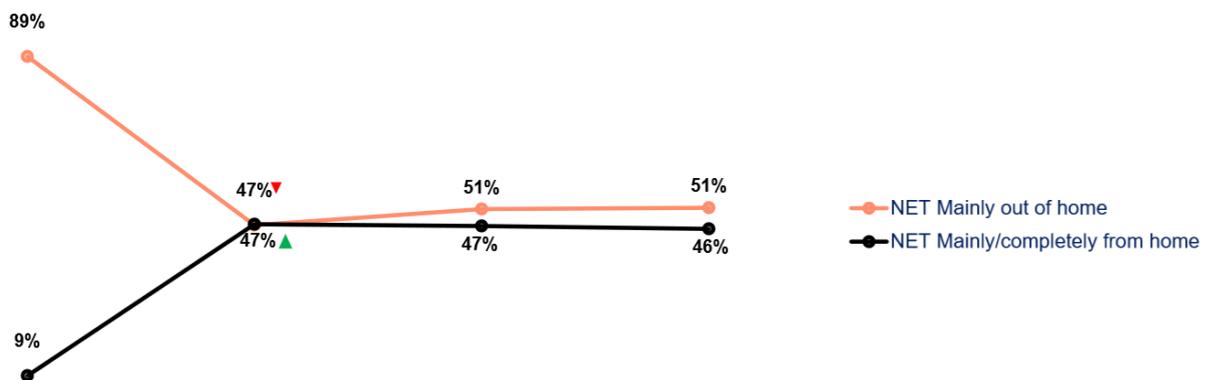
Figure 5.3 Traffic congestion index 2020 compared to 2019 – Auckland (Source: TomTom, 2020)

Auckland



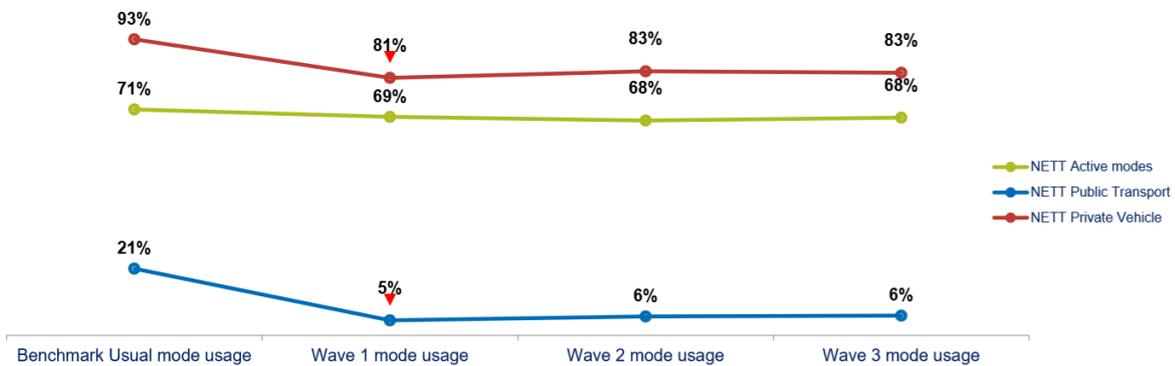
A significant part of this drop in mobility was due to changes in the pattern of work, as roughly half those who previously travelled to work shifted to working mainly or completely from home (Figure 5.4).

Figure 5.4 Proportion of people working in and out of home, three survey waves, Level 4 lockdown (Source: Waka Kotahi, 2020, p. 49)



An important finding was that the steepest drop in transport use by mode during Level 4 was amongst public transport users (Figure 5.5). Fear of infection was a particular concern for this group.

Figure 5.5 Modes used in a normal week versus used in the past week, three survey waves, Level 4 lockdown, 21 April 2020 (Source: Waka Kotahi, 2020, p. 25)



Nearly half (45%) of public transport users in the Waka Kotahi COVID-19 mobility monitor reported that they had reduced their public transport use because they were worried about becoming infected with COVID-19. A further question on perceptions of different modes during this period showed that bus users in particular were concerned about their ability to stay safe, avoid infection and safely physically distance while using the bus. People with disability experienced the least decline in public transport use during this period, despite infection concerns, most likely due to their greater dependence on public transport. Unsurprisingly then, they were also the group most likely to report having taken a trip that they would prefer not to have made (Waka Kotahi, 2020).

Active transport users (in this case, cyclists) were the most likely to be satisfied that their mode provided for hygienic, safe transport that enabled them to physically distance adequately (Waka Kotahi, 2020) (Figure 5.6).

Figure 5.6 Perceptions of transport modes, normalised, 21 April 2020, Level 4 lockdown (Source: Waka Kotahi, 2020, p. 34)



There were variations in travel patterns in the community. There was generally fairly strong compliance with the stay-at-home order, with levels of ‘non-essential’ travel low, and only increasing slightly during the latter stages of the lockdown. Half of all essential workers were still required to travel during the lockdown (Figure 5.7). Some groups were also more likely to completely self-isolate (ie, not to leave home at all). COVID-19

vulnerable groups, people with disability, and elderly people were the most likely to be in this group. In general, survey data from the Waka Kotahi 21 April 2020 COVID transport impact report showed that 18% of people reported that they did not leave their house at all, except for exercise, in the previous week of lockdown. This number rose to 21% for people who were COVID-19 vulnerable, 22% for people with disability, and 28% for those aged 70+ (Waka Kotahi, 2020). Another local survey of transport patterns during lockdown found that 20% of people with disability did not leave their property at all during a typical week in Level 4 (Burdett, 2020).

Figure 5.7 Reported activity and movement during the last seven days compared to three-wave benchmark⁵, 21 April 2020 (Source: Waka Kotahi, 2020, p. 16)

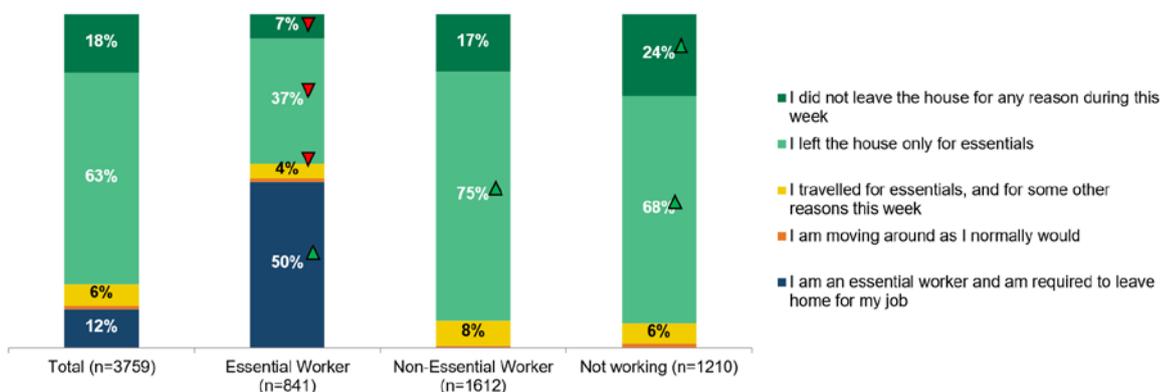
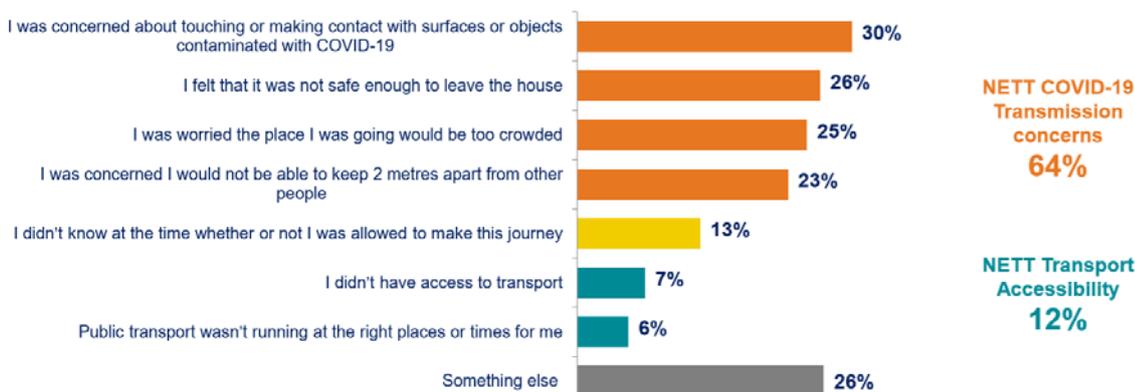


Figure 5.8 Reasons people were unable to make essential journeys (based on three waves) (Source: Waka Kotahi, 2020, p. 55)



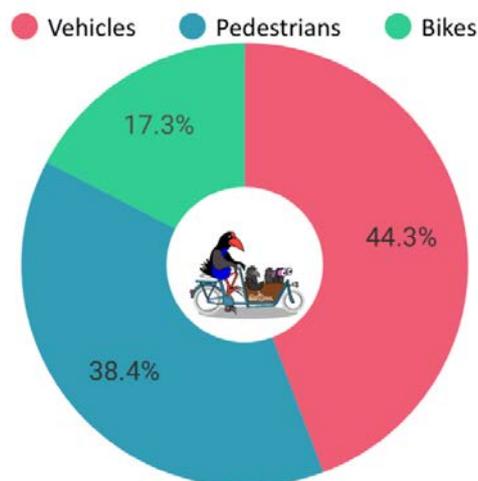
While use of all modes declined during lockdown, one of the notable aspects of lockdown was the increased use of active modes at the neighbourhood level. We believe it is important to point out that this neighbourhood-level ‘mode shift’ was invisible in the aggregated national transport statistics because it was (and is) not measured. However, the trends are evident in community transport surveys.

Because most suburbs experienced a decline in motorised traffic but local travel for exercise was allowed, local trips using active modes, such as walking, cycling and wheeling, were more common. Bike Auckland’s Big Backyard Bike Count, for instance, which ran in 250 locations around the city during Level 4 lockdown, found that the neighbourhood travel mode share was 19% people on wheels, 42% people on feet, and 39%

⁵ Survey data was collected weekly, in ‘waves’.

using private vehicles (Bike Auckland, 2020) (Figure 5.9). This is a rough comparison, since the surveys were undertaken in quite different ways, but the New Zealand Household Travel Survey reports the typical mode share of all trips as 83% private vehicle, 10% walking, 4.2% public transport, and 1.5% cycling (Ministry of Transport, 2018b).

Figure 5.9 Auckland neighbourhood mode share, Level 4 lockdown, Big Backyard Bike Count (Source: Bike Auckland, 2020)



5.4 COVID-19 and mental health: What effects will the pandemic have on psychological wellbeing?

While initial public health efforts have focused on infection control, there is increasing research attention focused on the profound effects the pandemic is likely to have on both individual and community mental health. In this section we outline relevant international research on the mental health impacts of newly emergent infections, and we examine what early data we have in Aotearoa that is relevant to the topic of this report.

5.4.1 Newly emergent infections and mental health

Because the virus is new, most of the research that is now available focuses on mental health impacts of previous NEIs such as SARS (sudden acute respiratory syndrome), MERS (Middle East respiratory syndrome) or H1N1 (swine flu). For example, studies of the global epidemic of SARS in 2003 (which was caused by a virus closely related to that responsible for COVID-19) have demonstrated a variety of mental health effects amongst not only those who are sick with the disease but also those who are infected but have no symptoms, close contacts of patients, health care workers, and more broadly those experiencing 'lockdowns' or involuntary quarantine. The psychological consequences for individuals who are infected with COVID-19 may be long-lasting. Physical symptoms of the illness (including fever, hypoxia, coughing, and especially difficulty with breathing) and the side-effects of medications (such as insomnia resulting from use of corticosteroids) all cause anxiety and mental distress (Mak et al., 2009; Xiang et al., 2020). Mak et al.'s study of hospitalised SARS patients concluded that uncertainty about one's prognosis when experiencing a 'novel' disease, witnessing adverse events in hospital, and time in intensive care all constituted a 'terrifying experience' for those who became infected with the virus (Mak et al., 2009, p. 319).

Patients also often experience anxiety and guilt about possible effects of contagion, quarantine and stigma on their friends and family (Xiang et al., 2020). Psychological difficulties commonly persist for several years post-infection. One cohort study of SARS survivors in Hong Kong found that nearly two thirds (58.9%) experienced a *Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition* (DSM-V) psychiatric disorder, and a third (33.3%) still had a disorder 30 months post-SARS infection. One-fourth of these patients had post-traumatic stress disorder (PTSD), and 15.6% had depressive disorders. Anxiety disorders, including panic disorders, social phobia and agoraphobia, were all still common amongst this group more than two years post-infection (Mak et al., 2009).

Mak et al. (2009) note that compared to natural disasters, the unpredictability of the 'novel' virus and the fact that social support systems are often immobilised by isolation and stigmatisation can deepen and prolong psychological distress amongst survivors. Many SARS patients also experienced ongoing pain and physical impairments, and higher rates of unemployment, sick leave and early retirement. Other studies have also reported high rates of PTSD amongst health care staff treating SARS patients (S.-C. Park & Park, 2020).

Studies comparing psychological outcomes for people quarantined (due to the risk that they may be infectious) compared with those not confined report increased frequency of anxiety, detachment from others, insomnia, irritability and depression (Brooks et al., 2020; S.-C. Park & Park, 2020). Quarantine has been applied previously, though on a more limited scale than has occurred with COVID-19, in the control of infectious disease, and we summarise here the findings of a rapid review of effects on mental health. Boredom, anger and loneliness are commonly reported (S.-C. Park & Park, 2020; Xiang et al., 2020). These occur in children as well as adults, and the effects are seen to persist, though diminished in magnitude, up to three years subsequently (Brooks et al., 2020). Imposed restrictions appear to have more adverse effects than voluntary quarantine. The duration of quarantine is important – stronger impacts are associated with restrictions that last longer than 10 days than with shorter periods of quarantine. Studies with a longitudinal design found that after quarantine, many people continue, sometimes for months, with avoidance behaviours such as staying away from crowds, not entering public transport and other enclosed places, frequent handwashing, and cutting contact with people who might be unwell (Brooks et al., 2020).

The novelty of the virus and the fact that other people represent a potential source of threat (instead of, or perhaps as well as, comfort) heighten social anxiety, stigmatisation and discrimination (including racist discrimination) in many communities, undermining the social cohesion that is especially important during 'traumatic events' of this kind (Asmundson & Taylor, 2020; Cheung, 2004; Puterman et al., 2009).

Experience with previous NEIs has shown that 'pervasive feelings of hopelessness and uncertainty' as well as maladaptive 'safety' behaviours such as hypervigilance and avoidant behaviour are common responses (Hisham et al., 2020).

Uncertainty about access to basic supplies was a common stressor, which continued for some to be a source of anxiety for months subsequently. It seems likely these effects would be more marked amongst people living alone and those with limited mobility (eg, elderly people and those with disability), but few studies to date have examined these more vulnerable groups. There are other limitations in the research to date, which has generally included small groups that have been quarantined due to possible exposure to infections, but it seems likely that many of the findings will apply in the COVID-19 case, where whole cities (and countries) have been locked down (G. J. Rubin & Wessely, 2020).

Anxiety about infection is more likely to be disabling among those who were particularly prone to anxiety and worry prior to the event (Taha et al., 2014). A history of psychiatric illness was associated in some studies with increased likelihood of displaying anxiety, anger and other features of PTSD. Those on low incomes reported higher rates of stress and depressive symptoms due to quarantine than those with greater financial

security. Social isolation was reported as a cause of boredom, frustration and distress almost invariably by those who experienced quarantine.

Research has shown that there are a number of other challenges for tāngata whaiora around the experience of NEIs. Specialist mental health staff are commonly not considered 'essential' staff within hospital settings during a pandemic, and those who have been infected, as well as people with pre-existing mental health challenges (especially those already in forms of compulsory isolation such as psychiatric wards or prison) have been shown to have particular difficulties accessing appropriate mental health support. This was observed during both the SARS and (early stages of) the COVID-19 pandemics (Liebrenz et al., 2020). Under normal circumstances, the psychological and psychiatric care of individuals in prison is already a major challenge for many health care systems – a problem that is even more evident in times of crisis (Liebrenz et al., 2020).

5.4.2 COVID-19 in Aotearoa, community wellbeing and mental health

With infection numbers, and deaths still relatively low in New Zealand, the largest mental health effects of COVID-19 so far are likely to be around community anxiety around the virus, the negative impacts of isolation and restrictions on movement, potential reductions in access to (mental) health care, and increases in unemployment and underemployment.

Looking ahead to the ways in which COVID-19 may affect mental health and wellbeing in New Zealand and elsewhere, economic hardship and job losses have been highlighted. A strong connection has been demonstrated, in New Zealand, between involuntary job losses and subsequent poor mental health. For instance, a study of the closure of freezing works in Hawke's Bay found that serious self-harm requiring hospital admission increased by two and a half times (Keefe et al., 2002). European studies have demonstrated the detrimental effects economic recessions may have on mental health, but signal also that in the main it is the policy response to economic downturns, rather than the recession itself, that determines long-term population health (Stuckler et al., 2009).

In a recent national survey, 13% of New Zealanders said they or a family member had lost a job since the start of the pandemic (13%), while 19% had difficulties paying monthly bills (19%). Two-fifths of participants said they or a household member have felt depressed (41%) or had trouble sleeping (43%). Māori were twice as likely to say they or a household member has lost a job (20% vs. 11%), were unable to pay monthly bills (34% vs. 14%), or filed for unemployment benefits (27% vs. 10%) compared with Pākehā. Māori were also more likely to report that they were unable to get prescription medicine on time (27% vs. 12%) or access adequate medical care (28% to 14%) (Thaker & Menon, 2020). Recently released unemployment figures suggest that there has been a significant rise in underemployment as a result of the pandemic, and that job losses have disproportionately affected women – with one analysis suggesting that women have experienced 90% of the job losses associated with the COVID-19 recession (Stats NZ, 2020b).

New Zealand studies also showed that feelings of loneliness increased during our first lockdown. In general, people with disability, unemployed people, Māori, solo parents, low-income households, and youth (aged 15–24) experience the highest levels of prolonged loneliness in Aotearoa (Loneliness NZ, 2020). Research showed that during lockdown, solo parents, youth and unemployed people experienced the largest increases in loneliness. While 5.8% of youth experienced prolonged loneliness before lockdown, this rose to 20.8% during lockdown, before dropping slightly to a still high 17.0% post-lockdown (Loneliness NZ, 2020). It is notable that while there has been a justifiable focus on the connectedness and loneliness of older people during the pandemic, isolation experienced by youth, sole parents and the unemployed did not feature as strongly in public debates. Given the disruptions to schooling, concerns about a rise in child abuse in lockdown, and these figures on youth loneliness, youth mental health may have been particularly at risk

during the early stages of the pandemic. Recently released results from the Ministry of Health *COVID-19 Health and Wellbeing Survey* also showed high levels of loneliness during lockdown (34%), with slight improvements since the end of lockdown (21% in late July 2020, after 6 weeks at Level 1, Aotearoa's lowest alert level) (Ministry of Health, 2020a).

5.5 How can the transport system support mental wellbeing during the COVID-19 pandemic?

In this chapter we have examined what happened to mobility during our first lockdown. We have also explored what we know about the likely mental health impacts of COVID-19. While we have not been able to identify any specific literature on how transport systems can support mental wellbeing during a pandemic, there are likely to be many contributions that the transport system can make to supporting community resilience during this time. The transport sector plays a key role in enabling essential workers to access employment, as well as enabling communities to access basic needs and health care and to have opportunities for social connection and physical activity during lockdowns.

The literature on mental health and NEIs, as well as early local data on psychological wellbeing, suggests that a number of negative mental health impacts of COVID-19 are already starting to appear in Aotearoa. It is valuable to reflect on how the transport sector can be configured to optimise community wellbeing and mental health resilience during the next few years while we seek to manage the pandemic.

One piece of local research that highlights one of the areas where the transport system may support mental health during the pandemic is the *Life in a Low-Traffic Neighbourhood* study described below.

5.5.1 Low-traffic neighbourhoods to support mental health during a pandemic

5.5.1.1 Introduction

During lockdown, the lead author of this study, Dr Kirsty Wild, conducted an independent study for the NGO Women in Urbanism Aotearoa titled *Life in a Low-Traffic Neighbourhood*, which explored what it was like to live in a low-traffic neighbourhood during the Level 4 stay-at-home order (Wild, 2020). As outlined in other parts of this report, the evidence suggests that rising traffic volumes have a negative impact on community mental health. The Level 4 lockdown represented a sort of 'natural experiment' in moving to a low-traffic neighbourhood environment, so it was a valuable opportunity to conduct research on what this experience is like for New Zealanders. Although the study did not explicitly set out to explore the impact of this shift on mental health, psychological wellbeing was a key theme within the study findings.

The *Life in a Low-Traffic Neighbourhood* study provides a number of useful findings and reflections relevant to the exploration of the relationship between transport and mental health during a pandemic, including during periods of acute infection control and the period of economic and social recovery following compulsory lockdown orders. We have provided a summary of the study here, with permission.⁶

5.5.1.2 Methods

This study explored the experience of environment and mobility at the local neighbourhood level during the Level 4 lockdown that occurred from 26 March to 17 April 2020. The results are based on an online qualitative questionnaire (Braun et al., 2020) that ran from 15 April to 1 May 2020, approximately the second half of the lockdown period. The questionnaire aimed to collect reflections from the community on the

⁶ The full report, with quotes and photos submitted by participants, can be found at www.womeninurban.org.nz/lifeinalowtrafficneighbourhood.

experience of living in a low-traffic environment during this period. In general, qualitative studies on lived experiences of infection control measures, such as lockdowns, are identified as a critical part of epidemic (or pandemic) control responses. Qualitative studies help decision makers to understand how different interventions are likely to be perceived by diverse communities, and how likely they are to accept and engage with these interventions. They also help us to understand the impacts of interventions on people's lives and identify how infection control programmes can be designed in ways that support community wellbeing, including mental health (Vindrola-Padros et al., 2020).

Qualitative methods are particularly useful for gathering in-depth reflections from people in their own words – especially on unfamiliar or 'novel' experiences. Open-ended qualitative approaches are also useful for exploring new or unexpected aspects of experience that researchers may not anticipate. As noted already, neighbourhood lockdown is a novel experience for most New Zealanders. A very small number of older New Zealanders may have memories of the Spanish influenza pandemic, as well as regional lockdowns that occurred during polio outbreaks in the first half of the 20th century.

A total of 287 New Zealanders participated in the study. Seventy-four percent of the participants identified as female and 25% identified as male. Eighty-one percent of the participants were Pākehā/European, and the next biggest ethnic group was Māori at 5%. The biggest age categories were 45–55 (27%), followed by 35–44 (25%), and 25–34 (24%). The main strength of this study is that it was completed during lockdown, so the observations are based on reflections of those immersed in the experience, giving them a depth and an accuracy of recall that it is difficult to achieve in retrospective accounts. The key disadvantage of this study is that with small numbers, this study is not likely to be representative of all types of diverse community experience during lockdown.

The demographic profile of participants suggests that this study is more likely to provide insight into the experiences of people who were working from home during lockdown, so the study participants are probably less likely to be essential workers. However, it is important to note that only half of all essential workers reported being required to travel for their work, and these travelling essential workers may have had similar neighbourhood experiences on their 'days off'. Given the slightly younger age profile of the participants, it is also likely that we did not capture the experience of those who did not venture out into their neighbourhood frequently or at all during lockdown.

It would be useful to triangulate the results of this research with other research studies that have run during lockdown, including the Manaaki Whenua – Landcare Research study on connecting with nature during lockdown (Greenaway, 2020), and New Zealand data from the global survey on physical activity during lockdown being run locally by researchers from Massey, Lincoln and Canterbury universities (Massey University, 2020). Both these studies are likely to produce results that provide insights into movement and experience of neighbourhood during lockdown.

5.5.1.3 The neighbourhood environment during lockdown

Because most trips are made by car in New Zealand, most neighbourhoods likely experienced a decline in motorised traffic (see Figure 1.2). At the same time, because local travel for exercise and to shop for essential goods was allowed, there was an increase in local trips, and local trips using active modes, such as walking, cycling and wheeling.

It is likely that this decline in motorised traffic did not occur for everyone. Those living near worksites such as ports where 'essential' industrial travel continued may not have noticed a decline in motorised traffic in their neighbourhood.

There are a few other features of life in lockdown that likely shaped experience of neighbourhood during this time. Firstly, public and private recreational facilities such as gyms, pools and playgrounds were closed, and

people were encouraged to use local parks only. Government guidelines also explicitly encouraged local walking and cycling for exercise. Also, because all schools and most workplaces were closed during lockdown, and people were asked to travel within their household 'bubble', there was more opportunity and incentive for travelling together locally, as 'intimate units' (ie, family or household groupings).

Finally, there were also several other notable features of the social or cultural environment during lockdown. New Zealand enjoyed comparatively high public support for and compliance with the stay-at-home order, which is in part attributed to relatively high levels of social cohesion and trust in government and public institutions in New Zealand (Spoonley et al., 2020; Thaker & Menon, 2020). There were also a number of environmental features within neighbourhoods during lockdown that likely worked to reinforce this heightened sense of 'social solidarity' during lockdown in New Zealand: There was a noticeable decline in outdoor advertising, which in many cases was replaced by pro-social messaging funded by corporations, public art, or government-funded public health messages. In many neighbourhoods there were also evident physical markers of pro-social community sentiment, such as chalk graffiti, and the 'Bear Hunt' initiative, where neighbours put teddy bears in their windows (or on their lawn) for local children to look out for on their neighbourhood walks.

5.5.1.4 Key findings

Traffic noise

Reduced traffic noise was the most common observation amongst participants. People commonly reported feeling 'calmer' with less traffic noise, and a small number reported sleeping better. Many people commented that they had never really noticed how loud the traffic is, and how much it acts as a sort of 'background stress' for them, until now when they have something to compare it to. As well as reduced noise irritation, people also liked that reduced traffic noise enabled them to hear other things that they find pleasurable, including birdsong and the sounds of other people. They particularly like being able to hear kids play, laughter, and family conversation. There were also many comments about how reduced traffic volumes made it easier to talk to and connect with other people on the street – they could 'call out' to a neighbour on the street from two metres away and ask how they were. They also like that it was easier to have a conversation with people in their family when they went out walking together. Older people with declining hearing seemed to particularly like this, but people of all ages commented on it: speech was much more audible. Noise pollution does not tend to feature strongly in public debates over transport system design and effects in New Zealand; however, research by Waka Kotahi showed that traffic noise pollution is a significant source of annoyance within our cities, with about a third of urban residents reporting that they are 'very' or 'extremely' annoyed by road traffic noise (Humpheson & Wareing, 2019).

Feeling more 'relaxed' and less 'rushed' when walking

One of the things people reported enjoying most was that less motorised traffic reduced the level of 'alertness' and 'vigilance' required to use the footpath safely. People reported feeling less 'rushed' when crossing the road, or even when walking past driveways on the footpath. This reduced level of alertness was reported to make people feel more 'relaxed' and less 'tired' when walking around their neighbourhood. As one participant put it, this made it easier to 'enjoy the journey, rather than focus on the destination' (Wild, 2020, p. 12). Feeling safer and more relaxed when walking was a common experience, which was even more marked for people who had young children, who felt a reduced need to 'hold their kids ultra-tight', as one participant put it.

Parents reported that this reduced need for hypervigilance around safety meant that group trips as a family using active transport modes felt both more manageable and more fun, whereas in the past they could be quite stressful for them at times as parents. One participant remarked that the reduced need for parental

hypervigilance has made family trips more 'playful', while another parent talked about how the reduced need to focus so much on the safety of their kids had created more space for the grownups to also enjoy each other's company when going out. Finally, another father talked about how he enjoyed how much more independence his kids were able to enjoy in the neighbourhood during lockdown. Overall, people seemed to experience the reduced need for hypervigilance around safety as opening up space for other, more enjoyable aspects of family life when going out together.

Cycling: More diverse people on bikes

Many people reported cycling for the first time in their neighbourhood or cycling more than usual because they felt much safer with lower traffic volumes. Interestingly, many people remarked that even where there are cycle lanes they were using the road to cycle, because pedestrians were often walking on the cycle lanes in order to socially distance safely. There were many accounts of people teaching their kids to ride, and people particularly enjoyed seeing little kids riding in their neighbourhood, whether or not they had taken up cycling themselves. Little kids cycling seemed to represent a marker of 'community life' for many people. Perhaps like the sounds of kids playing, it makes people happy to see kids biking. It was certainly a theme that came up frequently. We are not aware of any formal surveys of the demographic split or demographic changes in neighbourhood cycling during lockdown, but as these accounts illustrate, there appears to have been a diversification of the cycling demographic during lockdown, with more women, children and adolescents cycling in their neighbourhoods.

This diversification is perhaps not surprising, given that concerns about being injured by motorised traffic and feeling 'stressed' by needing to avoid motorised traffic are often cited as primary reasons why people do not cycle in their neighbourhoods, and these concerns are raised more frequently by women than men. Also, increased motorised traffic volumes in neighbourhoods has been identified as a reason why there has been a particularly marked decline in cycling amongst children and adolescents in recent years. Cycling to school in New Zealand has reduced from 1 in 12 school children in the late 1980s to 1 in 50 children by 2014 (Ministry of Transport, 2015). There is generally considered to be a high 'latent' potential for neighbourhood cycling and walking that is constrained by concerns about injury. One Auckland Transport survey, for instance, showed that 60% of Aucklanders reported that they would like to try neighbourhood cycling if the risk of traffic injury was reduced (Auckland Transport et al., 2017). New Zealand studies with children show that they that they would like more opportunities to play in their streets (Egli et al., 2020) and to explore their neighbourhoods by bike (Mackie, 2009), and during the lockdown period this appeared to be a much more likely possibility for them.

Running

Running did not come up as commonly as increases in walking and cycling, but when it did, people mentioned enjoying having more space to run safely. Like walking and cycling, running and other forms of outdoor exercise are likely to replace some use of indoor recreational spaces such as gyms and pools where physical distancing is more difficult to achieve.

Enjoying nature

Enjoying seeing and hearing birdlife during lockdown was another common theme. The combination perhaps of more birds around, and more opportunity to notice them, was a recurrent observation. Heightened enjoyment of nature during lockdown is also an interesting phenomenon. It is valuable to reflect on whether there has been more birdlife in our cities during lockdown, or whether people have simply been noticing birdlife more. It is likely to be a combination of both.

Reports of increased wildlife in cities during lockdown have been common across the world, including in New Zealand. Local ecologists have noted that increased birdlife in our urban areas is likely a result of a combination of reduced traffic noise and disturbance, less maintenance in parks, and potentially the drought conditions leading up to lockdown (Doyle, 2020). Dr Danielle Shanahan, director of the Zealandia urban wildlife sanctuary in Wellington, noted that reduced traffic noise has likely played a significant role in encouraging birds to sing more and in enabling us to hear them more. Interestingly, there also seems to be some evidence that replacing traffic noise with birdsong also reduces the speed of walking: evidently, stressful noises prompt us to walk more quickly, and relaxing sounds have the opposite effect. Thus, birdsong and other natural sounds in urban settings provide a type of restorative prompt that slows us down and makes it more likely that we will notice and absorb natural experiences (Franěk et al., 2019). Once again people using slower, 'open-air' transport modes like walking, running and biking generally report noticing and enjoying nature more (Pretty et al., 2005; Wild & Woodward, 2019).

A 'cleaner' neighbourhood

Air pollution was a less common theme than noise pollution, but there were numerous comments about the perception that the air felt 'fresher', and that breathing and opening windows felt 'more pleasant'. Several people also noticed being able to 'smell' more. People on roads with heavier traffic levels were particularly likely to comment on feeling more comfortable opening their windows. These observations fit with trends in routinely collected measures of air quality in New Zealand cities. The improvements were unevenly distributed but substantial. National Institute of Water and Atmospheric Research (NIWA) scientist Ian Longley said, 'While pollution was down by three-quarters on average, at least a third of Aucklanders reduced their exposure to traffic pollution by 90% during lockdown' (Morton, 2020, para. 6).

A greater sense of community

The perception that their neighbourhood felt 'friendlier' was another major theme in the research. People like seeing more people from their neighbourhood – they felt the quality of interaction between people had improved and that there was more 'community spirit'. Many people appeared to look forward to their daily walk or cycle as one of their key sources of connection and pleasure.

Nostalgia, and the 'country town' feel of more time spent local and on foot or bike

The neighbourhood experience during lockdown seemed to activate a degree of nostalgia. Perhaps because most people were staying local with their families, and perhaps because many people were seeing kids biking, which has declined in recent times, the lockdown experience reminded some people of their childhood, or certainly of times past, when they had experienced a more 'village' like neighbourhood experience.

Concerns about safety

There were two major safety issues that came through in the results: firstly, many people felt concerned that while there were fewer cars, the cars that were still around seemed more likely to be speeding. Indeed, traffic data from Waka Kotahi during lockdown showed considerable increases in average traffic speed in most of our urban centres. Some people expressed concern about what would happen when lockdown ended and people still needed to walk on the road.

The other major safety concern was whether there would be adequate space for safe physical distancing once car traffic returned. A number of people observed that both pedestrians and cyclists were using the road space to socially distance safely. Several cyclists also noted that they were riding on the road, rather than using cycle lanes, because these lanes were being used more frequently by pedestrians and runners attempting to physically distance.

These experiences suggested that both pedestrians and cyclists would be more vulnerable to traffic injury as motorised traffic returned and reoccupied street spaces that people were using for physical distancing. This reduction in space available for safe physical distancing would also likely increase conflicts between cyclists and pedestrians.

5.5.1.5 Discussion

The study results highlight a number of key features of the experience of neighbourhoods during the Level 4 lockdown in March/April 2020: less noise irritation, greater use of active transport modes, a greater sense of community, and increased enjoyment of nature and birdlife. These experiences are likely the result of an interplay between changes in the social environment as well as changes in the physical environment of neighbourhoods during lockdown – the most marked physical change being a decline in motorised traffic using local streets.

As noted, there was strong public support for stay-at-home measures and a high level of pro-social messaging in the community, generated by government public health messaging, ‘solidarity’ billboards created by commercial advertisers, and community art and initiatives (eg, neighbourhood graffiti and rituals like the Bear Hunt). Despite these pro-social cues, however, it is still likely that there was a high level of anxiety in the community about strangers as a source of infection. The fact that people felt safer walking and cycling with a decline in motorised traffic in their neighbourhoods during lockdown likely helped to reinforce the more positive potential for people and neighbours to remain a source of connection and solidarity. Proximity plays a primary role in enabling people, including children, to make friends, and there are also fewer opportunities for spontaneous social contact in neighbourhoods with higher traffic volumes (Mindell & Karlsen, 2012; Wiki et al., 2018). Children and adults who use the slower open-air active modes like walking and cycling also tend to like their neighbourhoods more, to feel more connected to their neighbours and to feel safer in their communities (D. Appleyard, 1976; van den Berg et al., 2017). This is primarily because moving slowly through neighbourhoods generally provides people with more opportunities for eye contact, social interaction and social observation.

5.5.1.6 Conclusion

More enjoyable local opportunities to be with family and ‘safely’ connect with neighbours on foot or bike appeared to be sources of relaxation, pleasure and potentially ‘resilience’ during quarantine. Understandably, people seemed to look forward to their time out of the house, and lower traffic volumes in their neighbourhood made it easy to connect with both people and nature when they were out. Lowering traffic volumes and speeds could be considered as useful interventions to protect levels of physical activity as well as to boost levels of morale and community resilience during periods of quarantine as well as during the more extended periods of recommended or self-imposed physical distancing that we are likely to experience until there is an effective treatment for COVID-19.

This recommendation is echoed by the findings of the recent study by the World Wellbeing Panel (2020) titled *How to Keep Up Wellbeing During the COVID-19 Pandemic: A Global Perspective*, which identifies safe opportunities for low-intensity exercise such as walking, jogging and cycling as key ‘mood-boosting’ protective resources that can be used to support the mental and physical health of populations at this time. It is also supported by the findings of Holly Walker’s (2020) report *Alone Together: The Risks of Loneliness in Aotearoa New Zealand Following COVID-19 and How Public Policy Can Help*, which also identifies interventions to ‘prioritise walkability, social interaction, common space, [and] easy access to parks and green space’ as key ways to reduce the risks of loneliness during the pandemic (p. 9).

5.5.2 Transport, COVID-19 and mental health in Aotearoa, further reflections

Beyond the reorganisation of neighbourhood transport ecosystems, it is useful to provide some initial reflections on the impacts of COVID-related changes to our transport systems on mental health.

5.5.2.1 Commute stress

During lockdown approximately half of New Zealand workers began to work at home. Because most workers use a car to commute, and car commuting – especially long car commutes – has a negative effect on mental health, the reduction in commuting during lockdown is likely to have had a positive impact on the mental health of many New Zealanders. This may not extend to active transport commuters, who tend to experience their commute as a positive contributor to their mental health. Consistent with this, international research has shown that active transport users (Figure 5.10) and those with the shortest commutes (Figure 5.11) were the groups most likely to miss their commute during early COVID-19 lockdowns (O. Rubin et al., 2020).

Figure 5.10 Do you miss commuting? By mode, global online survey, University of Amsterdam (Source: O. Rubin et al., 2020, p. 6)

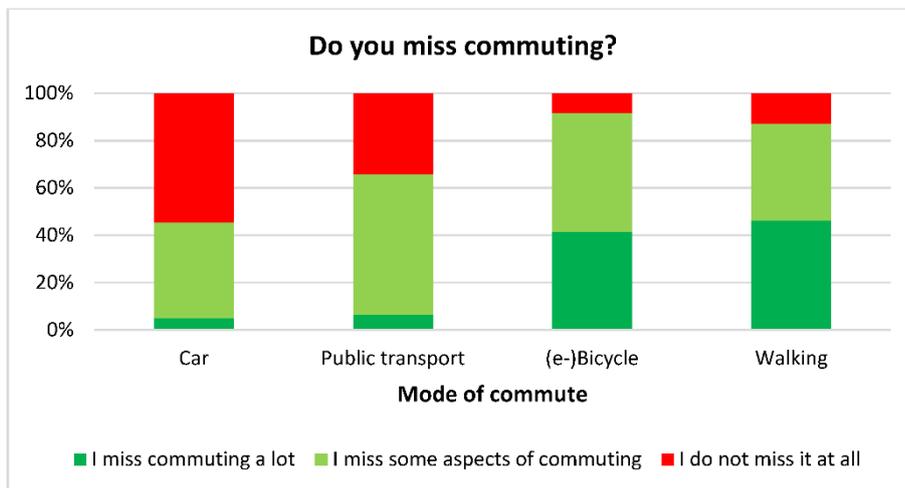
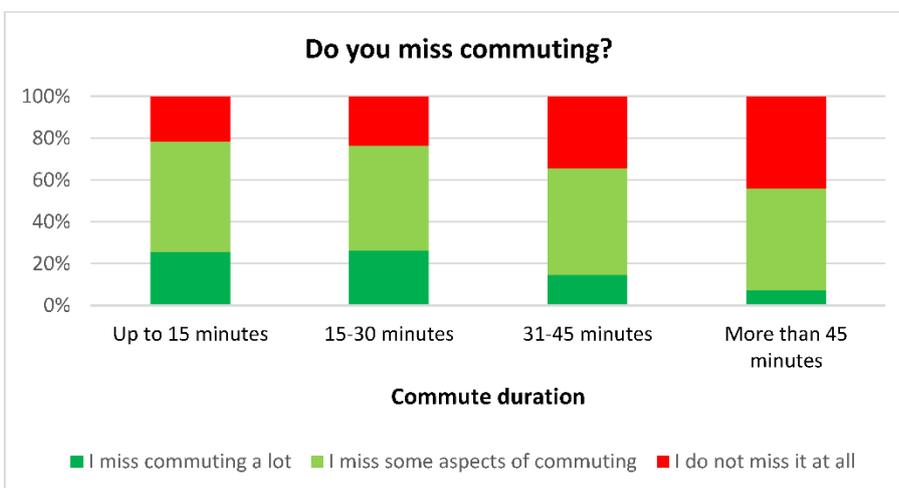


Figure 5.11 Do you miss commuting? By commute duration, global online survey, University of Amsterdam (Source: O. Rubin et al., 2020, p. 6)



For the workers who still continued to work outside of their home during lockdown and had to use public transport – particularly buses, where Waka Kotahi research shows concerns about infection were high amongst users – the commute was likely a source of considerable anxiety during lockdown. Both active transport commuters and those commuting by car likely saw improvements in the quality of their commute and effect on mood because high traffic volumes are identified as a source of stress for both groups.

5.5.2.2 Transport poverty

The future course of the COVID-19 pandemic in New Zealand is unknown. The economic consequences of COVID-19 will likely be severe, and as the country enters recession, with rising levels of unemployment, the transport system may be a protective factor, a social resource, or a further source of stress. Unemployment generally reduces incomes, often dramatically, at a time when people may be required to spend more time travelling to search for a new job.

For those who will now struggle to afford a car and car-related expenses such as petrol, insurance and parking, the costs and availability of public transport will make a significant impact on wellbeing. We know that unemployment has a significant and enduring negative effect on mental health: reducing or eliminating public transport fees during the recovery period would help to reduce barriers that lower-income people, including the large numbers of newly unemployed people, face to finding new employment.

5.5.2.3 Social connection and transport

While there has not been much formal research on the impact of the pandemic on family life yet, the small amount of data we do have, combined with anecdotal reporting, suggests that the effects were uneven and affected by income. For those with larger houses and higher incomes, lockdown may have provided opportunities for respite, rest and, with schools closed, reconnection with whānau. However, for many people with disability, single parents, and those living in crowded living conditions or living with abusive family members, the closure of schools, reduced access to support systems, and isolation in unhealthy, crowded living conditions may have stressed and weakened connections with family, whānau and community. Older people, people with disability and people with health conditions that make them vulnerable to COVID-19 were the most likely to completely self-isolate, likely making them more susceptible to social isolation and feelings of loneliness. Use of digital communication tools such as Zoom or Skype may help people to reduce the loneliness of lockdowns (Miller, 2020); however, access to these technologies is uneven. People living in social housing, people with disability, Pacific peoples, Māori, and older people (particularly those aged over 75 years) have lower rates of access to the internet in Aotearoa (Grimes & White, 2017).

The *Life in a Low-Traffic Neighbourhood* study suggests that increases in opportunities for family and social connection at the neighbourhood level due to reduced traffic levels may potentially have been more evenly spread throughout the community than experiences of restoration and connection within the home. This is an important observation in terms of making sure that people – overwhelmingly lower-income people – living in poorer quality, overcrowded housing have opportunities for connection with neighbours and joyful experiences with whānau during the operation of stay-at-home orders.

5.5.2.4 Active transport and physical activity

One positive aspect of the New Zealand stay-at-home order was that New Zealanders were encouraged to continue to leave their home for exercise in their local area. This is important, as regular physical activity is important for maintaining mental health – especially during times of increased stress or anxiety. The reduction in motorised traffic in most neighbourhoods made a significant contribution to creating conditions where people felt safe enough to use forms of active transport more frequently. It was evident that some of

the ‘missing demographics’ (groups that typically use bicycles rarely), including women, children and teenagers, seized opportunities to ride on neighbourhood streets during this period.

Post-lockdown, as we enter recovery, the research suggests that there is likely to be enduring anxiety within the community about using enclosed exercise spaces like gyms, pools, and recreation centres. Outdoor environments, including parks and neighbourhoods, are lower-risk exercise environments with regard to infection. However, high levels of motorised traffic are a powerful deterrent to walking and cycling and seriously reduce the quality of the experience for those who do venture onto noisy, high-speed streets. Interventions to reduce traffic levels and make more space for walking and cycling during the recovery from COVID-19 and beyond will make an important contribution to ensuring that people have safe opportunities for mood-boosting exercise during difficult and uncertain times.

5.5.2.5 Access to greenspaces

The sense that lockdown provided opportunities to ‘reconnect with nature’ was frequently reported in the media, as well as in studies like the *Life in a Low-Traffic Neighbourhood* report and the Manaaki Whenua – Landcare Research study on connecting with nature during lockdown (Greenaway, 2020). As noted in our literature review (Chapter 1), contact with nature and access to urban green spaces are associated with many measures of good mental health, including reduced anxiety and improved mood (Nutsford et al., 2013). We have discussed the role that decreased traffic volumes, and in particular decreased traffic noise, played in increasing opportunities to notice and appreciate natural phenomena during lockdown. In its own right, traffic noise in cities is an important and generally neglected source of ill health, with important implications for mental health (WHO, 2011). Overall, the experience of lockdown showed how reducing levels of motorised traffic and traffic noise enable people to engage with and feel a sense of enhanced connection with their local places.

5.6 Conclusion

In general, the effects of COVID-19 on mental health are likely to be varied, according to whether people experience infection, the frequency of involuntary lockdowns, the conditions people live in during stay-at-home orders, and whether people experience unemployment. Factors such as income, housing quality and density, disability, age, and health status also appear to have a differential impact on mental health during a pandemic. Our initial review of the evidence on mental health impacts of pandemics, as well as the transport experience during lockdown, suggests that there are some key ways that our transport system could act as a protective resource that supports good mental health over the coming years as we manage and recover from the virus.

1. Introduce interventions to reduce levels and speed of motorised traffic in neighbourhoods to support physical distancing and ‘stay local’ orders.

The experience of traffic reduction in neighbourhoods during lockdown represents a reversal of the negative mental health effects associated with increasing levels of ‘community severance’ in our cities. As the *Life in a Low-Traffic Neighbourhood* study showed, reducing traffic levels opened up important new opportunities for exercise, ‘physical distancing’, restoration and connection that were an important source of resilience during stay-at-home orders. Reducing traffic levels in neighbourhoods is likely to make a particularly positive impact on the mental health of people with disability and ‘COVID-vulnerable’ populations, including older people and people with chronic health conditions. These groups have been shown to have the highest levels of anxiety about staying safe and are the most likely to practise ‘self-isolation’ beyond any mandated stay-at-home order. This points to the potential for much greater levels of unrealised mobility by older people and people with impairments in the community for whom physical distancing in more compressed and crowded

pedestrian spaces will be more challenging. These vulnerable groups are particularly at risk of loneliness and worsening mental health during the period when we search for a vaccine.

Low-traffic neighbourhood interventions may also be particularly valuable for people living in areas with higher levels of overcrowded, substandard housing. Research shows that neighbourhood traffic levels effectively act to expand or contract our 'home territory' (Wiki et al., 2018), and people, and perhaps especially children, in crowded households (especially those who also have no private backyard space) will particularly benefit from the expansion of home space provided by reducing traffic levels and improving the quality and safety of local streets during the pandemic.

2. Reduce or eliminate public transport fees, and increase passenger comfort and safety.

Public transport users are the most vulnerable to COVID-19 infection if we see a resurgence of the virus, and they are also the group who understandably have the highest anxieties about the safety of their travel experience. Research suggests that the lack of personal space on public transport – particularly on buses – is an existing source of stress for transport users, and this stress will now be further heightened by the pandemic. This is an important opportunity to reprioritise the comfort and safety of bus users in particular by reconfiguring bus seating to provide additional space for each user. Bus users typically have the lowest user satisfaction of any transport users, and this is a mode that those living in transport poverty may also be more likely to be forced to use. The mental health of public transport users, and bus users in particular, is likely to further decline without moves to reduce and reconfigure seating on buses to give each passenger at least 1 metre of space.

Reducing or eliminating fees on public transport during the recovery would also make an important contribution to increasing the chances of lower-income unemployed people to find new employment. As noted, unemployment is a major determinant of poor mental health in all communities, but particularly in low-income communities, and the transport system can play an important role in boosting the employment opportunities of this group during this tough period. Free public transport is likely to be particularly protective of the mental health of women. Women typically experience higher rates of mental illness and rely on public transport more, and have been identified as a group most vulnerable to heightened unemployment due to job losses in retail (a predominately female sector) and the fact that the New Zealand Government job creation schemes are focused on creating jobs in traditionally male sectors such as construction.

6 Discussion

Transport and mental health is a new field of research, and an important one, for the following reasons. Mental health is central to wellbeing, and mental health problems are common. But features of the environment that bolster mental health, or damage it, are not well-understood. Little has been written about mental health in the transport sector, but there appear to be abundant opportunities for interventions in favour of health and wellbeing.

The purpose of this report is to describe, in broad terms, what is presently known about the influences of transport on mental health and wellbeing, and to explore the possibilities to make positive changes in Aotearoa. We acknowledge the many aspects of mental health and the variety of relevant research. Our review of the evidence highlights different ways to measure the impact of transport on mental health, including immediate and short-lived effects such as those on mood and trip satisfaction, more global measures such as the effects of transport on life satisfaction, and clinical measures such as the effects of transport on levels of anxiety, depression and psychological distress. Because this is an emergent field of research, the different strands of transport and mental health research are not well integrated yet. We have sought to bring together these diverse contributions to identify and explore important trends and pathways of influence.

Aotearoa is experiencing an increase in mental distress and mental illness in our communities. As a key social institution, it is important to understand what role transport is playing in this distress, and how our transport systems can be configured to help promote good mental health and wellbeing in our communities. Women, youth, Māori, Pacific peoples, and people living on low-incomes experience the highest levels of psychological distress in our communities. Young people are the group experiencing the steepest rise in mental health challenges. What does our research tell us about what role the transport systems could be playing in contributing to this psychological distress, as well as how we could use our transport systems to improve mental health?

The literature review provides some initial clues. People with long commutes (40 minutes plus), especially long car or public transport commutes; people who struggle to afford petrol or public transport fees; people who are dependent on others for travel and feel a lack of 'control' over their mobility; and people who find transport systems physically difficult, painful and embarrassing to navigate all experience poorer mental health than those who do not face such challenges in the transport sphere. People who experience a combination of these stresses experience the poorest mental health.

Our interview data reinforced these transport-related sources of psychological distress, as well as contributing a few more, including anxiety about harassment and violence against women using our transport systems, as well as psychoterratic stress – the separation from people and places of cultural and environmental significance to Māori.

Increases in anxiety and social isolation in our communities are particularly troubling trends in mental health in Aotearoa, and this report highlights the key role that some aspects of our current transport system (noise, cost, congestion, low-quality public and active transport environments) are playing in these phenomena. Increasing traffic volumes are creating increased levels of traffic noise; longer, more tiring commutes; and a decline in feelings of 'control' and self-efficacy associated with trip-making. These types of sensory and psychological experiences are anxiety-provoking for everyone. However, they have the most severe mental health effects on those people who already live with higher levels of anxiety (tāngata whaiora), and those who already have more frequent experiences of feeling less 'in control' and having fewer 'choices' in other aspects of their lives (youth, and those living with disability and living on low incomes).

This report also highlights the ways that transport-related anxiety, which is created by regular overactivation of our threat-detection systems through things like traffic noise, 'hypervigilance' about injury, and fear of violence, contributes to social isolation. Participants talked about the ways that these sources of anxiety make people, and especially tāngata whaiora, feel 'afraid of the world' and contribute to self-isolation amongst this group. Finally, they also talked about how these transport stresses are reducing important opportunities for mental health restoration. As one participant noted, with increasing traffic volumes, the anxiety of crossing the road to get to a park is increasingly outweighing the benefits of spending time in green spaces: 'The stress of getting somewhere is going to offset the benefits of (being) somewhere.' Another participant talked about how increasing traffic volumes leave you 'constantly at that safety level like, oh, is everything ok, is everything ok?'

The Inclusive Streetscapes study found that positive, enabling, mood-lifting, affirming and connecting aspects of mobility may be enjoyed by all. But poorly designed environments create particular emotional and mental burdens for those with restricted mobility. Poor design also leads to dependencies that are unwanted and inhibiting. This study found that safety is a mental wellbeing issue, a salutary reminder that is true for everyone, but those living with mobility impairments frequently must deal with hazards that are not recognised by others, including transport professionals.

As the report highlighted, all these stresses for individuals combine at the neighbourhood level to create the phenomenon of 'community severance', a thinning out of opportunities to hear your neighbours, to cross roads to speak to them, and to notice things that you like about your neighbourhood. Research suggests that community severance or a decline in social connection and social capital (feelings of trust and belonging within neighbourhoods) due to rising traffic volumes is an increasing problem in Aotearoa. This research suggests that traffic-related community severance is likely to be having particularly negative effects on the mental health of our youth.

Returning to the WHO life-course approach to mental health, it is useful to reflect on the potential impacts of Aotearoa's transport system on key phases of mental health development within our communities. Given the evidence of the association between high car use, long commute times and psychological distress, it is likely that the increase in congestion in our cities and lengthening car commute times are having a negative effect on family life at the prenatal, attachment, and family-building life stages.

Longer commutes are associated with poorer mental health amongst parents, poorer quality family life and higher levels of relationship separation, all of which elevate levels of psychological distress amongst parents and children. There is a need for local research in Aotearoa on the effect of longer commute times and rising car use on pregnancy, attachment, and satisfaction with family life. A recent US study, for instance, on pregnancy and long commutes found that a 10-mile increase in commute distance raises the probability of low birth weight by 0.9 percentage points, and the probability of intrauterine growth restriction by 0.6 percentage points. The authors concluded that these poorer pregnancy outcomes are most likely the result of a combination of higher commute stress and a lack of time available to access antenatal care due to long travel times (Wang & Yang, 2019).

There is also a need for research on the impact of changes in our transport systems on the mental health of children and adolescents. Adolescents are particularly at risk of insufficient physical activity, and in Aotearoa, declining levels of physical activity in adolescents has coincided with both a decline in active school travel and increasing rates of psychological distress amongst teenagers, and teenage girls in particular (Porskamp et al., 2019). To make better decisions on transport, we need to know more about the causes and cures of community severance in Aotearoa. For instance, what are the effects of rising rates of vehicle kilometres travelled on the foundations of mental wellbeing? How does the substantial increase in motorised traffic affect the socio-emotional development of children, patterns of parenting and family life, neighbourhood

cohesion, and social connection amongst older adults? Research shows that those who spend more time in neighbourhoods are more likely to be affected by the quality of the neighbourhood environment, including transport systems, so the mental health impacts of our transport system on women, children, older adults, and those experiencing unemployment should be key research priorities. Research on transport accessibility within Aotearoa would also be valuable. Transport accessibility is particularly important for those living in low-income communities, including tāngata whaiora, who often face additional challenges accessing employment.

Overseas research suggests that low-income communities face higher levels of transport-related mental distress because:

- commuting stress extends the experience of powerlessness associated with low-control jobs
- they are more likely to experience transport poverty and transport-debt-related psychological distress
- they often have higher levels of unemployment-related distress in their communities, but lower levels of transport accessibility.

These higher levels of transport-related stresses amongst individuals and within families are likely to have an impact on people right across the lifespan, including children, adolescents, parents, commuters and older adults within the community. But monitoring and reporting on transport trends often focuses on the whole population and does not reflect the widely varying experiences of sub-groups. For all these reasons, the impact of transport stresses on lower-income communities should be a priority for mental health research in Aotearoa.

We have also outlined a number of reasons why the transport experiences and priorities of Māori require particular attention: both transport accessibility and transport severance may look different, because valued places, connections and services may be different. There is little research currently available that explores the impact of our transport system across the lifespan for Māori, but what is available suggests that shared mobility and the ability to uphold and maintain relationships of care and connection, and to access sites of community and cultural significance, are important to Māori mental health across the life course. We also need more research on the transport experiences and priorities of Pacific peoples in Aotearoa. This report provides a brief glimpse of the insights that may be gained. Other ethnic (acknowledging, for instance, the diversity of Asian cultures in this country) and minority groups also deserve more attention.

It is critical to turn to what this research highlights about the ways that our transport system is affecting, and could enhance, mental health at the individual, neighbourhood and community level. As this report highlights, transport systems play a critical role in shaping the potential of neighbourhoods and streetscapes to act as therapeutic landscapes. *Life in a Low-Traffic Neighbourhood* (Wild, 2020) provides a valuable case study that illustrates how the re-configuration of neighbourhood traffic ecosystems can open up important opportunities for restoration and connection in times of stress. This study provides further support for the value of understanding mental health in relational terms as a collective resource that is built and maintained through everyday opportunities for connection and interaction.

For those who are in a position to walk or bike and have good access to high-quality footpaths or bike paths, it is clear that active transport improves mental health by providing low-cost, accessible opportunities to get out of the house, get some exercise, make and maintain social connections, and gain access to green and blue spaces. Walking, and the need for high-quality pedestrian infrastructure, was identified as particularly critical for the wellbeing of tāngata whaiora and people with disability, who are strongly reliant on this form of mobility to access services and look after their physical health.

Walking and cycling (and sometimes public transport) appear to provide important opportunities for mental restoration and connection. Where public transport works well, it is also identified as a place where you can

experience the sorts of casual social interactions – ‘Helpful conversation: “nice” but not too intimate’, as one participant put it – that enhances our sense of belonging and connection.

This research points to improving the quality of public transport and active transport environments as important ways in which the transport sector may contribute to improvements in mental health. Transport environments have the potential to be more important sites for ‘place-making’ – that is, ‘turning spaces into places that have meaning for people, give them pleasure to be in, and that resonate with feeling and memory’ (Village Well, 2006, p. 2). Two of the key informants in this study spoke about the ways that public transport environments provide an underutilised ‘canvas’ for ‘promoting wellness’. Lack of personal space, and the ‘sterility’ of public transport have long been identified as contributing to low levels of user satisfaction amongst bus users in particular (Thomas, 2010). The participants in this study talked about the ways that public transport could become a more ‘uplifting environment’ for people through use of colour, art, music, and providing more space and more comfortable seats. One of the Pacific participants also talked about how having Māori and Pacific art on buses and the use of Māori and Pacific greetings would create a more welcoming and uplifting experience for Pacific public transport users.

Interactions with bus drivers also emerged as a particularly critical relationship. Several of the participants talked about how important these interactions are in terms of feeling good about your day, getting the right information to be able to make trips, and feeling safe using public transport. There was concern about whether bus drivers are receiving enough training about how to support tāngata whaiora and people with disability to use public transport. Suggestions from participants included involving disability groups and Māori wardens in training for drivers on supporting tāngata whaiora to use public transport. The need for more training and support for tāngata whaiora to use public transport independently was identified as an ongoing need. Roger Mackett (2017, 2019) has completed several in-depth UK studies that provide recommendations for how to improve the quality of public transport environments for people living with mental health challenges. These studies could be used to help guide improvements to public transport environments in Aotearoa.

Our investigation of the experience of e-biking in Auckland shows that new active transport technologies may also expand transport choices and create new opportunities for health-enhancing mobility. However, the full benefit of new ‘micro-mobilities’ such as e-bikes will not be achieved until there are significant changes in transport policies and infrastructure to improve the safety and comfort of active transport users.

It is interesting to reflect on what we learnt from the experience of living in a low-traffic neighbourhood during the early stages of the COVID-19 pandemic. This was not a typical experience of neighbourhood, but it did provide an opportunity to gather some further data on the positive and negative impacts of transport systems on our mental health. The fact that reductions in levels of traffic noise and traffic stress as well as increases in opportunities to walk and bike were experienced as ‘restorative’ is consistent with existing research on the mental health harms associated with high levels of motorised transport in communities. To a certain extent, lockdown represented a ‘natural experiment’ in temporarily reversing traffic-related community severance. The experience of lockdown and the opportunities that lower traffic volumes provided for restoration and connection point to reducing traffic volumes and speeds in our communities as promising ways to improve mental health in our cities.

It is notable that the Ministry of Health’s (2020b) COVID-19 mental health recovery strategy, *Kia Kaha, Kia Māia, Kia Ora Aotearoa: Psychosocial and Mental Wellbeing Recovery Plan*, does not mention transport or include any references or objectives around neighbourhood or streets as sources of community connection and resilience. The recovery plan identifies the need to ‘encourage social cohesion’, and ‘build on the existing strengths and social capital of communities’, as key priorities (p. 5). As we have outlined in this report, research shows that streets and neighbourhoods are a key place where social cohesion and social

capital are built and maintained, and they become particularly critical and valued for this purpose when emergency 'stay local' orders are in place. The evidence, including evidence from the *Life in a Low-Traffic Neighbourhood* study that was conducted during the first lockdown, suggests that low-traffic neighbourhood interventions could be a useful tool for protecting and maintaining social cohesion during the COVID-19 pandemic.

In this report we have attempted to bring together what we know so far about the relationship between transport and mental health at the individual level, for people living with mental health challenges, and at the population level. Mental health is an issue for all communities, not just for the individuals amongst us who are seeking mental health treatment and care. Indeed, this research suggests that improvements that we make to improve the transport experiences of tāngata whaiora, including improving walkability, reducing transport volumes and noise in neighbourhoods, making cycling safer, and making public transport cheaper and more comfortable, are likely to improve the overall mental health of populations in our cities.

7 Recommendations

1. **Understand, monitor and report on progress towards meeting the transport needs of Māori.**

Given that previous research highlights the importance for Māori to travel together and be able to access important places and spaces such as marae and papakāinga, existing and new transport systems should be developed that support whānau Māori to travel together and in ways that enable such access to these and other important places and spaces as one way of supporting wellbeing among Māori.

Further, given there is only a small body of published work on Māori transport experiences, this is an area requiring further attention to better understand the ways in which transport may impact wellbeing among Māori. In particular, it is imperative that future research is grounded in a kaupapa Māori approach so as to meaningfully explore Māori perspectives of the relationship between transport and mental health in Aotearoa. This is an area requiring immediate attention given those inequities between Māori and non-Māori in mental health, transport accessibility, and transport severance that have been identified in previous research.

Lastly, as briefly mentioned in Chapter 5 of this report, Māori are experiencing inequitable impacts to wellbeing as a result of COVID-19. Further research should investigate these impacts as well as the ways in which our transport systems may be exacerbating and/or mitigating such impacts so as to more clearly understand how COVID-19 may be disrupting Māori wellbeing in the context of transport systems in Aotearoa.

2. **Understand, monitor and report on progress towards meeting the transport needs of Pacific peoples.**

It is important to note that we could find no research at all on the transport experiences of Pacific peoples in Aotearoa, and this should be a research priority. The small number of Pacific participants in this study made a number of recommendations around the ways that improving the quality and affordability of public transport, in particular, could contribute to the wellbeing of Pacific peoples.

3. **Understand, monitor and report on progress towards meeting the transport needs of women.**

This report highlights a number of ways in which the transport system has a particularly negative impact on the mental health of women, particularly regarding:

- a. higher levels of commute stress
- b. hypervigilance increasingly required to keep children safe from traffic injury within neighbourhoods
- c. harassment and fear of violence in transport environments.

Women generally have poorer mental health than men, and the transport experiences and needs of women should be monitored and reported on annually.

4. **Understand, monitor and report on progress towards meeting the transport needs of youth.**

Youth are experiencing the fastest increase in mental illness, and particularly anxiety, within our communities. This report highlights a number of ways that our transport system can act as a source of anxiety for youth, including the ways that a lack of transport choices for young people create social isolation and feelings of exclusion, especially for youth from low-income families. Our research suggests that reducing the cost of public transport and increasing the safety of active transport as a form of low-cost independent travel will improve the mental health of youth in Aotearoa.

5. Monitor and reduce transport noise in our cities.

As this report highlights, transport noise is an underappreciated source of mental ill-health in our communities. Transport noise is not well or consistently monitored in Aotearoa. Steps should be taken to monitor and set goals to reduce traffic noise pollution in our cities. As a first step, we should ensure that no one in New Zealand is exposed to a level of traffic noise that has been shown to cause physical health problems. Traffic noise should not exceed the WHO (2018) Environmental Noise Guidelines. Secondly, we should work to ensure that noise levels in residential areas are reduced further, to levels as low as possible, on the basis of the small but growing body of work associating quiet streets with comfort, sociability, local engagement and levels of active transport.

6. Monitor and reduce long commute trips (40 minutes plus), especially those trips made by car and bus.

There is strong evidence that long commutes reduce life satisfaction and have a negative impact on physical health, relationship stability and family life – all of which negatively impact on the mental health of children and parents. Greater use of mixed-use planning to increase urban density as well as investments in fast cycling infrastructure (bicycle highways) and rapid transit can reduce long commutes.

7. Monitor and reduce transport poverty.

This report adds to previous local research that finds transport poverty is a persistent and common problem in Aotearoa, especially for those living on a benefit or a low income. There is a need for further research to establish how much financial stress and foregone mobility occurs due to transport costs in Aotearoa. As one participant noted, financial stress is the ‘key stress’ for tāngata whaiora, many of whom live on a benefit. Others reported that for tāngata whaiora and those living on a benefit it was necessary sometimes to choose between transport costs and food – these findings mirror previous research by Rose et al. (2009) on transport exclusion in Aotearoa. There is indeed good reason to investigate ways of reducing transport costs for those on low incomes.

8. Measure, monitor and reduce sources of fear, anxiety and discomfort amongst active commuters.

There is good evidence that active transport is optimal for maintaining mental health in our communities. Walking (or wheeling) comes through as a particularly important form of transport for tāngata whaiora. Improving the quality and safety of active transport environments, and pedestrian environments in particular, will make an important contribution to improving community mental health.

9. Improve the comfort and vitality of public transport environments.

The participants provided important examples of the ways that the public transport can be reconfigured to improve mental health, including increased training for bus drivers and improvements to the quality of public transport environments that promote a stronger sense of inclusion and belonging. There is also a small amount of local research and a larger body of international research on the public transport needs of mental health service users that should be used to guide improvements in public transport.

10. Measure, monitor and reduce community severance.

This research has highlighted a number of ways in which traffic-related community severance is likely to be a mental health issue in Aotearoa: it reduces social cohesion in neighbourhoods, and it affects the emotional and cognitive development of children. There is a need for more research on levels of community severance in Aotearoa.

11. Address historical motorway-related community severance.

There is also a need to identify and address areas of historical community severance that have occurred as the result of transport infrastructure projects, such as the motorway severance outlined in the Inclusive Streetscapes project. This remedial work should ensure that local people have accessible, low-

cost transport options that allow them to meet their aspirations for wellbeing and ensure their right to access places of cultural and social significance within their communities.

12. Further investigate the potential of cycling as a community mental health intervention.

The BuyCycles programme highlights the potential of cycling to improve quality of life and expand the active transport radius of tāngata whaiora, who may be strongly reliant on walking and have difficulty affording to use public transport or a car. This report also provides examples of the challenges of cycling promotion with this group, including traffic stress and poorer physical health. Schemes involving e-bikes, running programmes in areas with lower traffic volumes, and more separated cycling infrastructure may help to overcome some of these obstacles.

13. Review the scope and style of transport consultation processes to better appreciate the impact of transport infrastructure on health and wellbeing in diverse cultural contexts.

The Inclusive Streets study underlined how important it is to be sensitive to the nuanced and oblique ways people refer to wellbeing. We cannot assume that pre-defined terms will have the same meaning for people's diverse, located experiences. The conceptions of wellbeing that come through in the empirical data do so in ordinary, lay language, and we pay attention to these in ways that highlight the need to take a broad and ordinary lens on mental, emotional and psychological experiences of disability and diverse mobilities in place. To these ends we recommend the uptake of meaningful, targeted, and culturally responsive consultation processes (rather than processes situated around complaints or open calls for community feedback).

14. Develop a COVID-19 pandemic recovery plan for the transport sector.

It is clear that as one of the key holders of 'space' in our cities, the transport sector can make an important contribution to protecting and enhancing mental wellbeing during the COVID-19 pandemic by making it safe and enjoyable for people to stay local when lockdowns, or 'stay local' orders, are in force.

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