## RESEARCH ARTICLE

# Adding a Cultural Lens to Active Transport Initiatives: Māori and Pacific Adolescents' Perceptions of Transport to School

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In Aotearoa/New Zealand, there is government directive and community support to focus on health equity in research and health promotion. Culturally responsive policies and services are expected. The purpose of this research is to describe Māori and Pacific adolescents' perceptions of different modes of transport to school (walking, cycling, busing and being driven/driving) rather than to compare perceptions between different ethnic groups through a deficit lens which is commonplace. Reporting findings in this way is so that equitable approaches to policy, and initiatives for active transportation to school can be considered. This study analysed data from adolescents (age 13 to 18 years) (n = 3608) who completed an online survey at school as part of the BEATS Research Programme in the city of Dunedin, New Zealand. In addition, four focus groups were conducted with Māori and Pacific adolescents. Overwhelmingly, adolescents across all ethnic groups had similar perceptions of walking, cycling, being driven/driving and busing to school. This similarity means that a whole of population approach to policy would be sufficient when combined with good quality overarching cultural responsiveness imbedded to support equity for Māori and Pacific adolescents. Findings specific to Māori and to Pacific adolescents are reported which will enable policy makers to consider additional cultural nuances in the active transport space.

**Keywords:** active transport; perceptions; Māori; Pacific; adolescents; school

## Introduction

The benefits of regular physical activity for youth are widely accepted (WHO, 2022) and associated with, for example, improved cognitive (Donnelly et al., 2016), cardiometabolic (Janssen and LeBlanc, 2010), musculoskeletal (Tan et al., 2014) and mental health and wellbeing (Biddle and Asare, 2011). Children who actively travel (e.g., walk or cycle) to school are more likely to reach recommended levels of physical activity compared to those who travel by car or bus (Kek et al., 2011; Khan, Mandic and Uddin, 2021). Active school travel interventions

also lead to increases in physical activity (Larouche et al., 2014) and active transport to school (ATS) increases the likelihood of active commuting in later life which has continuing positive health benefits (Yang et al., 2014). ATS is a complex behaviour and is influenced by personal, social, environmental and policy factors (Mandic et al., 2015a; Mandic et al., 2023).

When considering ATS research in Aotearoa/New Zealand, there is government directive, and community support, for a focus on health equity in research and in implementation and service delivery (Māngai, 2020). Health equity acknowledges that people have differences in health that are not only avoidable but are unjust. A focus on equity recognises that "people with different levels of advantage, require different approaches and resources to get equitable health outcomes" (Ministry of Health, 2018). In health research, projects that are specifically designed to "see" equity are more likely to lead to health initiatives and outcomes that are more equitable. From an ATS perspective this means that research should be able to provide recommendations that acknowledge differences so that intervention strategies and approaches can be tailored to specific populations where appropriate. Ethnicity and cultural context are important equity factors for Indigenous people worldwide. Aotearoa/New Zealand has an established history of reporting ethnic disparity in social and health outcomes, with robust data and informative systems that support such analysis (Statistics New Zealand, 2020).

Western society and colonisation have had a detrimental impact on Indigenous populations worldwide, affecting their cultural context, language, self-determination, and overall health and wellbeing (Walters et al., 2010; Pihama et al., 2014). Research on ATS among Indigenous children and adolescents is sparse. Recent research has shown that children from non-English speaking backgrounds, including Aboriginal and Torres Strait Islander children, are more likely to use ATS than children from English-speaking backgrounds (Australian Institute of Health and Welfare, 2018). This is consistent with Australian data which indicates that Aboriginal and Torres Strait Islander children aged 5–17 years are more physically active than their non-Aboriginal and Torres Strait Islander counterparts (Adepoyibi et al., 2022). There is consistent evidence of lower rates of active transport in general in urban compared to rural areas in developing countries and children living in poorer families and those who live closer to schools are also consistently more likely to engage in active transportation (Australian Institute of Health and Welfare, 2018). Circumstances such as having a larger household size and having older siblings have also been reported to increase the likelihood of ATS (Oyeyemi and Larouche, 2018).

With regard to perceptions of ATS, internationally adolescents generally have positive attitudes towards active transport to school; however, there are a range of individual, social, environmental and policy factors that influence their actual behaviour (Chillon et al., 2014; Lee, Orenstein and Richardson, 2021; Lin et al., 2017; Mendoza et al., 2011; Rahman et al., 2020). It is also important to not overlook that there are negative experiences reported relating to ATS such as traffic volume, safety of walking and cycling to school (Pocock et al., 2019), distance to travel and physical and motivation barriers (Aranda-Balboa et al., 2020; Lorenc, 2008). In a study by Miller et al. (2020), caregivers of Aboriginal children participating in the Study of Environment on Aboriginal Resilience and Child Health (SEARCH) were asked to describe the single most important factor that would help their children to be healthy and well, and active living was one of the identified important factors. Active living refers to having an active lifestyle and engaging in less sedentary behaviour, which includes factors such as reducing screen time (Miller et al., 2020). To our best knowledge, there are no previous studies that have examined perceptions of different modes of transport to school, among adolescents from diverse ethnic backgrounds.

In Aotearoa/New Zealand, Māori are the indigenous people and are provided with an assurance of equity within the foundation document of the country, Te Tiriti o Waitangi (1840). However, historical injustices and colonisation have meant that the obligations to Te Tiriti

have not been upheld by the government and Māori have poorer health outcomes than non-Māori. In addition, Aotearoa/New Zealand is home to many people from the islands of the Pacific, with Auckland being touted as "home to the largest Polynesian population of any global city" (Blakey and Clews, 2020). Pacific people also experience health inequity and poor health outcomes compared to the general population. In Aotearoa/New Zealand, approaches that are equity focused therefore need to acknowledge Māori as Te Tiriti o Waitangi partners first and foremost and use cultural context and ethnicity as lenses with which to consider equity for Māori and for Pacific people.

There is also sparse evidence of ethnic differences in ATS in Aotearoa/New Zealand. Children of Māori and Pacific Island descent are more likely to walk to primary school in Dunedin, New Zealand than non-Māori, non-Pacific children (Yelavich et al., 2008). However, the study did not take into account distance to school, which is the strongest correlate of ATS (Ikeda et al., 2018). Therefore, it is unclear if the ethnic differences would be apparent when distance to school was factored in. There is a trend towards increased ATS in children living in high-deprivation neighbourhoods (Ministry of Health, 2022), which is supported by Ikeda et al. (2018), who found that children who attended lower decile schools were more likely to use ATS. Ikeda et al. (2018), however, did not find that Māori and Pacific children reported higher rates of ATS than other ethnic groups and they hypothesise that socio-economic deprivation (using school decile) may have a greater impact on ATS than ethnicity.

Therefore, knowledge gaps exist in understanding of cultural context, ethnicity and ATS both internationally and in Aotearoa/New Zealand. Very few papers report ATS findings by ethnicity which makes interpretation for the purposes of equity impossible. Research in the general area of transport finds that when travel patterns are looked at by ethnicity, differences almost universally exist (Hu, 2021; Johnston-Anumonwo et al., 1997; Klein, Guerra and Smart, 2018; Shaw and Tiatia-Seath, 2022). This article reports on adolescents' perceptions of walking, cycling, being driven/driving and busing to school in Dunedin, New Zealand across five ethnic groups, with a focus on Māori and Pacific adolescents. Māori and Pacific scholars prefer that reporting of data is by ethnicity and that ethnicity reporting maintains a strengths-based format. The enquiries that are common in research when ethnic groups are compared against each other, or more importantly when Māori and Pacific are compared against the non-Māori and non-Pacific majority in Aotearoa/New Zealand, are unhelpful for shifting the rhetoric that Māori and Pacific people are always in deficit. Therefore, the purpose of this article is not to compare findings between different ethnic groups from a deficit approach. Focus group findings are described and reported alongside survey data. Findings are reported for adolescents from different ethnic backgrounds with a specific focus on Māori and Pacific adolescents' perceptions of different modes of transport to school, so that equitable approaches to policy and initiatives can be considered.

## Methods
### Participants
This article reports a combination of qualitative and quantitative findings. Quantitative data is from adolescents from all 12 secondary schools in the city of Dunedin, in Aotearoa New Zealand who participated in the Built Environment and Active Transport to School (BEATS) Study (2014–2015; 1,780 adolescents) (Mandic et al., 2016) and BEATS Natural Experiment (2020–2022; 1,828 adolescents) (Mandic et al., 2020). Details on school recruitment, participant recruitment and study procedures have been published elsewhere (Mandic et al., 2015b; Mandic et al., 2016; Mandic et al., 2020). Briefly, adolescents in school years 9 to 13 (age: 13 to 18 years) were recruited through their school. Adolescents received study-related information and if interested signed written consent prior to participation. For adolescents under 16 years of age, parental opt-in or opt-out consent was used in the BEATS Study, based on

the school's preference. Parental consent was not required in the BEATS Natural Experiment. Both studies were approved by the University of Otago Human Ethics Committee (BEATS: 13/203; BEATS Natural Experiment: 17/188) and Auckland University of Technology Ethics Committee (BEATS Natural Experiment: 21/314). A flowchart presenting participant recruitment and participant selection for different analyses included in this article is presented in **Figure 1**. In addition, four focus groups were conducted with Māori (n = 13) and Pacific (n = 10) adolescents as part of the BEATS Natural Experiment in 2022. We did not specifically ask focus group participants for their modes of transport, however in reviewing the transcripts we can confirm that in all focus groups most used the bus and walked to school and used private transport. We were unable to identify any focus group participants who biked to school.

### Measurements
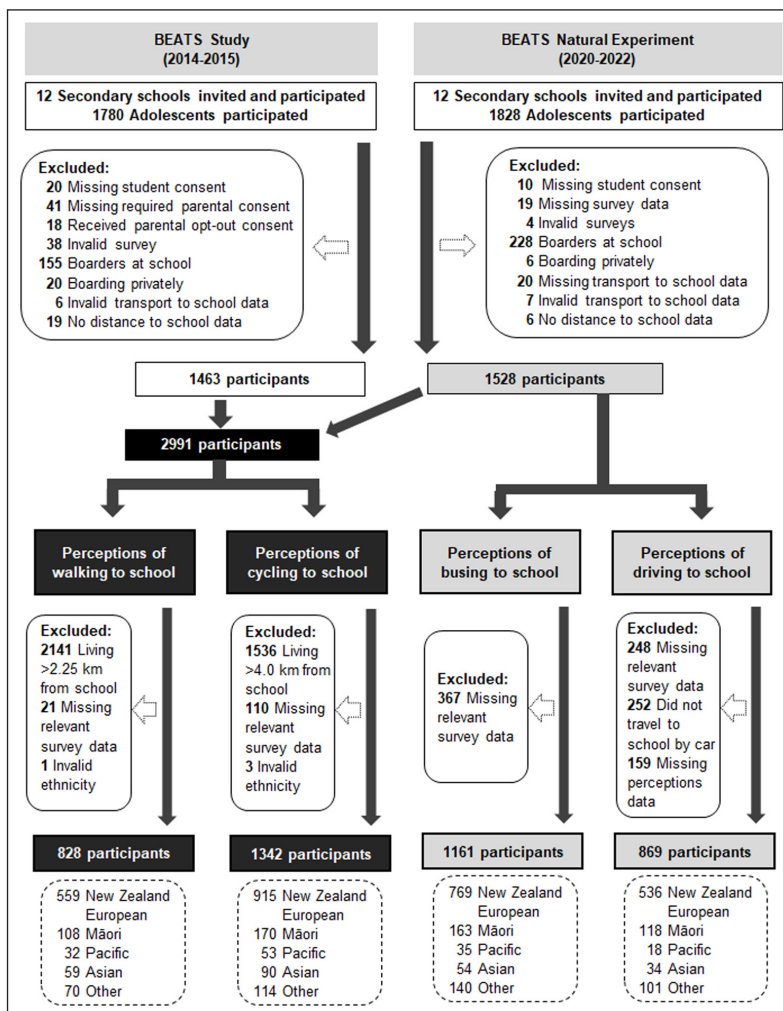In both studies, adolescents completed a 30- to 40-minute online survey.



**Figure 1:** Flowchart of participant recruitment and selection for specific analyses.

*Data on adolescents' perceptions of walking and cycling to school were collected in both the BEATS Study and the BEATS Natural Experiment. Data on adolescents' perceptions of busing to school and driving (or being driven) to school were collected only in the BEATS Natural Experiment.

### Survey

Adolescents completed an online survey during school time, under supervision of research staff. Participants self-reported their sociodemographic characteristics (date of birth, gender, ethnicity, and the number of vehicles in a household) and home address. Adolescents were categorized into five ethnic groups (Māori, Pacific, Asian, New Zealand European and Other) using prioritized ethnicity for New Zealand (Ministry of Health, 2008). Home address was used to calculate the shortest network home-to-school distance using Geographic Information Systems (GIS) (Mandic et al., 2016; Mandic et al., 2020). A threshold distance of ≤2.25 km for walking to school (Pocock et al., 2019) and ≤4.0 km for cycling to school in adolescents (Nelson et al., 2008) were defined based on previous research. Home address was also used to calculate the New Zealand Index of Deprivation which is a measure of area level deprivation calculated at meshblock (meshblock is a small geographic unit used for statistical data) level using the New Zealand Index of Deprivation for 2013 (NZDep2013) (Atkinson, Salmond and Crampton, 2014) for BEATS Study and calculated at Statistical Area Unit level for NZDep2018 (Atkinson, Salmond and Crampton, 2020; Salmond et al., 2006) for the BEATS Natural Experiment. The NZDep index is categorised using deciles (1 = least deprived to 10 = most deprived). For this analysis, NZDep data were subsequently recoded into quintiles (quintile 1 = least deprived to quintile 5 = most deprived).

#### Transport to school

Participants self-reported the frequency of use of different mode(s) of transport to school using response categories "all of the time", "most of the time", "sometimes", "rarely" and "never", as described previously (Mandic et al., 2017). Transport mode(s) that adolescents used "most of the time" or "all of the time" were used to define the dominant mode(s) of transport to school (i.e., "walkers", "cyclists", "other active mode(s)", "car users (being driven or driving)", "bus users (public and/or school bus)", "other motorised mode(s)", "bus users and walkers", "car users and walkers", "other mixed mode(s)" and "no predominant transport mode users" (those that used multiple transport to school modes but none of them "all the time" or "most of the time") (Mandic et al., 2023). Most common modes of transport to school are reported in this article whereas other modes or combinations (including most multi-modal journeys) were included in the "other mode(s) or combinations" variable. In addition, adolescents were asked how frequently they walked, cycled, bused or used a private vehicle for school travel in the previous week.

#### Perceptions of walking and cycling to school

Perceptions of walking and cycling to school were examined using a combination of survey items that examined individual factors based on the theory of planned behaviour (i.e., attitudes, subjective norms, perceived behavioural control and intention) (Ajzen, 1991) for each transport mode separately, as described previously (Mandic et al., 2022). Additional survey items examined perceived features of the social and physical environment by asking adolescents about their perceptions of safety and route to school (Mandic et al., 2022). These survey items were assessed using either a 4-point or 7-point Likert scale. Details on all survey items related to adolescents' perceptions of walking and cycling to school have been published elsewhere (Mandic et al., 2022).

#### Perceptions of busing to school

Survey items related to adolescents' perceptions of busing to school built on items originally developed for the BEATS Parental Survey published elsewhere (Mindell et al., 2021) and were included in the BEATS Natural Experiment only. Using a 4-point Likert scale ranging from "strongly agree" to "strongly disagree", adolescents indicated their level of agreement with

survey items which ranged from acceptability of bus travel time and cost for school travel, safety of getting to a bus stop and waiting at a bus stop, bullying on the bus, weather, before or after-school schedule, convenience of being driven to school, living close to school for bus travel and other reasons.

### Perceptions of driving to school

Survey items used for assessing adolescents' perceptions of being driven or driving to school were also designed based on the items originally developed for the BEATS Parental Survey and subsequently adapted for use in the survey of adolescents. These items assessed adolescents' preferences and ability to walk or cycle to school, logistics, time constraints, family and school influences, perceived distance to school for walking or cycling, weather, traffic and personal safety, availability of other transport options, availability and suitability of public transport, convenience of being driven to school as part of trip chaining, use of ride share and other reasons. Responses were assessed using a 4-point Likert scale ranging from "strongly agree" to "strongly disagree". These survey items were included in the BEATS Natural Experiment only.

### *Focus Groups*

Māori and Pacific adolescents (school years 9 to 13; age: 13 to 18 years) from two secondary schools (a co-educational school and a boys-only school) were recruited by their school to participate in focus groups. Four focus groups were conducted: two with Māori and two with Pacific adolescents. The process for the Māori and Pacific focus groups was guided by kaupapa Māori research methodologies (Smith, 1999), led by a Māori facilitator and analysis was performed by the Māori co-investigator for the project. It is acknowledged, however, that the focus group component was part of a larger non-Indigenous research methodology. Although, the process of engagement, data collection and analysis were kaupapa Māori (indigenous Māori methodology) that acknowledges Pacific people, the findings are presented with the survey data from the wider project. It is important to note that this paper is presented in a way that attempts to bridge the divide between scientific and Māori and Pacific worldviews. Therefore, the paper is not seeking to suggest an authentic Indigenous approach.

Focus group participants were drawn from the group of participants who were invited to participate in the survey, irrespective of whether they participated in the survey. We did not use purposeful sampling for recruiting focus group participants. In part that was driven by the nature of the study design in which researchers did not have information about prospective focus group participants as well as the challenges of the logistics and timing of this data collection in schools in between COVID-19 lockdowns in New Zealand during the 2021–2022 period. Focus groups were one hour in duration. Each focus group was officially opened with a karakia (traditional prayer). The facilitator asked adolescents if anyone wanted to offer a karakia, and if no one volunteered then the facilitator performed the karakia. Māori language was used for karakia for the Māori focus groups. Pacific adolescents were invited to offer a karakia in their native language. Adolescents were then welcomed by the facilitator and asked to introduce themselves in any way they felt comfortable, to establish connections within the group. The facilitator asked questions or provided comment that endeavoured to highlight connections with each participant. This process of whanaungatanga (making connections) is integral to kaupapa Māori and includes finding family lineage links and sharing experiences. It is acknowledged that kaupapa Māori is specific to a Māori cultural worldview and that Pacific worldviews are diverse and different. The facilitator supported participants in the Pacific focus group to use their own language, invited them to open and close the focus group in a way that felt right to them, and provide their own cultural context. Where Pacific adolescents did not want to contribute their own cultural practices around the focus groups,

the facilitator undertook these aspects in English or in Māori as agreed to by the group. A Pacific researcher was a contributor to the BEATS research and supported the development of processes for previous focus groups with Pacific adolescents. However, over the COVID-19 pandemic period her role within her community evolved and she was unable to contribute and facilitate these groups as planned. It would be best practice in Aotearoa/New Zealand for a Pacific facilitator to run focus groups with Pacific participants.

The BEATS focus group question matrix was used as a reference for the focus group conversations, as published previously (Hopkins and Mandic, 2017). Focus group questions complemented the survey questions, and included: current travel practices, motivations for current travel practices, barriers to alternative travel practices, perceptions of different transport modes for school travel, stereotypes of users of different transport modes, and influences on travel behaviours (e.g., parents, teachers, peers). A small meal was provided during the focus groups as part of the process of manaakitanga (showing kindness and gratitude) and a gift of a NZD$10 book voucher was given to each participant after the focus group. The facilitator gave a closing karakia to end the process.

### Data analysis

Sample selection for each set of quantitative data analysis is presented in **Figure 1**. Perceptions of walking to school were analysed among adolescents living within ≤2.25 km from their school (Pocock et al., 2019) whereas cycling perceptions were analysed among those who lived ≤4.0 km for school (Nelson et al., 2008). Perceptions of busing to school were analysed in the entire study sample, irrespective of the home-to-school distance. Perceptions of driving or being driven to school were analysed in all adolescents who were driven or drove to school at least one day per week, irrespective of how far they lived from school.

To calculate the proportion of participants agreeing with each statement, 4-point Likert scale items were recoded into "agree" and "disagree" and 7-point Likert scale items were recoded as "agree", "neutral" and "disagree". Categorical variables are reported as frequency (percentage) whereas continuous variables are reported as mean ± standard deviation. Sociodemographic characteristics and travel to school patterns across five ethnic groups were compared using $\chi^2$ tests for categorical variables and ANOVA for continuous variables with Scheffé post-hoc comparisons (or Tamhane's T2 post-hoc multiple comparisons when variances were unequal). Differences in perceptions of walking, cycling, busing and driving to school between adolescents from different ethnic groups were compared using binary logistic regression and ordinal regression to control for potential confounders (including age, gender, home-to-school distance and neighbourhood-level deprivation), with the New Zealand European as a reference. P-level of less than 0.05 was considered statistically significant. Survey data were analysed using SPSS Statistical Package, Version 29.0.

All focus groups were audio recorded, then transcribed. Following transcription, AR systematically read and re-read all transcripts. Within the context of the project, meaningful phrases and words were highlighted and coded. In this way certain themes could become apparent and interrogated. EK then performed a quality control process on the theming before the final focus group themes were agreed upon. Kaupapa Māori research process was again used in the analysis (kaupapa Māori research process is thematic analysis conducted by a researcher with a Māori world view and understanding of Kaupapa Māori theory). However, due to the nature of the questions and the imbedding of the focus groups within the wider scientific project, themes were not allocated under a Māori framework as would be usual process.

## Results

The findings presented in this section provide the results of the statistical analysis which compared differences in perceptions of walking, cycling, busing and driving/being driven to school by ethnicity. It is important to note, findings are described, in text, in a non-comparative, strengths-based manner and supported where appropriate with focus group findings. We have, however, chosen to present the breakdown of ethnicity in **Table 1** and ethnicity data from the survey. This is to paint the broader picture of sociodemographic characteristics with regard to transport to school.

### Sociodemographic characteristics and transport to school

Survey participant numbers, data source, key sample selection criteria, sociodemographic characteristics and transport to school patterns of four study samples included in different statistical analyses are presented in **Table 1**. Age, gender and average distance to school were similar whereas neighbourhood-level deprivation and number of vehicles in a household differed across the ethnic groups (**Table 1**). In addition, 13 Māori adolescents and 10 Pacific adolescents, from two secondary schools, participated in four focus groups.

**Table 1:** Sociodemographic characteristics and transport to school in four study samples used for different analyses.

| | Perceptions of walking to school | Perceptions of cycling to school | Perceptions of travelling to school by bus | Perceptions of travelling to school by car |
|---|---|---|---|---|
| | **n = 828** | **n = 1342** | **n = 1161** | **n = 869** |
| Data source | BEATS + BEATS Natural Experiment | BEATS + BEATS Natural Experiment | BEATS Natural Experiment | BEATS Natural Experiment |
| Sample selection | Lived ≤2.25 km from school | Lived ≤4.0 km from school | Lived >2.25 km from school | Driven or driving to school |
| Age (years)* | 15.0 ± 1.4 | 15.0 ± 1.4 | 15.0 ± 1.3 | 15.0 ± 1.3 |
| Gender (%) | | | | |
| Males | 46.6% | 46.5% | 47.5% | 44.9% |
| Females | 52.8% | 52.5% | 49.8% | 52.5% |
| Gender diverse | 0.6% | 1.0% | 2.8% | 2.6% |
| Ethnicity (%) | | | | |
| New Zealand European | 67.5% | 68.2% | 66.2% | 65.8% |
| Māori | 13.0% | 12.7% | 14.0% | 14.7% |
| Pacific | 3.9% | 3.9% | 3.0% | 3.2% |
| Asian | 7.1% | 6.7% | 4.7% | 4.5% |
| Other | 8.5% | 8.5% | 12.1% | 11.7% |

(Contd.)

| | Perceptions of walking to school | Perceptions of cycling to school | Perceptions of travelling to school by bus | Perceptions of travelling to school by car |
|---|---|---|---|---|
| | **n = 828** | **n = 1342** | **n = 1161** | **n = 869** |
| Neighbourhood deprivation score (%) | n = 825 | n = 1334 | n = 1161 | n = 868 |
| 1 (least deprived) | 24.8% | 23.4% | 31.2% | 33.5% |
| 2 | 25.5% | 24.1% | 26.6% | 27.5% |
| 3 | 19.2% | 19.9% | 16.4% | 14.4% |
| 4 | 19.0% | 19.6% | 16.6% | 15.8% |
| 5 (most deprived) | 11.2% | 13.0% | 9.2% | 8.8% |
| Number of vehicles in a household (%) | | | | |
| None | 3.6% | 3.8% | 1.5% | 0.6% |
| One | 31.2% | 29.7% | 19.0% | 17.0% |
| Two or more | 65.2% | 66.5% | 79.5% | 82.4% |
| Distance to school (km)* | 1.3 ± 0.6 | 2.0 ± 1.1 | 7.0 ± 7.6 | 7.9 ± 8.2 |
| Usual mode of transport to school† (%) | | | | |
| On foot | 58.3% | 41.2% | 16.6% | 6.0% |
| By bicycle | 1.3% | 1.3% | 1.0% | 0.8% |
| By bus and on foot | 0.2% | 2.3% | 9.7% | 5.9% |
| By car and on foot | 7.5% | 7.2% | 12.5% | 15.0% |
| By car (driven by others or driving) | 26.7% | 37.7% | 47.8% | 62.4% |
| By bus (public or school bus) | 1.2% | 3.7% | 5.2% | 3.6% |
| Other mode(s) or combinations | 4.7% | 6.6% | 7.1% | 6.4% |

*Data reported as mean ± standard deviation.
†Transport mode(s) used "most of the time" or "all of the time".

## Perceptions of walking to school

### Description of study sample

Age, gender, distance to school and modes of travel to school were similar for all adolescents who lived within 2.25 km from their school. The most common transport to school modes were walking (58.4%) and travelling by private vehicle (26.7%). Transport to school modes did not differ significantly across ethnicity groups.

### Māori adolescents

Some Māori adolescents agreed that walking to school was interesting (40.7%) and pleasant (46.3%), and the majority agreed that walking to school was healthy (71.3%). Overall, 78.7% reported being confident to walk to school; however, the 12% who reported not being confident is much higher than reported by other ethnic groups. Approximately half of Māori identified logistical barriers to walking to school perceiving that walking to school takes too much time (45.4%), that they had too much to carry with them to walk to school (51.9%) and that they were often too tired to walk to school (56.6%).

Focus group findings support survey findings with Māori adolescents identifying that they would "rather get to school another way" (other than walking) as often they are "too tired in the morning [to walk]" and "[driving] is quicker than walking".

### Pacific adolescents

Vehicle ownership is an important consideration when assessing ATS. Overall, 9.4% of Pacific adolescents reported not having a vehicle in their household, 46.9% reported having one vehicle, and 43.8% had two or more vehicles. Most (87.5%) agreed that walking to school was healthy, and this is supported by focus group findings with Pacific adolescents, one student indicating that "walking, I think it's just like a good way of exercising. It also wakes you up in the morning".

Pacific adolescents reported that distance to school, amount of stuff to carry, tiredness and safety concerns were barriers for walking to school. The majority said they had the intention to walk to school (87.5%) and were also confident to do so (87.5%).

**Table 2:** Adolescents' perceptions of walking to school by ethnicity.

| | New Zealand European | Māori | Pacific | Asian | Other |
|---|---|---|---|---|---|
| | n = 559 | n = 108 | n = 32 | n = 59 | n = 70 |
| **Attitudes** | | | | | |
| ***Experiential beliefs*** | | | | | |
| Walking to school is interesting[†] (%) | | | | | |
| Disagree | 18.8% | 30.6% | 21.9% | 18.6% | 18.6% |
| Neutral | 32.4% | 28.7% | 37.5% | 25.4% | 22.9% |
| Agree | 48.8% | 40.7% | 40.6% | 55.9% | 58.6% |
| Walking to school is pleasant[†] (%) | | | | | |
| Disagree | 15.0% | 25.9% | 18.8% | 20.3% | 12.9% |
| Neutral | 26.7% | 27.8% | 31.3% | 11.9% | 21.4% |
| Agree | 58.3%[a] | 46.3%[a] | 50.0% | 67.8% | 65.7% |
| Walking to school is stimulating[†] (%) | | | | | |
| Disagree | 26.5% | 38.9% | 21.9% | 25.4% | 24.3% |
| Neutral | 33.1% | 29.6% | 28.1% | 32.2% | 31.4% |
| Agree | 40.4%[a] | 31.5%[a] | 50.0% | 42.4% | 44.3% |

(Contd.)

| | New Zealand European | Māori | Pacific | Asian | Other |
|---|---|---|---|---|---|
| | n = 559 | n = 108 | n = 32 | n = 59 | n = 70 |
| **_Instrumental beliefs_** | | | | | |
| Walking to school is healthy[†] (%) | | | | | |
| Disagree | 5.2% | 8.3% | 6.3% | 1.7% | 5.7% |
| Neutral | 12.7% | 20.4% | 6.3% | 5.1% | 7.1% |
| Agree | 82.1%[a,c] | 71.3%[a] | 87.5% | 93.2%[c] | 87.1% |
| Walking to school is good[†] (%) | | | | | |
| Disagree | 9.1% | 14.8% | 9.4% | 8.5% | 5.7% |
| Neutral | 20.4% | 27.8% | 21.9% | 16.9% | 12.9% |
| Agree | 70.5%[a,d] | 57.4%[a] | 68.8% | 74.6% | 81.4%[d] |
| Walking to school is useful[†] (%) | | | | | |
| Disagree | 9.3% | 18.5% | 15.6% | 11.9% | 7.1% |
| Neutral | 24.7% | 31.5% | 28.1% | 32.2% | 20.0% |
| Agree | 66%[a] | 50%[a] | 56.3% | 55.9% | 72.9% |
| **Parental, peer and school support** | | | | | |
| My parents or guardians think I should walk to school[†] (%) | | | | | |
| Disagree | 8.2% | 13.0% | 18.8% | 15.3% | 4.3% |
| Neutral | 12.7% | 14.8% | 15.6% | 6.8% | 12.9% |
| Agree | 79.1% | 72.2% | 65.6% | 78.0% | 82.9% |
| My friends think I should walk to school[†] (%) | | | | | |
| Disagree | 10.0% | 20.4% | 21.9% | 18.6% | 11.4% |
| Neutral | 29.5% | 24.1% | 28.1% | 16.9% | 32.9% |
| Agree | 60.5% | 55.6% | 50.0% | 64.4% | 55.7% |
| My school encourages me to walk to school* (% agree) | 34.5%[c] | 29.6% | 31.3% | 49.2%[c] | 42.9% |
| **Perceived behavioural control** | | | | | |
| I have complete control over whether or not I walk to school[†] (%) | | | | | |
| Disagree | 25.4% | 33.3% | 21.9% | 28.8% | 14.3% |
| Neutral | 8.9% | 6.5% | 25.0% | 8.5% | 8.6% |
| Agree | 65.7% | 60.2% | 53.1% | 62.7% | 77.1% |
| **Behavioural intentions** | | | | | |
| I intend to walk to school frequently[†] (%) | | | | | |
| Disagree | 25.4% | 33.3% | 21.9% | 28.8% | 14.3% |
| Neutral | 8.9% | 6.5% | 25.0% | 8.5% | 8.6% |
| Agree | 65.7%[d] | 60.2% | 53.1% | 62.7% | 77.1%[d] |

(Contd.)

| | New Zealand European | Māori | Pacific | Asian | Other |
|---|---|---|---|---|---|
| | n = 559 | n = 108 | n = 32 | n = 59 | n = 70 |
| **Self-efficacy** | | | | | |
| I am confident I could walk to school[†] (%) | | | | | |
|    Disagree | 4.7% | 12.0% | 3.1% | 13.6% | 4.3% |
|    Neutral | 4.5% | 9.3% | 9.4% | 5.1% | 7.1% |
|    Agree | 90.9%[a,c] | 78.7%[a] | 87.5% | 81.4%[c] | 88.6% |
| **Personal motivations** | | | | | |
| Waking to school is a great way to get some exercise* (% agree) | 90.9% | 88.0% | 96.9% | 88.1% | 90.0% |
| I can chat to my friends on my walk to school* (% agree) | 53.3% | 50.9% | 59.4% | 57.6% | 47.1% |
| **Logistic-related barriers** | | | | | |
| Waking to school takes too much time* (% agree) | 26.3%[a,c] | 45.4%[a] | 34.4% | 40.7%[c] | 28.6% |
| It involves too much planning ahead to walk to school* (% agree) | 10.6%[c] | 16.7% | 18.8% | 20.3%[c] | 5.7% |
| I get too hot and sweaty walk to school* (% agree) | 20.9%[a,b,c] | 30.6%[a] | 40.6%[b] | 33.9%[c] | 25.7% |
| I have too much stuff to carry to walk to school* (% agree) | 41.7%[a,b] | 51.9%[a] | 75.0%[b] | 52.5% | 37.1% |
| It is not convenient for me to walk to school because of my after-school schedule* (% agree) | 24.9% | 31.5% | 43.8% | 28.8% | 20.0% |
| I often feel too tired to walk to school* (% agree) | 37.6%[a,b,c] | 55.6%[a] | 65.6%[b] | 52.5%[c] | 47.1% |
| I often cannot be bothered to walk to school* (% agree) | 41.1%[c] | 55.6% | 53.1% | 57.6%[c] | 50.0% |
| **Convenience** | | | | | |
| It is easier for someone to drive me to school, on the way to something else* (% agree) | 38.7%[c] | 47.8% | 57.1% | 51.9%[c] | 42.4% |
| **Environmental barriers** | | | | | |
| It is too far to walk to school* (% agree) | 9.1%[a,b,c] | 18.5%[a] | 28.1%[b] | 22.0%[c] | 8.6% |
| There are no footpaths along the way* (% agree) | 8.4% | 11.1% | 6.3% | 5.1% | 2.9% |
| The weather is too cold and wet to walk to school* (% agree) | 49.4% | 55.6% | 59.4% | 57.6% | 51.4% |

(Contd.)

| | New Zealand European | Māori | Pacific | Asian | Other |
|---|---|---|---|---|---|
| | n = 559 | n = 108 | n = 32 | n = 59 | n = 70 |
| **Perceptions of the route for walking and cycling to school** | | | | | |
| There is too much traffic along the route* (% agree) | 28.8% | 29.3% | 39.3% | 29.6% | 25.4% |
| There is one or more dangerous crossings along the route* (% agree) | 27.9% | 28.3% | 39.3% | 29.6% | 28.8% |
| There are too many hills along the way* (% agree) | 25.1%[c] | 27.2% | 21.4% | 42.6%[c] | 33.9% |
| The route does not have good lighting along the way* (% agree) | 9.7% | 15.2% | 7.1% | 16.7% | 11.9% |
| **Safety perceptions** | | | | | |
| It is unsafe to walk to school* (% agree) | 5.9%[b,c] | 6.5% | 25%[b] | 15.3%[c] | 7.1% |
| My parents think it is not safe to walk to school* (% agree) | 6.8%[b,c] | 7.4% | 25%[b] | 16.9%[c] | 7.1% |

*Data collected on a 4-point Likert scale (1 = strongly disagree to 4 = strongly agree).

†Data collected using a 7-point Likert scale (1 = strongly disagree to 7 = strongly agree).

Results of regression analysis (reference: New Zealand European; controlled for age, gender, neighbourhood-level deprivation and distance to school): [a]$p < 0.05$ New Zealand European vs. Māori; [b]$p < 0.05$ New Zealand European vs. Pacific; [c]$p < 0.05$ New Zealand European vs. Asian; [d]$p < 0.05$ New Zealand European vs. Other ethnic groups.

### *Perceptions of cycling to school*
#### Description of study sample
Age, gender, distance to school and modes of travel to school were not significantly different across ethnic groups for 1342 adolescents who lived within 4.0 km from their school.

In this sample, 41.2% of adolescents regularly walked to school and 37.7% travelled to school by a private vehicle. Only 1.3% of adolescents regularly cycled to school. Other modes included 7.2% travelling by a combination of by car and on foot, 2.3% by bus and on foot, 3.7% by public or school bus only and 6.6% other modes or combinations. Transport to school modes did not differ significantly across ethnicity groups.

#### Māori adolescents
Only 30% of Māori adolescents perceived cycling to school as interesting, and similar rates were seen for the perception that cycling was pleasant (26.5%) and stimulating (31.8%). Over half (59.2%) of Māori adolescents agreed that they had complete control over whether or not they could cycle to school with a third (32.9%) perceiving it was unsafe to cycle to school.

#### Pacific adolescents
Approximately a quarter of Pacific adolescents perceived cycling to school as interesting (24.5%) or pleasant (22.6%), and just over half agreed cycling was healthy (54.7%). Only 43.4% were confident to cycle to school and almost half (49.1%) perceived cycling to school to be unsafe.

Due to low numbers of adolescents who cycle to school there were no focus group findings with regard to cycling to school.

**Table 3:** Adolescents' perceptions of cycling to school by ethnicity.

| | New Zealand European | Māori | Pacific | Asian | Other |
|---|---|---|---|---|---|
| | n = 915 | n = 170 | n = 53 | n = 90 | n = 114 |
| **Attitudes** | | | | | |
| *Experiential beliefs* | | | | | |
| Cycling to school is interesting[†] (%) | | | | | |
|   Disagree | 30.9% | 35.9% | 28.3% | 30.0% | 33.3% |
|   Neutral | 29.7% | 34.1% | 47.2% | 26.7% | 24.6% |
|   Agree | 39.3% | 30.0% | 24.5% | 43.3% | 42.1% |
| Cycling to school is pleasant[†] (%) | | | | | |
|   Disagree | 35.2% | 38.8% | 30.2% | 38.9% | 32.5% |
|   Neutral | 28.2% | 34.7% | 47.2% | 23.3% | 20.2% |
|   Agree | 36.6% | 26.5% | 22.6% | 37.8% | 47.4% |
| Cycling to school is stimulating[†] (%) | | | | | |
|   Disagree | 31.7% | 35.3% | 30.2% | 31.1% | 31.6% |
|   Neutral | 29.1% | 32.9% | 43.4% | 28.9% | 21.9% |
|   Agree | 39.2% | 31.8% | 26.4% | 40.0% | 46.5% |
| *Instrumental beliefs* | | | | | |
| Cycling to school is healthy[†] (%) | | | | | |
|   Disagree | 6.2% | 12.4% | 9.4% | 4.4% | 7.9% |
|   Neutral | 20.0% | 22.9% | 35.8% | 10.0% | 9.6% |
|   Agree | 73.8%[a,b,c] | 64.7%[a] | 54.7%[b] | 85.6%[c] | 82.5% |
| Cycling to school is good[†] (%) | | | | | |
|   Disagree | 18.5% | 21.2% | 22.6% | 18.9% | 17.5% |
|   Neutral | 30.4% | 30.6% | 39.6% | 24.4% | 21.9% |
|   Agree | 51.1% | 48.2% | 37.7% | 56.7% | 60.5% |
| Cycling to school is useful[†] (%) | | | | | |
|   Disagree | 20.1% | 25.9% | 18.9% | 17.8% | 20.2% |
|   Neutral | 30.2% | 35.9% | 41.5% | 30.0% | 24.6% |
|   Agree | 49.7%[a] | 38.2%[a] | 39.6% | 52.2% | 55.3% |
| **Parental, peer and school support** | | | | | |
| My parents or guardians think I should cycle to school[†] (%) | | | | | |
|   Disagree | 48.3% | 47.9% | 43.4% | 58.4% | 49.6% |
|   Neutral | 28.6% | 26.6% | 30.2% | 28.1% | 28.3% |
|   Agree | 23.1%[c] | 25.4% | 26.4% | 13.5%[c] | 22.1% |

(Contd.)

| | New Zealand European | Māori | Pacific | Asian | Other |
|---|---|---|---|---|---|
| | n = 915 | n = 170 | n = 53 | n = 90 | n = 114 |
| My friends think I should cycle to school[†] (%) | | | | | |
|     Disagree | 47.0% | 48.5% | 47.2% | 48.3% | 46.0% |
|     Neutral | 35.3% | 30.2% | 28.3% | 37.1% | 43.4% |
|     Agree | 17.7% | 21.3% | 24.5% | 14.6% | 10.6% |
| My school encourages me to cycle to school* (% agree) | 17.4% | 20.6% | 28.3% | 23.3% | 20.2% |
| **Perceived behavioural control** | | | | | |
| I have complete control over whether or not I cycle to school[†] (%) | | | | | |
|     Disagree | 15.7% | 26.6% | 24.5% | 19.1% | 21.2% |
|     Neutral | 11.6% | 14.2% | 11.3% | 20.2% | 9.7% |
|     Agree | 72.7%[a,c] | 59.2%[a] | 64.2% | 60.7%[c] | 69.0% |
| **Behavioural intentions** | | | | | |
| I intend to cycle to school frequently[†] (%) | | | | | |
|     Disagree | 90.0% | 83.4% | 84.9% | 89.9% | 86.7% |
|     Neutral | 5.7% | 11.2% | 9.4% | 6.7% | 3.5% |
|     Agree | 4.3%[a] | 5.3%[a] | 5.7% | 3.4% | 9.7% |
| **Self-efficacy** | | | | | |
| I am confident I could cycle to school[†] (%) | | | | | |
|     Disagree | 31.3% | 37.3% | 49.1% | 46.1% | 33.6% |
|     Neutral | 9.1% | 13.6% | 7.5% | 10.1% | 14.2% |
|     Agree | 59.6%[b,c] | 49.1% | 43.4%[b] | 43.8%[c] | 52.2% |
| **Personal motivations** | | | | | |
| Cycling to school is a great way to get some exercise* (% agree) | 85.2%[a] | 77.1%[a] | 77.4% | 90.0% | 83.3% |
| I can chat to my friends while cycling to school* (% agree) | 12.5% | 10.6% | 15.1% | 11.1% | 11.4% |
| **Logistic-related barriers** | | | | | |
| Cycling to school takes too much time* (% agree) | 25.2% | 29.4% | 30.2% | 28.9% | 23.7% |
| It involves too much planning ahead to cycle to school* (% agree) | 36.2%[a] | 30.6%[a] | 37.7% | 41.1% | 38.6% |
| I get too hot and sweaty cycling to school* (% agree) | 42.6%[b] | 46.5% | 64.2%[b] | 45.6% | 38.6% |
| I have too much stuff to carry to cycle to school* (% agree) | 61.3% | 57.1% | 62.3% | 61.1% | 69.3% |
| It is not convenient for me to cycle to school because of my after-school schedule* (% agree) | 48.7% | 47.1% | 49.1% | 42.2% | 43.9% |

(Contd.)

| | New Zealand European | Māori | Pacific | Asian | Other |
|---|---|---|---|---|---|
| | n = 915 | n = 170 | n = 53 | n = 90 | n = 114 |
| I often feel too tired to cycle to school* (% agree) | 42.7% | 44.1% | 49.1% | 45.6% | 45.6% |
| I often cannot be bothered to cycle to school* (% agree) | 53.4% | 50.6% | 50.9% | 50.0% | 58.8% |
| **Convenience** | | | | | |
| It is easier for someone to drive me to school, on the way to something else* (% agree) | 51.5% | 57.0% | 62.5% | 58.6% | 57.3% |
| **Environmental barriers** | | | | | |
| It is too far to cycle to school* (% agree) | 22%c | 26.5% | 26.4% | 32.2%c | 18.4% |
| There are no cycle lanes along the way* (% agree) | 64.6%[a,b] | 52.9%[a] | 41.5%[b] | 67.8% | 64.0% |
| The weather is too cold and wet to cycle to school* (% agree) | 56.4% | 52.9% | 52.8% | 63.3% | 64.0% |
| **Perceptions of the route for Cycling and cycling to school** | | | | | |
| There is too much traffic along the route* (% agree) | 38.2% | 34.4% | 41.7% | 34.5% | 33.0% |
| There is one or more dangerous crossings along the route* (% agree) | 34.6% | 29.8% | 37.5% | 33.3% | 40.8% |
| There are too many hills along the way* (% agree) | 35.7%[c,d] | 35.1% | 31.3% | 51.7%[c] | 44.7%[d] |
| The route does not have good lighting along the way* (% agree) | 11.8% | 17.2% | 20.8% | 17.2% | 18.4% |
| **Safety perceptions** | | | | | |
| It is unsafe to cycle to school* (% agree) | 36.6%[c] | 32.9% | 49.1% | 50%[c] | 40.4% |
| My parents think it is not safe to cycle to school* (% agree) | 29.8%[a,c] | 22.9%[a] | 30.2% | 43.3%[c] | 34.2% |

*Data collected on a 4-point Likert scale (1 = strongly disagree to 4 = strongly agree).

†Data collected using a 7-point Likert scale (1 = Strongly disagree to 7 = Strongly agree).

Results of regression analysis (reference: New Zealand European; controlled for age, gender, neighbourhood-level deprivation and distance to school): [a]$p < 0.05$ New Zealand European vs. Māori; [b]$p < 0.05$ New Zealand European vs. Pacific; [c]$p < 0.05$ New Zealand European vs. Asian; [d]$p < 0.05$ New Zealand European vs. Other ethnic groups.

## Perceptions of busing to school

### Description of study sample

Age, gender, distance to school and modes of travel to school were not significantly different whereas neighbourhood-level deprivation and household car ownership were significantly different across ethnic groups for 1161 adolescents who had data on perceptions of taking a bus to school.

Overall, 10.2% of adolescents had and 9.3% did not have a public bus available in their area and 20.5% did not know. In the total sample, 60.4% of adolescents lived within 5 minutes from a bus stop, 23.9% lived 6 to 15 minutes from a bus stop, 8.5% lived more than 15 minutes away and 7.2% did not know. Overall, 10.9% and 11.3% of adolescents used the bus for travelling to and from school every day, respectively, either alone or in combination with other modes. Public bus availability, distance to a bus stop and bus use for school travel did not differ significantly between the groups (data not presented). Adolescents' perceptions of busing to school did not differ across the ethnic groups with the exception of the convenience of trip chaining and concerns about safety of walking to or waiting at the bus stop for some ethnic groups (**Table 4**).

### Māori adolescents

Approximately two thirds (60.6%) of Māori adolescents reported that having a parent that was already taking the car out was a barrier to busing to school. This is not surprising as 78.5% of Māori adolescents reported that there were two or more vehicles in their households.

Reflecting the finding that only 14.5% of the survey participants took the bus to school, there were no focus group participants who took the bus to school and therefore no findings with regard to busing to school for Māori adolescents.

### Pacific adolescents

Pacific adolescents talked at length in the focus groups about busing to school. Focus group participants mostly took a private car to school even when the bus stop was nearby their home. Alike to Māori adolescents, 82.9% Pacific adolescents expressed that having a parent that was already taking the car out prevented them from busing to school: "I go in the car, but I've been on the bus a few times, it's probably 10 metres away from my house"

Taking the bus was perceived by Pacific focus group participants as a negative way to get to school:

> "…was with my friend and it was ok 'cause we were sitting together but if I was like by myself, I'd probably like walk"
> "so, you have to look at who is on the bus, and then decide"
> "…especially if you've got like, like you're scared to like be around a lot of people"

**Table 4:** Adolescents' perceptions of busing to school by ethnicity.

|  | New Zealand European | Māori | Pacific | Asian | Other |
|---|---|---|---|---|---|
|  | **n = 769** | **n = 163** | **n = 35** | **n = 54** | **n = 140** |
| Number of vehicles in a household (%) |  |  |  |  |  |
| None | 1.0% | 2.5% | 0.0% | 3.7% | 2.1% |
| One | 15.3% | 19.0% | 34.3% | 25.9% | 32.9% |
| Two or more | 83.6% | 78.5% | 65.7% | 70.4% | 65.0% |
| **Perceptions of travelling to school by bus** | (% agree) | (% agree) | (% agree) | (% agree) | (% agree) |
| The bus stop is too far from home | 16.4% | 12.9% | 14.3% | 14.8% | 16.4% |
| The bus trip takes too long | 37.8% | 39.3% | 31.4% | 40.7% | 40.7% |

(Contd.)

| | New Zealand European | Māori | Pacific | Asian | Other |
|---|---|---|---|---|---|
| | n = 769 | n = 163 | n = 35 | n = 54 | n = 140 |
| The bus is too expensive | 16.0% | 16.6% | 22.9% | 25.9% | 21.4% |
| I am concerned that I could be bullied on the bus | 7.7% | 11.0% | 11.4% | 13.0% | 6.4% |
| I believe it is unsafe for me to walk to the bus stop | 8.1%[b] | 9.2% | 17.1%[b] | 5.6% | 5.0% |
| I believe it is unsafe for me to wait at the bus stop | 7.0%[a] | 13.5%[a] | 14.3% | 13.0% | 7.9% |
| It is not pleasant to wait at the bus stop when the weather is cold or wet | 55.7% | 51.5% | 48.6% | 61.1% | 62.9% |
| My parent is already taking the car out so it is more convenient to drive me to school | 60.6%[b] | 57.1% | 82.9%[b] | 66.7% | 67.9% |
| I cannot take a bus to or from school because I have other activities before or after school | 41.1% | 36.8% | 42.9% | 44.4% | 36.4% |
| We live too close to school | 24.2% | 23.3% | 37.1% | 24.1% | 25.0% |
| Other reasons | 2.9%[c] | 3.7% | 0.0% | 18.5%[c] | 3.6% |

All perceptions data collected on a 4-point Likert scale (1 = strongly disagree to 4 = strongly agree).

Results of regression analysis (reference: New Zealand European; controlled for age, gender, neighbourhood-level deprivation and distance to school): [a]$p < 0.05$ New Zealand European vs. Māori; [b]$p < 0.05$ New Zealand European vs. Pacific; [c]$p < 0.05$ New Zealand European vs. Asian; [d]$p < 0.05$ New Zealand European vs. Other ethnic groups.

### Perceptions of being driven or driving to and from school

#### Description of study sample

Age, gender neighbourhood-level deprivation and transport to school modes were not significantly different across ethnic groups for 869 adolescents who were driven or driving to or from school at least one day per week. However, significant differences were observed in vehicle ownership (**Table 5**).

In this sample, 62.4% of adolescents were driven or driving to school every day, with no significant difference by ethnicity. Among 158 adolescents who were 16 years of age or older (age eligible for driver's licence in New Zealand), 22.8% had no driver's licence, 34.8% had a learner's licence, 32.9% had a restricted licence and 9.5% had a full driver's licence. Although a significant difference in driving licence status was observed across ethnic groups, three out of five ethnic groups had a small sample size (less than 20 participants) for this comparison. Perceptions of driving or being driven to school among adolescents were driven or driving to school at least one day per week were largely similar across the ethnic groups, with only few statistically significant differences (**Table 5**).

### Māori adolescents

Māori focus group findings indicate that Māori adolescents would prefer to be driven or to drive to school compared to walking or taking the bus. Common reasons Māori adolescents agreed with in relation to being driven or driving to school were; having too much stuff to carry (63.3%), family running short of time (62.5%), the weather being too wet or too cold (76.6%), the distance between home and school being too far (60.9%) and the convenience for parents or someone else to drive them to school on way to/from work or somewhere else (71.9%). When asked if they would prefer getting to school another way (other than walking) the responses were unanimous:

> "Drive myself"
> "[driving is] quicker than walking"
> "You could still get up late and make it to school on time"

Older Māori adolescents had their driver's license, allowing some independence, younger adolescents were most limited in their mode of transport options but wanted to get their driver's license when eligible, because of the convenience:

> "Mum doesn't have to drive me everywhere"
> "Then I get to put whatever I like on the radio"

However, adolescents acknowledged that cost was a barrier for them in getting a driver's license.

### Pacific adolescents

Half of Pacific adolescents reported that they were driven or drive to school because of parental concerns about adolescents' personal safety. Approximately half of Pacific adolescents (46.4%) reported that there are too may dangerous roads between home and school. Additionally, 39.3% Pacific adolescents agreed that their parents are worried about personal safety issues.

Among focus group participants travelling by private vehicle was the most common form of transport to school:

> "One of my siblings or my parents will take me to school"
> "My mum drops me off and once a month, i probably take the bus"
> "Usually my sister drives the car"

Being driven or driving to school was also a parental preference for Pacific focus group participants. They also acknowledged that being driven to school created some issues at times. This was reflected in the survey answer where 57.1% of Pacific adolescents reported that being driven to school or driving them self was because of family usually running short of time:

> "It's always awkward really, its normally rushing because we're always late"
> "Same here, ... we make them [parents] late as well"
> "I would just like take the bus ... I think I just did it 'cause, just to save them, 'cause my parents, like they work night shifts...and it's just a good break for them too"

Older Pacific adolescents preferred to drive themselves to school where it was possible, this was because of their parents' perception of their driving and the ease of driving themselves:

"They turn into like professional like car judges aye"
"My dad gets really panicky and he's always holding onto the thing and I'm like dude, calm down"
"Yea you can like go in your own time [when you drive yourself]"

Pacific adolescents acknowledged that cost with regard to driving and maintaining a vehicle was a barrier for them in getting a driver's license.

**Table 5:** Adolescents' perceptions of being driven or driving to school by ethnicity.

| | New Zealand European | Māori | Pacific | Asian | Other |
|---|---|---|---|---|---|
| | n = 572 | n = 128 | n = 28 | n = 39 | n = 102 |
| **Number of vehicles in a household (%)** | | | | | |
| None | 0.5% | 1.6% | 0.0% | 0.0% | 0.0% |
| One | 13.8% | 15.6% | 28.6% | 23.1% | 31.4% |
| Two or more | 85.7% | 82.8% | 71.4% | 76.9% | 68.6% |
| **Perceptions of being driven or driving to school** | | | | | |
| My parents or someone else drive me to and from or I drive myself to and from school because… | (% agree) | (% agree) | (% agree) | (% agree) | (% agree) |
| I do not enjoy walking or cycling | 37.1% | 40.6% | 28.6% | 51.3% | 36.3% |
| I am not physically able to walk or cycle to school | 17.3%[c] | 18.8% | 14.3% | 28.2%[a] | 18.6% |
| I have too much stuff to carry | 69.2% | 63.3% | 64.3% | 74.4% | 67.6% |
| My family is usually running short of time | 57.3% | 62.5% | 57.1% | 51.3% | 52.0% |
| Our family never really thought about how we travel | 34.3% | 27.3% | 25.0% | 23.1% | 28.4% |
| The school does not allow cycling to school | 5.6% | 7.0% | 3.6% | 7.7% | 6.9% |
| The distance between home and school is too far to walk or cycle | 68.9% | 60.9% | 57.1% | 64.1% | 70.6% |
| The weather is too wet or cold | 76.4%[c] | 76.6% | 71.4% | 89.7%[a] | 70.6% |
| There are too many dangerous roads between home and school | 46.5%[c] | 49.2% | 46.4% | 53.8%[a] | 43.1% |
| I am worried about personal safety issues | 25.5% | 24.2% | 32.1% | 23.1% | 28.4% |

(Contd.)

| | New Zealand European | Māori | Pacific | Asian | Other |
|---|---|---|---|---|---|
| | n = 572 | n = 128 | n = 28 | n = 39 | n = 102 |
| My parents are worried about personal safety issues | 30.4%[d] | 24.2% | 39.3% | 35.9% | 42.2%[a] |
| Public transport is not available | 19.6% | 18.0% | 17.9% | 12.8% | 15.7% |
| There is public transport, but it is not suitable for me | 36.0% | 32.8% | 32.1% | 46.2% | 30.4% |
| It is convenient for my parent(s) or someone else to drive me to school on the way to/from work or elsewhere | 78.0% | 71.9% | 67.9% | 79.5% | 78.4% |
| My parents have set up a ride share with other students | 15.7% | 19.5% | 17.9% | 2.6% | 8.8% |
| It's not possible for me to travel to school any other way | 31.3% | 25.0% | 25.0% | 38.5% | 25.5% |
| Other reasons | 2.4% | 3.1% | 3.6% | 7.7% | 2.0% |

*Transport mode(s) used "most of the time" or "all of the time".

All perceptions data collected on a 4-point Likert scale (1 = strongly disagree to 4 = strongly agree).

Results of regression analysis (reference: New Zealand European; controlled for age, gender, neighbourhood-level deprivation and distance to school): [a] $p < 0.05$ New Zealand European vs. Māori; [b] $p < 0.05$ New Zealand European vs. Pacific; [c] $p < 0.05$ New Zealand European vs. Asian; [d] $p < 0.05$ New Zealand European vs. Other ethnic groups.

## Discussion

The key survey-based finding is that for adolescents in Dunedin, there is very little difference between ethnic groups in adolescents' perceptions of walking and cycling to school among those who live within reasonable walking and cycling distance to school, respectively. Similarly, very little differences were observed across ethnic groups for perceptions of busing to school in the entire sample and perceptions of being driven or driving to school among those who rely on private vehicles for their school travel. This is consistent with the limited evidence that is currently available. Yelavich et al. (2008) found no significant difference in perceived distance to school, parental attitudes towards ATS, and perceived safety of the route to school by ethnicity among New Zealand children (Yelavich et al., 2008). The findings of the present study therefore support the use of a whole of population approach to encouraging ATS, when appropriate ethnic nuances (discussed below) are incorporated. However, any interventions that were to focus on Māori or Pacific adolescents should engage with Māori and Pacific communities and have adolescent voice throughout the development and trialling phases.

Key nuances in Māori and Pacific adolescents' perceptions of different modes of transport to school have been identified in this research. For Māori adolescents who lived within walking distance to school even though a majority agreed that walking to school was healthy, less than half thought walking to school was pleasant or interesting. Logistical barriers were identified with adolescents perceiving that walking to school took too much time, they had too

much to carry, and they were too tired. Pacific adolescents who lived within walking distance to school also reported logistical barriers to walking, with distance to school, the amount of stuff to carry, tiredness, and safety concerns highlighted. Mendoza et al. (2011) also found that attitudes about walking to school were positive in ethnic minority youth in the United States but home-to-school distance, inclement weather and safety concerns for walking (and cycling) to school were common barriers to ATS (Mendoza et al., 2011). These findings concur with other work about barriers to ATS, irrespective of ethnicity (Mandic et al., 2022). The findings of the present study highlight the need to focus on addressing logistic barriers to walking to school for both Māori and Pacific adolescents with an additional focus on developing positive attitudes towards walking to school among Māori adolescents and addressing safety concerns related to walking to school for Pacific adolescents and their parents.

With regard to perceptions of cycling to school, only 1.3% of all adolescents surveyed in this study cycled to school on a regular basis which is likely to explain the findings that few Māori and Pacific adolescents perceived cycling to be interesting or pleasant. Low cycling rates have been reported in Aotearoa New Zealand (Mandic et al., 2017; Mandic et al., 2023). Previous work as part of the BEATS Research Programme, with focus groups of students and parents, identified cycling safety, including features and perceptions of the built environment, the behaviours of other road users, previous cycling experiences and cycling skills and experiences as factors that impacted perception of cycling (Hopkins and Mandic, 2017). Mandic et al. (2017) did not examine perceptions of cycling by ethnicity but found that among New Zealand adolescents, perceptions of cycling to school were generally positive (Mandic et al., 2017). The study found that the majority of adolescents believed that cycling to school was a good way to be active and that it was enjoyable. However, there were some perceived barriers to cycling, such as concerns about safety, distance, and the availability of secure bike storage at school. In addition, a recent study found that Pacific people in Aotearoa New Zealand had fewer bikes per household than non-Pacific people (Shaw and Tiatia-Seath, 2022). Further research exploring perceptions, barriers and advantages of cycling for Māori and Pacific adolescents is needed to gain an in-depth understanding of cycling perceptions and behaviours for Māori and Pacific adolescents and if cycling is to be considered as a viable option for ATS in Aotearoa/New Zealand context. Future research in this area would benefit from utilising kaupapa Māori theory and methodology and elements of co-design because engagement of adolescents would be essential to determine an effective intervention.

Perceptions of busing to school were also likely influenced by low numbers of adolescents who travelled to school by public or school bus (5.2% for bus only and 9.7% for travelling by bus and on foot). For Māori adolescents, having a parent that was already taking the car out was identified as a barrier to taking the bus to school, whereas other perceptions of busing to school were similar to other ethnic groups. Pacific adolescents who participated in the focus groups perceived taking the bus negatively, with aspects such as safety and comfort level, relating to who else was on the bus, identified as key concerns. Safety concerns have been previously identified as a barrier to busing to school (Mindell et al., 2021). In addition, compared to those who used ATS, bus users were more likely to report parental safety concerns and that they perceived that their commute to school was less likely to give them opportunities to socialise (Mandic et al., 2020). There is a need for more research that examine perceptions of busing to school for Māori and Pacific adolescents. Addressing low levels of busing to school should take on board adolescents' perceptions so to support greater bus use. Efforts to promote busing to school for Māori adolescents should focus on addressing the convenience of trip chaining while for Pacific adolescents' efforts should focus on addressing safety and comfort levels of using bus for school travel.

The majority of adolescents in this study were driven or drove themselves to school at least once a week. Perceptions of being driven or driving to school among those adolescents did not differ by ethnicity. Focus group findings showed that Māori adolescents preferred to be driven or to drive to school, however the cost associated with maintaining a car was identified as a barrier to getting a license. Similarly, Pacific adolescents identified cost as a barrier to getting a driver's license. Pacific focus group adolescents noted that they were mostly driven to school because of parental concerns about personal safety and that driving was a parental preference. To the authors' best knowledge, no previous study has examined perceptions of being driven or driving to school for Indigenous, Māori or Pacific adolescents. Yelavich et al. (2008) mentioned that in their study some children reported being driven to school due to safety concerns but did not report such data by ethnicity (Yelavich et al., 2008) The link between driving or being driven to school and sedentary behaviour is clear (Kek et al., 2019; Khan, Mandic and Uddin, 2021), therefore efforts to minimise private vehicle travel to and from school that are culturally relevant for Māori and Pacific adolescents would support increased physical activity levels with flow on effects to health and wellbeing.

### Study implications

The findings from the present study supports the use of a whole of population approach to encourage ATS and minimise reliance on private vehicle travel to school that incorporates appropriate ethnic nuances. The specific describing of nuances for Māori and Pacific adolescents are provided to ensure that an equity lens is used in preparing strategies and policy in Aotearoa/New Zealand to support ATS. A general overarching approach to promoting ATS for all ethnic groups in New Zealand would be suitable. However, cultural context, appropriate language and intervention design aspects need to be inclusive of Māori and Pacific worldviews, engage with Māori and Pacific communities and include adolescent voices.

In Aotearoa/New Zealand, te reo Māori (the Māori language) is an official language. Therefore, ATS initiatives in New Zealand should at the very least be bilingual. Pacific people have diverse language groups and use of a person's own language to communicate public messaging will support the understanding and uptake of that messaging. Translation of messaging from schools and transport authorities into various Pacific languages is also recommended. Cultural context can be integrated by using design aspects and symbols that have meaning for Māori and for Pacific people. This means ideally co-creating with different people and population groups versions of key information and messaging so that the information is meaningful and likely to support ATS behaviours, compared to a generalised approach.

### Strengths and limitations

The major strength of the study is the mixed methods approach in which survey findings are reported by ethnicity and accompanied by findings from focus groups conducted with Māori and Pacific adolescents. The report adds to the evidence base about ATS specifically with regards to the perceptions of ATS for Māori and for Pacific adolescents. The reporting of quantitative data is novel and reflects a strengths-based approach to data presentation that does not frame Māori and Pacific people through a deficit lens. Additional strengths include a large number of surveyed participants with 100% school recruitment rate from the study city and data analysis which took into account distance to school and neighbourhood-level deprivation.

Study limitations include imbedding of the cultural component of the research within a much larger scientific programme of work and, the small number of focus groups with Māori and Pacific adolescents with small numbers of participants. A Pacific researcher was

a contributor to the BEATS research; however, she was unable to facilitate the Pacific focus groups. This is a limitation for the study and it would be gold standard in Aotearoa/New Zealand for a Pacific facilitator to run focus groups with Pacific participants. The use of questionnaires and focus group could also be seen as a limitation as these methods are highly vulnerable to social desirability and acquiescence biases. The fact this study utilises a cross sectional design is also limitation as it is impossible to make causal inferences. Lastly, while we state that comparing the different ethnic groups is not our primary interest, there are still a large number of comparisons (**Tables 2** to **5**). Thus, it is necessary to acknowledge that this involves a high risk of type 1 error (false positives)

### Future research

A specific kaupapa Māori (indigenous Māori methodology) and/or kaupapa Pacific (methodology arising from the various Pacific Islands) research project should be designed that extends this work, using the current data, so to support further equity focused approaches to ATS. The inclusion of both Māori and Pacific researchers and focus group facilitators would be required for a culturally robust process. In addition, future research with Indigenous populations outside of Aotearoa/New Zealand is important as there is very little ethnic diversity in the current ATS evidence base. Additionally, given that many Māori and Pacific adolescents perceived many barriers to ATS and expressed preference for driving, future research could take this aspect of the findings and work with Māori and Pacifica adolescents to understand how a shift away from driving toward ATS could occur. Engagement of adolescents would be essential to determine an effective intervention.

## Conclusions

This article highlights that in Aotearoa/New Zealand a general approach to the development of policy and the creation of approaches to support ATS and minimise use of private vehicle travel to school is appropriate. Such developments should use cultural context, te reo Māori and Pacific languages and should be guided by Māori and Pacific experts. Research that reports data by ethnicity can support equitable approaches to policy and initiatives for ATS. In addition, research reporting that considers the cultural context of Māori and Pacific adolescents is important from an Aotearoa/New Zealand perspective and is a new evidence contribution to the ATS knowledge pool. The implications of this work are also relevant for research and policy making internationally in countries that have indigenous populations. The reporting of quantitative data by ethnicity, use of appropriate language and cultural context discussed here can be applied in other countries.

## Data Availability Statement

Data used in data analysis for this project will not be shared due to sensitivity of the collected data as well as participants having been given assurances that the collected data will not be shared.

students and volunteers), Finau Taungapeau (Pacific community representative) who assisted with this research and all participating schools and adolescents.

## Informed Consent Statement

Informed consent was obtained from all subjects involved in the study. Parental opt-in or opt-out consent was used in the BEATS Study. No parental consent was required in the BEATS Natural Experiment.

## Institutional Review Board Statement

The BEATS Study was approved by the University of Otago Ethics Committee (13/203; July 2023). The BEATS Natural Experiment was approved by the University of Otago Human Ethics Committee (17/188; December 2017) and Auckland University of Technology Ethics Committee (21/314; September 2021).

## Competing Interests

The authors have no competing interests to declare.

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