**Exploring active school travel in young children**

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# Policy summary

## Context

Active school travel (AST; getting to or from school by walking or wheeling) confers considerable health and environmental benefits, predominantly through increased physical activity and reduced vehicle-related air and noise pollution. AST levels in Aotearoa New Zealand (NZ) have declined substantially over recent decades to the point where they are amongst the lowest worldwide. Evidence on AST associates for older children, and in relation to the physical built environment, has grown significantly over time, but less is known regarding AST associates in younger children and socio-environmental associates of AST in this age group. There is also a lack of research exploring change in AST over the earliest school years, a key life stage for setting AST habits for lifelong health gain. Furthermore, research and knowledge on rangatahi Māori and their experiences of AST is minimal and what is available is quantitative. Qualitative research findings from the thesis of Jasmine Simpson (Ngāpuhi, Ngati Rangiteaorere (Te Arawa)) will add an increased understanding of the AST context for Māori populations including the enablers, barriers and impact of AST on Māori students’ wellbeing and the influence of AST on Māori student engagement and achievement at school.

## Summary

In this research, we undertook two sets of quantitative analyses:

Firstly, we sought to determine the relationships between individual, family/household, school, and community factors and children’s AST at 6 years and at 8 years of age. Participants were from the Growing Up in New Zealand study (**GUiNZ**); overall 1670 respondents were included in the year 6 analyses and 885 respondents for the year 8 analyses. Structural equation modelling was used to identify factors associated with AST at 6 years. Due to the poor overall fit for the 8-year structural equation model, multiple regression was instead performed to explore the direct relationships between AST and other observed variables.

Secondly, we aimed to measure whether shifts in transport modes occur between 6 and 8 years of age, and identify factors associated with mode shifts. We used data from 642 participants from the 6- and 8-year waves of GUiNZ who had not moved home or school. Factors associated with shifts from active to passive, and passive to active modes from 6-8 years were explored using stepwise logistic regression with backwards selection.

This funding also supported a Hauora Māori master’s thesis student, Jasmine Simpson (Ngāpuhi, Ngati Rangiteaorere (Te Arawa)), who was supervised by co-investigator Dr Hayley McGlashan (Te Aupōuri). Jasmine Simpson drew on Kaupapa Māori and narrative inquiry methodologies to explore the following research aims: (1) to develop a comprehensive understanding of the factors that influence rangatahi Māori to participate in AST, (2) to examine the strategies Māori parents/caregivers use to encourage their children to participate in AST, (3) to examine the strategies that kaiako (teachers) of rangatahi Māori use to encourage their students to participate in AST, and (4) to develop a comprehensive understanding of the influence of AST on rangatahi Māori wellbeing and engagement at school.

## Findings

For the cross-sectional analyses importance of living close to schools had a significant and positive relationship with AST, and a significant negative relationship with AST was found for perceived distance to schools at 6 and 8 years. At 8 years, negative associations with AST were detected for parent/caregiver involvement with school and children being of Pacific ethnicity.

For the examination of change between 6 and 8 years, AST was low at both time points (37% at 6 years, 34% at 8 years). Overall, 12% moved from active to passive modes and 9% moved from passive to active modes. Higher odds of shifting to active travel modes at 8 years were found for boys, living closer to school, parent-reported importance of living close to school, and child-reported peer relationships/liking school. Only one factor was associated with changing to passive modes; the odds of changing to passive modes (versus remaining with active modes) was 15% lower (OR 0.85) with every one unit increase in school community cohesion.

For the Hauora Māori study the most prominent themes that emerged included the drastic decrease in generational AST commute methods; children rarely commute to school the same way their parents did when they were young (walking or cycling). Whānau shared that they were reluctant to allow their tamariki to walk or cycle to school because of safety concerns for their children as many of the connecting routes were on, or beside streets with heavy traffic flow. Other reasons for low levels of AST were the lack of weather protection along the commute, including covered walk/cycle ways, and the expense of public transport and weather protective clothing. Aligned with this was the further decrease in AST levels post Covid-19 due to concerns of children getting cold and unwell. Rangatahi Māori shared that they enjoyed AST when their whānau or friends walked or cycled with them. Those whānau who lived closer to school were more likely to engage in AST in comparison to those who lived further away. Kaiako shared that students who regularly used AST as their commute method to school were often more focused and engaged in their learning.

## Implications

The persistently low rates of AST in this research highlight an urgent need for policy and practice to enable and encourage active travel modes for *all* tamariki. Distance remains the overriding factor associated with AST in young children – efforts to ensure children have easy access to, and are supported to attend, schools in close proximity to home are warranted. Considering the low rates of biking in NZ children and that distance thresholds for biking are further than walking, installation of connected biking infrastructure (separated from cars) would overcome some issues with distance. It is essential that programmes that support access to bikes and bike skills training (e.g., Waka Kotahi’s Bike Ready) continue (and ideally are expanded) to ensure all children are able to utilise this infrastructure safely. Connecting with the wider school community to instigate park and walk, scooter squads, bike trains, and walking school bus programmes would be beneficial. Improved safety around schools and providing safe routes to school are needed, including through improved driver behaviour (reduced speeds, red light running, improved attention and stopping at pedestrian crossings) and provision of safe pedestrian crossings is needed.

Similar implications arose from the Kaupapa Māori research, including the need for walking school buses to support whānau with multiple children and single parent/working whānau. Whānau also spoke about the desire for safer walk/cycle ways on the commute to school highlighting a need for covered routes and routes that were not directly next to main roads and streets with high traffic flow. A need for more affordable weather protectant school uniform items was also expressed. Some whānau also shared that they could use a mixture of public transport and AST if public transport was free for all travellers.

Current policy initiatives, in particular Waka Kotahi/NZTA’s Improving Transport Choices package, align well with these recommendations.

## Recommendations

Key recommendations are:

* Installation of connected biking infrastructure that is separated from cars around schools.
* Installation of safe pedestrian infrastructure (connected and wide footpaths, safe pedestrian crossings [ideally signalised or raised]).
* Support schools to develop walking school buses, scooter squads, and cycle trains.
* Support agencies, key roles, and groups that deliver AST programmes at local, regional, and national levels (e.g., school travel plan co-ordinators, non-government organisations [e.g., Triple Teez], Community Transport Teams [Auckland Transport]).
* Develop and deliver media packages around improved driver behaviour, especially around schools.
* Apply findings from Waka Kotahi/NZTA’s Innovating Streets programmes that have shown promise for supporting AST – considering slower speeds, low traffic neighbourhoods, school streets, etc.
* Involve whānau and kaiako in the planning and implementation of walking school buses and support those from single parent/working families and those with multiple children.
* Support schools to reduce the cost of weather protective school uniform items i.e., rain coats and winter hats/beanies. Furthermore, increase funding for schools to provide umbrellas to whānau to increase AST.
* Provide free public transport for all.

# Executive summary

Active school travel (**AST**; i.e., walking or wheeling to school) confers significant health and environmental benefits, predominantly through increased physical activity and reduced vehicle-related pollution. AST levels in Aotearoa New Zealand (NZ) have declined significantly over recent decades1 to the point where they are amongst the lowest worldwide.2 Notably, these decreases in NZ are counter to international trends, where active school travel rates have been increasing.3

This project drew on our substantial body of work and experience where we have made significant advances in understanding AST associates in the 9-13 year old-age group. Less is known regarding the AST trajectory and associates in younger children, where substantial opportunities to lay foundations for ongoing AST exist.

Research aims were: (1) to develop a comprehensive understanding of relationships between individual, family/household, school, and community factors with children’s AST in the Growing Up in New Zealand (**GUiNZ**) study, (2) to determine whether meaningful differences exist in AST between 6 and 8 years, and (3) to identify factors associated with any AST change between 6 and 8 years. We used structural equation modelling, multiple regression, and stepwise logistic regression with backwards selection to assess these relationships.

In addition to our quantitative analyses using the GUiNZ data, this funding supported a Hauora Māori master’s thesis student, Jasmine Simpson (Ngāpuhi, Ngati Rangiteaorere (Te Arawa)), who was supervised by co-investigator Dr Hayley McGlashan (Te Aupōuri). Simpson drew on Kaupapa Māori and narrative inquiry methodologies to explore and examine the AST practices of Māori whānau in the Northland region. Simpson’s qualitative data provided an insight into the levels of AST for Māori children and how these practices impacted the wellbeing and engagement of rangatahi Māori at their respective schools.

Overall, extremely low rates of AST were observed in the GUiNZ study participants which were consistent with other national datasets. A range of factors were associated cross-sectionally with AST at 6 years and 8 years, and with changes to AST or to passive transport modes from 6 to 8 years. Distance to school was consistently significantly associated with whether children got to school actively. In the Hauora Māori study there was a drastic decrease in generational AST commute methods; children rarely commute to school the same way their parents did when they were young (walking or cycling). Whānau shared that they were reluctant to allow their tamariki to walk or cycle to school because of safety concerns for their children as many of the connecting routes were on, or beside streets with heavy traffic flow. Other reasons for low levels of AST were the lack of weather protection along the commute, including covered walk/cycle ways, and the expense of weather protection clothing. Aligned with this was the further decrease in AST levels post Covid-19 due to concerns of children getting cold and unwell. Rangatahi shared that they enjoyed AST when their whānau or friends walked or cycled with them. Those whānau who lived closer to school were more likely to engage in AST in comparison to those who lived further away. Kaiako (teachers) shared that students who regularly used AST as their commute method to school were often more focused and engaged in their learning.

These findings demonstrate the need for actions to increase and maintain AST in young children, in particular overcoming challenges of living further away from school. Further recommendations include the increased involvement of whānau and kaiako in the planning and implementation of AST initiatives such as walking school buses.

# Introduction

## Active school travel in young children in Aotearoa New Zealand

Active school travel (**AST**; walking or wheeling to/from school) confers health and environmental benefits, predominantly through increased physical activity and reduced vehicle-related air and noise pollution.4-8 AST levels in Aotearoa New Zealand (**NZ**) have declined significantly over recent decades to the point where they are amongst the lowest worldwide.1,2,9-11 Notably, these decreases in NZ are counter to international trends, where active school travel rates have been increasing.3 Urgent intervention is imperative; intervening early in life is essential for improving current and future health.

Promoting AST in children is complex and multi-faceted. Our current research has revealed a number of challenges faced by stakeholders responsible for promoting AST.12 Interviews with stakeholders have demonstrated the important role that transport agencies and the wider neighbourhood environment play in supporting AST.13 However, there remains a lack of clarity and direction in terms of what type of intervention(s) are likely to be most effective for young children.

Socio-ecological approaches are necessary to understand the multiple layers of influence on AST, including factors across individual, family/household, school, and communities.14-18 Our work has shown that variation across age groups exists in terms of what factors are important to target for improving AST.16,18-23 There is a paucity of information related to factors of importance for children in their earliest years of school, arguably the optimal life stage for intervention to achieve long-term health gain. In the context of limited budget and capacity, the value of effective, targeted intervention for specific age groups cannot be underestimated. This information can be used to inform future intervention development. For example, our work with older children aged 9-13 years has demonstrated the importance of promoting time spent with friends and family for AST programmes.24

## The Growing Up in New Zealand Study

The quantitative data analysis for this project draws data from the longitudinal Growing Up in New Zealand (**GUiNZ**) cohort study, the full methods of which are detailed elsewhere.25 This study provides comprehensive information on key child wellbeing factors across six wellbeing domains. The first wave of the study was with pregnant mothers of 6,846 children and their partners, who were living in the Tāmaki Makaurau/Auckland and Waikato Regions of NZ. Children were born between March 2009 and May 2010. Birth parameters for the GUiNZ child cohort aligned to contemporary births nationwide.26

The GUiNZ study offers a unique opportunity to address current research and policy knowledge gaps by providing new evidence that examines these complex relationships for a large group of young children in NZ. It is possible that there are meaningful shifts in AST even in early school years such as between ages 6 and 8 years in the GUiNZ data collection waves. These children will have been in school years 1 or 2 during the 6 year measurement wave, and school years 3 or 4 for the 8-year wave. These stages within school are significantly different – shifting from a focus on transition to school in years 1-2, to increased independence in years 3-4, alongside increased physical skill capability. Thus, it could be contended that AST may also increase over this life stage, for example through increased autonomy and/or skill acquisition.

## Hauora Māori and active school travel

There is limited research to understand AST in tamariki and rangatahi Māori. A recent review highlighted a range of challenges to AST unique to Māori, and the need for focused research in this area.27 A hauora Māori master’s thesis scholarship was budgeted for a project to be conducted as part of this research, with Dr Hayley McGlashan (Te Aupōuri) as primary supervisor. Dr McGlashanis a specialist in health and education, and brought her substantive expertise in school policies and practices and an in-depth understanding of the New Zealand school system to the project. The specific approaches to be employed were not pre-specified as part of the research proposal, but were instead developed in consultation between the student and Dr McGlashan. We were fortunate to have Jasmine Simpson (Ngāpuhi, Ngati Rangiteaorere (Te Arawa)) undertake her master’s study through this project, titled: *Māori paving the way: How Active School Travel is changing the way our rangatahi learn*.

## Research aims and alignment with the Child and Youth Wellbeing Strategy

This project involved two related, but distinct pieces of work.

Firstly, for the analysis using GUiNZ data, research aims were: (1) to develop a comprehensive understanding of relationships between individual, family/household, school, and community factors with children’s AST in the GUiNZ study, (2) to determine whether meaningful differences exist in AST between 6 and 8 years, and (3) to identify factors associated with any AST change between 6 and 8 years. We used structural equation modelling, multiple regression, and stepwise logistic regression with backwards selection to assess these relationships.

Secondly, the research aims for Jasmine Simpson’s master’s thesis research were: (1) to develop a comprehensive understanding of the factors that influence rangatahi Māori to participate in AST, (2) to examine the strategies Māori parents/caregivers use to encourage their children to participate in AST, (3) to examine the strategies that kaiako of rangatahi Māori use to encourage their students to participate in AST, (4) to develop a comprehensive understanding of the influence of AST on rangatahi Māori wellbeing and engagement at school.

The research directly addresses key elements of the Child and Youth Wellbeing Strategy(children are happy and healthy; living in healthy, sustainable environments). It is also well placed to contribute to the healthy eating and physical activity in schools programme announced in the 2019 Wellbeing budget10. Internationally, the research draws from the Child Friendly City Framework for Action12 and the UN Convention on the Rights of the Child13, informing health-promoting environments for children. Longer-term, it aligns with the UN Sustainable Development Goals14, particularly Goals 3 (healthy lives and wellbeing) and 11 (making cities inclusive, safe, resilient and sustainable).

# Method

## Quantitative modelling using GUiNZ data

The quantitative modelling drew from the 6 year (school years 1-2) and 8 year (school years 3-4) waves of the study, and the original maternal questionnaire (for sociodemographic items not captured elsewhere). We undertook two examinations: Firstly we undertook cross-sectional analyses to determine the relationships between individual, family/household, school, and community factors and children’s AST at 6 years and at 8 years of age; secondly, we explored whether shifts in transport modes occurred between 6 and 8 years of age, and identified factors associated with mode shifts (i.e., from active to passive, or vice-versa).

### Cross-sectional analyses

#### Participants

Participants for the 6 year cross-sectional analyses were eligible if they met the following criteria: (1) with child ID, (2) mothers usually residing in New Zealand, (3) children usually residing in New Zealand, (4) children who attend school in New Zealand, (5) response to the question about ‘active travel mode’, and (6) who had ethnicity information. For the 8 year analyses, in addition to the 6 year inclusion criteria, participants who had moved house or attended any other school since they were 6 years old were excluded, in order for us to retain environmental perception measures from the 6 year phase (which may differ if attending a different school or if living in a different house).

#### Measures

The dependent variable was parent-reported usual mode of travel to/from school assessed at 6 years and 8 years, using the question *“What forms of transport do you mostly use to get your Growing Up in New Zealand study child/children to and from school?”* Responses were dichotomised into active travel (i.e., bicycle, scooter and walking), and passive travel (i.e., car, school bus, public transport, and taxi).

Independent variables were: Child’s gender (female, male), self-prioritised ethnicity (i.e., identifying with one ethnic group only, categorised as New Zealand European, Māori, Pacific, Asian, Other), neighbourhood level deprivation using the NZDep2013, household composition, importance of living close to school, perceived home-school distance, parent/caregiver perceptions of child at school at 6 years, parent/caregiver perceptions of child at school at 8 years, parent/caregiver involvement with school at 6 and 8 years, child-reported peer and school relationships at 8 years, and school community cohesion at 6 and 8 years.

Two control variables were included in this study based on data availability in the GUiNZ study and hypothesised potential impacts of residential mobility and maternal education on the dependent and independent variables: Maternal education (no secondary school qualification, secondary school/NCEA 1-4, diploma/trade certification/NCEA 5-6, Bachelor’s degree, higher degree) and number of times moved since child was 4 years old (none, one, two, three, four, five, six and greater than or equal to seven). For number of times moved, the corresponding 8 year item was used to screen participants out of analyses so that only participants who had not moved since the 6 year wave were included in analyses in order for us to retain environmental perception measures from the 6 year phase (which may differ if attending a different school or if living in a different house).

#### Data analyses

Structural equation modelling was used to identify factors associated with AST at 6 years. Due to the poor overall fit for the 8 year structural equation model, multiple regression was instead performed to explore the direct relationships between AST and other observed variables.

### Exploring change in AST from 6 to 8 years

#### Participants

Eligibility criteria for analysis were: had child ID number; mother was usually residing in NZ; child was usually residing in NZ; child attended school in NZ; usual travel mode to school was reported; child ethnicity was reported; and at the 8 year wave, the child had not moved house or attended any other school since the 6 year wave (in order to achieve a longitudinal dataset and retain environmental perceptions from the 6 year study wave).

#### Measures

The dependent variable was change in usual school travel mode (assessed as above), either from active to passive, or passive to active modes, from 6 to 8 years.

All variables used in the cross sectional analyses above were included as candidate variables in these analyses (i.e., sociodemographic factors (sex, ethnicity, maternal education), area-level factors (NZDep2013, perceived home-school distance, importance of living close to school), child-reported peer and school relationships, parent/caregiver perceptions of child at school (6 years and 8 years), parent/caregiver involvement with school (6 years and 8 years), and school community cohesion (6 years and 8 years)).

#### Data analyses

Stepwise logistic regression was used with backwards selection, whereby the full model was first fitted including all explanatory variables (as listed above). The least significant term was then removed from the model in a stepwise fashion, until all variables in the model were related to the outcome at a significance level of p < 0.1. This process was repeated for participants who changed from usually travelling using passive travel modes to active travel modes between the two time points, and for those who changed from active to passive travel modes between the survey waves.

### Māori paving the way: How Active School Travel is changing the way our rangatahi learn

#### Participants

Participants in this research consisted of seven rangatahi Māori (aged 5 to 14 years) and six adults, all from Tai Tokerau. The group of rangatahi Māori consisted of four females (5, 10, 12, 13 years old) and three males (8, 10 and 14 years old). Māori adult participants consisted of four women and two men. All six adults had children and three of the six adults were also teachers.

#### Kaupapa Māori methodology

This research was conducted with a combination of Kaupapa Māori and narrative inquiry methodologies with qualitative data. This research was conducted in line with Smith’s28 1999 definition that Kaupapa Māori research is research by Māori, for Māori and with Māori. The primary researcher of this project (Jasmine Simpson) is tangata whenua Kaikohe, Tai Tokerau (Ngāpuhi, Te Rarawa) and Rotorua (Ngāti Rangiteorere). Additionally, those who assisted on the research, such as the primary supervisor and transcribing assistant are Māori also. Therefore, the research was entirely conducted by Māori wāhine tōa. All participants are Māori and, either from Tai Tokerau, or have lived and worked in Tai Tokerau for many years. Therefore, this research was “conceived, developed, and carried out by Māori, and the end outcome is to benefit Māori”.29 The qualitative data provided an insight into the levels of AST for rangatahi Māori and how these practices impact the wellbeing and engagement of rangatahi Māori at their respective schools.

#### Narrative inquiry methodology

Narrative inquiry research is helpful when wanting to capture people’s lived experiences as it explores in-depth the meaning(s) people attach to their experiences. Naturally, Māori are story tellers, and to capture their experiences meaningfully and in a way that gave them the time and effort they deserve, it was necessary to utilise the narrative inquiry methodology through qualitative data in the form of interviews (30-60 minutes long). The interviews were undertaken between the May and July 2022. Tania Cliffe-Tautari30 explains how pūrākau have shaped Māori history for generations and enable Māori to explore their own identity and perceptions about being Māori. Our histories and identities are shared through kōrero, at whānau gatherings such as tangi and weddings, on the marae, around the dinner table, on car trips to the homestead or as bed time stories. Usually verbally but shared in a multitude of ways and places, our stories are how we learn about our ancestors, our land and our traditions, so what better way to conduct this research than through kōrero with pūrākau. It is a medium our people are comfortable or at least familiar with, and one that is embedded in our culture as opposed to the possible disconnect they may feel behind a screen or piece of white paper. Questionnaires were used only as a backup in this study and even then, time and space was allowed for those who opted for this method to share their story to whatever extent they wanted.

#### Data analyses

For this research project, qualitative data was collected in the form of interviews which provided open-ended, emerging data through kōrero. These interviews contain many pūrākau shared by the participants about their childhood, their family and their own experiences getting to and from school. In order to analyse this data appropriately, Jasmine Simpson mostly utilised narrative analysis and discourse analysis to examine the kōrero shared with the participants and the resulting transcriptions. Discourse and narrative analysis were utilised most often reviewing the transcriptions from the interviews. This is because discourse analysis itself is a process of analysing qualitative research data and involves the close reading of transcripts specifically with the intention of finding patterns of meaning. Discourse analysis is a complementary framework within Kaupapa Māori methodological research as it aligns with Kaupapa Māori aims of examining patterns and processes of social change.

# Results

## Cross sectional analyses

In total 1,670 respondents were included in the year 6 analyses and 885 respondents included in the year 8 analyses. Overall, 34.3% and 33.3% students reported active travel to school (i.e., walking or biking) at 6 years and 8 years, respectively.

### 6 year analyses

After controlling for maternal education and number of times moved since age four, the model indicated that living close to schools had a significant and positive relationship with AST (Table 1). A significant negative relationship with AST was found for perceived distance to schools. There were no significant indirect paths in the model. However, two direct paths regarding school community cohesion were identified. Parent/caregiver involvement in schools and perceived child’s independence were significantly and positively associated with school community cohesion.

### 8 year analyses

Table 1 shows a similar positive association between AST and the importance of living close to schools and a negative relationship between AST and perceived distance to school at age eight. Negative associations were detected for being of Pacific ethnicity (estimate = -0.100, p = 0.03).

#### Table 1. Standardised direct, indirect, and total effect of observed variables on AST at 6 years (n = 1,670) and 8 years (n = 885)

|  |  |  |
| --- | --- | --- |
| Pathways | Adjusted model (6y) | Adjusted model (8y) |
| Direct effect | Indirect effect | Total effect | Direct effect |
| Perceived home-school distance → Active school travel | -0.463\*\*\* |  |  | -0.472\*\*\* |
| Number of people living in house → Active school travel | 0.046 |  |  | 0.039 |
| Gender (Male) → Active school travel | -0.032 |  |  | 0.046 |
| Area level deprivation → Perceived home-school distance → Active school travel |  | -0.002 | 0.019 |  |
| Area level deprivation → Perceived home-school distance  | 0.004 |  |  |  |
| Area level deprivation → Active school travel | 0.021 |  |  | -0.011 |
| Māori†→ Active school travel | 0.002 |  |  | -0.026 |
| Pacific† → Active school travel | -0.032 |  |  | -0.100\*\* |
| Asian† → Active school travel | 0.008 |  |  | -0.011 |
| Other† → Active school travel | 0.040 |  |  | 0.003 |
| Importance of living close to school → Active school travel | 0.305\*\*\* |  |  | 0.188\*\*\* |
| School community cohesion → Active school travel | -0.069 |  |  | -0.014 |
| Parent/caregiver involvement with school → School community cohesion → Active school travel |  | -0.013 | 0.049\* |  |
| Parent/caregiver involvement with school → School community cohesion | 0.192\*\*\* |  |  |  |
| Parent/caregiver involvement with school → Active school travel | 0.060 |  |  | -0.071\* |
| Parent/caregiver perceptions of child at school → School community cohesion→ Active school travel |  | -0.039 | 0.024 |  |
| Parent/caregiver perceptions of child at school → School community cohesion | 0.561\*\*\* |  |  |  |
| Parent/caregiver perceptions of child at school → Active school travel | 0.063 |  |  | -0.033 |
| Child reported peer relationship |  |  |  | 0.041 |
| Maternal education → Active school travel | 0.003 |  |  | 0.019 |
| Times moved since 4y → Active school travel | -0.040 |  |  |  |
| R2 | 32.5% |  |  | 34.8% |

Note: Significance levels: \*p < 0.10, \*\*p < 0.05, \*\*\*p < 0.01.

Adjusted model: adjusted for maternal education and times moved since 4y at 6y and maternal education at 8y

**†**Reference group: New Zealand European

## Exploring change in AST from 6 to 8 years

In total, 642 children were included in these analyses. Rates of AST at each time point were relatively similar (37% at 6 years, 34% at 8 years), and travel mode predominantly remained constant over time. However, there were observable shifts, with 78 participants (12%) moving from active to passive modes between the time points, and 59 (9%) moving from passive to active modes from 6 to 8 years.

Table 2 presents the final model and odds ratios for changing to active school travel modes at 8 years (versus continuing to get to school passively), for the 402 participants who usually used passive modes to travel to school at 6 years. Compared with children whose parents perceived their school to be 1km or less from home, those whose parents perceived their school to be more than 1km from home had 71% lower odds of shifting to active travel modes rather than remaining using passive travel modes at 8 years. For every one unit increase in parent-reported importance of living close to school, children had 38% higher odds of shifting to active travel modes versus continuing to travel to school using passive modes. The odds of changing to AST rather than remaining using passive travel modes were 20% higher with every one unit increase in child-reported peer relationships at 8 years.

#### Table 2: Odds ratios for changing to active school travel modes at 8 years (versus continuing to get to school using passive travel modes)

|  |  |  |  |
| --- | --- | --- | --- |
| Independent variable | Categories/comparison or units | OR (95%CI) | p-value |
| Sex | Males versus females | 1.98 (1.06, 3.70) | 0.033 |
| Importance of living close to school  | Continuous*Mean ± SD: 8.3±1.7**Range: 2-10* | 1.38 (1.11, 1.82) | 0.004 |
| Parent perceived proximity to school | ≥1km vs <1 km | 0.29 (0.15, 0.51) | <0.001 |
| Child-reported peer relationships at 8 years | Continuous*Mean ± SD: 12.8±2.4**Range: 3-15* | 1.20 (1.04, 1.38) | 0.012 |
| Parent/caregiver involvement with school at 8 years  | 1 (any one of 3 items agreed with) versus 0 (no agreement with 3 items asked) | 0.30 (0.09, 1.03) | 0.057 |

Notes: n=402 participants who usually used passive modes to travel to school at 6 years (all variables p < 0.10)

Table 3 presents the final model and odds ratios for changing to passive school travel modes at 8 years (versus continuing to get to school actively), for the 240 participants who usually got to school using active travel modes at 6 years. The odds of changing to passive modes (versus remaining with active modes) was 15% lower (OR = 0.85) with every one unit increase in school community cohesion.

#### Table 3: Odds ratios for changing to passive school travel modes at 8 years (versus continuing to get to school using active travel modes)

|  |  |  |  |
| --- | --- | --- | --- |
| Independent variable | Categories/comparison or units | OR (95%CI) | p-value |
| I think that my child/children are happy in their school (6 years) | Continuous*Mean ± SD: 13.3±1.8**Range: 3-13* | 1.21 (0.99, 1.48) | 0.064 |
| School community cohesion at 6 years | Continuous*Mean ± SD: 16.9±1.9**Range: 10-20* | 0.85 (0.72, 0.99) | 0.046 |

Notes: n=402 participants who usually used passive modes to travel to school at 6 years (all variables p < 0.10)

## Māori paving the way: How Active School Travel is changing the way our rangatahi learn

Jasmine Simpson drew on Kaupapa Māori and narrative inquiry methodologies to explore and examine the AST practices of Māori whānau in the Northland region. Simpson’s qualitative data provided an insight into the levels of AST for Māori children and how these practices impacted the wellbeing and engagement of rangatahi Māori at their respective schools.

Among the key themes highlighted in the analysis of the data was a drastic decrease in generational AST commute methods; children rarely commute to school the same way their parents did when they were young (walking or cycling). Whānau shared that they were reluctant to allow their tamariki to walk or cycle to school because of safety concerns for their children as many of the connecting routes were on, or beside streets with heavy traffic flow. Another reason for low levels of AST was the lack of weather protection along the commute, including covered walk/cycle ways and the expense of weather protection clothing. Aligned with this was the further decrease in AST levels post Covid-19 due to concerns of children getting cold and unwell. Rangatahi shared that they enjoyed AST when their whānau or friends walked or cycled with them. Those whānau who lived closer to school were more likely to engage in AST in comparison to those who lived further away. Kaiako shared that students who regularly used AST as their commute method to school were often more focused and engaged in their learning.

# Discussion

In this research we took a multifaceted approach to understanding factors of importance for AST in NZ. We undertook quantitative modelling to determine relationships between AST and individual, family/household, school, and community factors for young children at ages 6 and 8 years. We then measured whether shifts in usual school transport mode (from passive to active, or vice-versa) occur between 6 and 8 years of age, and identified factors associated with a change over time, either from passive to active modes, or from active to passive modes. Concurrently, a master’s thesis research project was conducted to explore and examine the AST practices of Māori whānau in the Northland region.

Overall, we found low rates of AST, consistent with national-level data.31 It is worth reiterating here that AST levels in NZ have declined significantly over recent decades to the point where they are amongst the lowest worldwide.1,2,9-11 Indeed, the 2022 Global Physical Activity Matrix placed NZ near the bottom of the 57 countries for AST, with only five countries ranked lower.2

Our findings revealed that parents’ perceived distance to school and parent reported importance of living close to school had significant relationships with whether children got to school actively at both 6 years and 8 years, and were also associated with changes to active or passive modes in the expected directions. Distance to school is consistently observed as playing an overriding role on children’s AST.32,33 This research contributes to this evidence base by providing robust evidence for younger children in their earliest years of school. Taken together, this evidence demonstrates the importance of children having access to schools nearby home to encourage AST, in line with previous research. Policy and practice to ensure equity in liveable neighbourhoods, including connecting schools with communities through safe and walkable school neighbourhoods, are imperative.34 Ongoing consideration and critique of school closures, amalgamation, and school site choice for new developments is essential in the context of supporting sustainable travel modes for children and their families.35,36 Considering threshold distances for biking are longer than for walking,37 it is also likely that providing safe and connected infrastructure for biking could help overcome some distance-related barriers (although the evidence base to date has largely focused on older children and youth).38,39 Additionally, strategies such ‘park and walk’ (i.e., where dedicated spaces for parking away from the school are identified, alongside ensuring safe routes from parking locations to schools), walking school buses, and bike trains may support AST uptake.40-42 Little is known regarding public transport use in this young age group in NZ. School bus routes that are reliable; timely; tailored to where students live, learn, and play; and that connect to other services (e.g., commuter trains) may play an important role in reducing car use and increasing children’s physical activity. Inequities in living further from schools likely exist – for example, those living in remote areas; families wishing to prioritise te reo Māori immersion education (i.e. Kura Kaupapa Māori or Kura ā Iwi) or specialist schools for their children may have to travel further.27 Future research to explore these issues is warranted.

In the cross-sectional analyses at the 8 year survey wave only, children of Pacific ethnicity were significantly less likely than children of NZ European ethnicity to get to school actively. In the NZ context, variable findings have been reported with regard to ethnicity and AST. A 2018 meta-analysis of studies across the country found no significant association between AST and ethnicity.16 However, our most recent (2022) physical activity report card also showed that children and young people of Pacific ethnicity had considerably lower rates of AST than their non-Pacific peers.31 It is possible this scenario has socio-economic drivers. For example, 56% of people of Pacific ethnicity live in areas of high deprivation, compared with 20% of the total population, they are less likely to own their own home, and are more likely to experience overcrowding.43 Area-level deprivation has been associated with lower perceptions of neighbourhood safety and subsequent engagement in local neighbourhood environments.44 While area-level deprivation has been inconsistently linked with walkability,45 lower individual socio-economic status has been associated with residing in areas with lower quality pedestrian infrastructure,46 which may dissuade active travel modes. A higher level of residential mobility has been reported for Pacific people compared with those of European ethnicity,47 which may also impact school travel modes. However, this would not have been the case in the current study, as we limited the 8 year sample to those who had not moved since the 6 year study wave. Previous research has linked a range of socio-economic factors with whether children got to school actively – for example a positive relationship has been observed between AST and area-level deprivation,16 while no meaningful difference by socio-economic status was observed in our 2022 physical activity report card.31 Similarly, in the current research we found no association between AST and area-level deprivation at either age. We also conducted additional analyses and found no significant difference in parent/caregiver perceived distance to school or importance of living close to school for Pacific children compared with non-Pacific children.

There was little change in travel mode over time, with nearly 80% of children remaining with the same travel mode between 6 and 8 years of age. It is worth recalling that only participants who had not shifted home or school were included in the analyses examining change over the two survey waves. Given the significant role of the built environment in supporting active travel modes,16,22,32,48 it is possible that this finding is reflective of the unchanging physical environments of these children. Considering also the evidence for tracking of activity behaviours over time,49 it is possible these trends will continue for these children without a significant shift in how active travel modes are prioritised and supported for children, including the development of supportive physical infrastructure.

It is also possible the findings presented here are a function of the younger age of children in this study, who are just entering their school years.32 Parents may be less likely to allow children in this younger age group to travel to school independently,50 or to simply get around their neighbourhood actively until they are perceived as being old enough,51 ultimately limiting opportunities for AST in early school years. It is likely that a significant age-related shift may occur at later time points (e.g., at the 12-year wave of GUiNZ). Longitudinal work with additional time points is required to explore these patterns in more detail.

Boys were almost twice as likely as girls to shift to AST at 8 years. Inequities in AST for girls are consistently observed in later childhood and into adulthood.52 It is possible that parents allow their boys to transition to having greater autonomy and parental licence for independent mobility at an earlier age than for girls, which could be linked to parents’ perceptions of their child’s ability to navigate their environments safely, or other safety concerns. Findings from the current study highlight the need to ensure equitable opportunities for girls to be able to get to and from school actively.

Child-reported peer relationships at 8 years were associated with significantly greater odds of shifting to active travel modes from 6 to 8 years. As this variable was only assessed at 8 years, we are unable to determine whether child relationships were constant over time and/or impacted AST – it may be that friendships are developed through getting to school actively together, or that having friends living nearby allows for greater AST.53,54 The collection of child perceptions is a useful contribution to this research field, particularly considering differences in perceptions around AST exist between children and parents.55 This novel finding highlights the potential role of social support and peer relationships on AST, and the utility of assessing this factor from children’s perspectives in future research.

Only one variable, school community cohesion at 6 years, was associated with significantly lower odds of shifting from active to passive modes at p < 0.05. This variable captured parental perceptions about the school fostering involvement, other family/friends attending the school, and a sense that their child was happy and felt that they belonged at the school. Earlier research has demonstrated the important role of neighbourhood or community social cohesion and connections in supporting children’s AST and independent mobility.17,56 This research provides new evidence for the importance of social cohesion at the school community level, and its association with travel mode change over time. While the same items were not assessed at 8 years, this finding provides some indication that having established connections and cohesion in the early years of school might help children to maintain AST behaviours over time.

Using a combination of Kaupapa Māori and narrative inquiry methodologies with qualitative data, Jasmine Simpson’s research provided an insight into the levels of AST for Māori children and how these practices impacted the wellbeing and engagement of rangatahi Māori at their respective schools. Themes highlighted a drastic decrease in generational AST commute methods and a range of barriers to AST for tamariki that align with previous research but also included the negative impacts of Covid-19. Rangatahi shared that they enjoyed AST when their whānau or friends walked or cycled with them. Kaiako shared that students who regularly used AST as their commute method to school were often more focused and engaged in their learning.

# Limitations and future directions

## Strengths, limitations, and directions for research

The quantitative analyses for this study involved secondary data analysis from the GUiNZ study, a longitudinal survey of factors across six wellbeing domains. While the study provides comprehensive information on key child wellbeing factors, it was not designed to understand school travel in detail and potential factors of relevance have changed over survey waves. Accordingly, we were not able to explore shifts in key social factors over time, or consider other known factors of importance for AST, in particular safety57 and objective measures of the physical environment16,22,32,48. The addition of objective built environment measurements and other key factors of importance for AST over multiple timepoints (ideally measuring routes travelled) would be worthwhile in future studies. Future research would also benefit from using consistent longitudinal measures of social connections and perceptions of the social environment in this context.

Although the GUiNZ participant numbers at each survey wave exceeded 6,000, it is important to note the current analyses were limited to those who responded to the school travel mode item. For the 8 year cross-sectional analyses and analyses exploring change in travel mode, only children who hadn’t moved from their home or school between the 6 and 8 year survey waves were included. This approach was important to allow us to remove the potential impact of changing environments, however it does mean our findings must be treated with caution and are not generalisable to the wider population.

A strength of this research is the robust, evidence-based approach to examining a range of features hypothesised to relate to young children’s AST. In this study, we drew from the work of Medeiros, Buttazzoni58 and in Ross and Buliung59, in particular recognising the need to address equity in AST studies, including reporting equity considerations. We have highlighted sex inequities in shifting to AST from 6 to 8 years, and reflected on children’s rights and possible inequities in supports for AST and implications for disabled children and Māori tamariki, rangatahi, and their whānau. Other equity factors (e.g., migrant status60) were not able to be explored, but are worthy of examination in future studies, alongside more detailed examination across ethnicity, sex and gender, and disability. In addition, future research would benefit from targeted approaches to understand broader socio-political and ecological impacts on children’s AST including exploring social forces, social justice, and school attendance[[1]](#footnote-1);61, infrastructural deficits in more detail and with an equity lens;22 the impacts of gentrification;62 urban sprawl and geographical inequities;63 equity of amenity access;64 and poverty65 and health injustice66 in relation to children’s AST.

## Summary and recommendations

The persistently low rates of AST revealed in this research highlight an urgent need for policy and practice to enable and encourage active travel modes for *all* tamariki and their whānau. The summary and recommendations are based on the findings of this research, contextualised within the national and international evidence base. An overwhelming body of evidence shows a negative relationship between distance to school and AST across all age groups.16 Parents report the primary barriers to their child’s AST as the infrastructure/built environment (e.g., unsafe or no infrastructure for active modes), unsafe traffic environments, distance to school, concerns about crime-related safety, and lack of social support.18,48 School representative concerns centre on safety on the school journey, with safe transport environments, availability of safe and connected infrastructure for walking and biking, and strong community partnerships (e.g., for bike skills training) being key to supporting AST.57 Modelling of built environment characteristics in relation to AST consistently demonstrate significant links between AST and a shorter distance to school, biking infrastructure, residing in more ‘walkable’ neighbourhoods (i.e., with greater street connectivity, residential density, land use mix, retail floor area ratio, and destination accessibility).17,33,38,39 In terms of interventions, bike trains67 walking school buses68 and multicomponent approaches (e.g., such as Safe Routes to School69 where infrastructural interventions and supportive programmes run in conjunction) have been effective in increasing AST.

While estimating costs of such interventions is beyond the scope of this project, it is worth highlighting a study in Tāmaki Makaurau suggested benefits of 10-25 times greater than costs for transforming urban roads using physical separation on main roads and speed reductions on local streets.70 It is also challenging to determine the potential scale of the impact of infrastructural interventions for active school travel (and possible sub-group differences in impacts). Evidence suggests environmental approaches may have a greater and more sustained impact than individual-focused interventions on behaviour change as the environmental context in which the behaviour occurs remains unchanged.71 Environmental interventions also have a greater reach and impact than individual-focused interventions.72 Local evidence suggests that clear communications and high levels of community engagement are important considerations to optimise AST interventions and avoid unanticipated negative consequences.40

Our findings show that distance remains the overriding factor associated with AST in young children – efforts to ensure children have easy access to, and are supported to attend, schools in close proximity to home are warranted. Considering the low rates of biking in NZ children and that distance thresholds for biking are further than walking, installation of connected biking infrastructure (separated from cars) would overcome some issues with distance. It is essential that programmes that support access to bikes and bike skills training (e.g., Waka Kotahi’s Bike Ready) continue (and ideally are expanded) to ensure all children are able to utilise this infrastructure safely. Connecting with the wider school community to instigate park and walk, scooter squads, bike trains, and walking school bus programmes where feasible for the community would be beneficial. These programmes involve supervision of a group of students for the journey to school. While these generally rely on the parent community for supervision, examples exist of broader community involvement (e.g., 78 year old [Ces Pettit volunteered for Tāmaki Makaurau’s first walking school bus for nearly a decade](http://www.stuff.co.nz/auckland/local-news/central-leader/3577300/Walking-man-steps-down)), which may reduce burden on time-poor parents. Evidence demonstrates the positive impact of such programmes on children’s AST.40,69,73 Moreover, research with children shows children “value a scaffolded approach to their independency by being accompanied by parents and siblings or other adults as for example on walking school buses or cycle trains”34 and that there may be long-lasting impacts of these programmes – with teenage walking school bus graduates “fondly remember[ing] their time on the bus and show ‘traces’ of enthusiasm for walking as an everyday form of active travel in an environment in which driving is the aspirational norm long after they graduated”.34,74 Improved safety around schools and providing safe routes to school are needed, including through improved driver behaviour (reduced speeds, red light running, improved attention and stopping at pedestrian crossings) and provision of safe pedestrian crossings. Current policy initiatives, in particular Waka Kotahi/NZTA’s Improving Transport Choices package, align well with these recommendations.

The implications from the Hauora Māori study demonstrate the need for actions to increase and maintain AST for rangatahi Māori, in particular overcoming challenges of living further away from school (including providing free public transport), increasing the safety of AST routes and increasing accessibility/affordability of weather protective clothing. Evidence suggests a significant association between public transport use and physical activity75 (albeit no such studies have yet been conducted with younger populations across diverse regional contexts). Shifting children from individual motorised cars to public transport is likely to bring considerable benefit in terms of reduced congestion, emissions, and reduced burden on parents. Forthcoming research suggests that providing free public transport results in improved health outcomes, with greater benefits for people residing in lower socio-economic areas compared with higher socio-economic areas.76 Further implications include the increased involvement of whānau and kaiako in the planning and implementation of AST initiatives such as walking school buses.

### Key recommendations are:

* Installation of connected biking infrastructure that is separated from cars around schools.
* Installation of safe pedestrian infrastructure (connected and wide footpaths, safe pedestrian crossings [ideally signalised or raised]).
* Support schools to develop walking school buses, scooter squads, and cycle trains.
* Support agencies, key roles, and groups that deliver AST programmes (including bike skills training and bike share programmes) at local, regional, and national levels (e.g., those delivering Waka Kotahi’s Bike Ready programme, school travel plan co-ordinators, non-government organisations [e.g., Triple Teez], and Community Transport Teams [Auckland Transport]).
* Develop and deliver media packages around improved driver behaviour, especially around schools.
* Apply findings from Waka Kotahi/NZTA’s Innovating Streets programmes that have shown promise for supporting AST – considering slower speeds, low traffic neighbourhoods, school streets, etc.
* Involve whānau and kaiako in the planning and implementation of walking school buses and support those from single parent/working families and those with multiple children.
* Support schools to reduce the cost of weather protective school uniform items (e.g., rain coats and winter hats/beanies). Furthermore, increase funding for schools to provide umbrellas to whānau to increase AST.
* Provide free public transport for all.

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1. Including, but not limited to include education deprivation, migration and discrimination, school funding, school discipline, residential mobility and housing insecurity, adverse childhood experiences, school climate, school victimisation, access to care, and other barriers to school attendance [↑](#footnote-ref-1)