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RESEARCH ARTICLE

# Adolescents' Active Transport to School and Parental Perspectives in a School Choice Policy Environment

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Internationally many adolescents do not meet the recommended level of regular physical activity. Although active transport to school (ATS) is promoted to increase physical activity in adolescents, relying solely on ATS is not feasible for those who live beyond walkable or cyclable distance to school. School choice education policies complicate the potential of ATS when adolescents do not enrol in the closest school. This research contributes to sparse New Zealand and growing international literature to examine parental perspectives on school choice, travel to school decisions and modes of travel to school in adolescents enrolled in the closest versus non-closest school.

We analysed questionnaire responses from 352 parents in Dunedin, differentiating results for enrolment in the closest versus non-closest school. Overall, only 38.9% of adolescents enrolled in their closest school. The adolescents who enrolled in their closest school lived closer to school and more frequently used ATS compared to their peers who enrolled in a non-closest school (home-to-school distance (walkable (≤2.25 km)/cyclable (>2.25–4.0 km)/beyond cyclable (>4.0 km)): 47.4%/27.8%/24.8% versus 4.8%/20.3%/74.9%; $p < 0.001$; transport to school (active/motorised/mixed): 40.9%/56.9%/2.2% versus 9.3%/82.7%/7.9%; $p < 0.001$). Nearly three-quarters of school choice decisions were made by parents jointly with their adolescent. Parents whose adolescent enrolled in the closest school more frequently reported proximity to home, social connection and school's co-educational status (only for adolescents enrolled in co-educational school) as reasons for school choice compared to their counterparts. Mixed-mode initiatives may support adolescents to increase ATS when they attend a school beyond cyclable distance.

**Keywords:** School choice; active transport; school; parents; adolescents

## 1 Background

Globally, four out of five adolescents are not sufficiently physically active (Guthold *et al.*, 2020). Insufficient physical activity is also an issue for New Zealand adolescents. Recent evidence showed that 62% of 11–14-year-olds and 47% of 15–17-year-olds self-reported meeting the recommendations of 420 minutes per week of moderate-to-vigorous-intensity physical activity in New Zealand (Wilson *et al.*, 2023). Physical activity for adolescents includes a range of activities such as organised sports and physical activity, active play, school-based physical activity and active transport to school (ATS) (Wilson *et al.*, 2023). Activities such as ATS can contribute to increasing and maintaining higher levels of physical activity in adolescents (Kek *et al.*, 2019; Khan, Mandic and Uddin, 2021) and play an important role in achieving physical activity recommendations in this age group. In addition to contributing to public health goals of increasing physical activity, promoting active transport also contributes to societal interest in alternatives to private vehicle transport and sustainability concerns (World Health Organization, 2018).

Rates of ATS among adolescents, however, remain low and have been declining in many developed countries in recent decades (Chillón *et al.*, 2013; McDonald, 2007), including New Zealand (Ministry of Transport, 2015; Smith *et al.*, 2019; Wilson *et al.*, 2023). In New Zealand, the rates of adolescents being driven to secondary school increased significantly from 21% in 1989–1990 to 32% in 2010–2014 (Ministry of Transport, 2015). The private vehicle dominance for transport to school in New Zealand is not surprising given the high rates of private vehicle ownership (Te Manatū Waka Ministry of Transport, n.d.), urban sprawl (Stephenson *et al.*, 2018), and educational policies that enable school choice (Gordon, 2015; Mandic *et al.*, 2018) as well as additional factors such as time constraints experienced by modern families (Skarin *et al.*, 2017), convenience of trip chaining when travelling by private vehicle (Gustat *et al.*, 2015), limited availability and/or suitability of public transport for school travel (Mindell *et al.*, 2021), and adolescents' preference for car-based transport (Hopkins, García Bengoechea and Mandic, 2021).

In New Zealand, only 22% of adolescents in school years 7–10 (approximate age 12–15 years) used active transport to/from school during the 2019–2020 period (Wilson *et al.*, 2023). Recent research reported lower rates of walking to school among New Zealand adolescents 1–2 years since the onset of the COVID-19 pandemic compared with 5–6 years before the pandemic (Mandic *et al.*, 2024). Given the multiple benefits of ATS on adolescents' health and academic achievement as well as social, environmental and economic benefits (Gössling *et al.*, 2019; Larouche *et al.*, 2014; Waygood *et al.*, 2017), it is important to understand and address concerning trends of declining rates of ATS in this age group.

Distance is the strongest determinant of ATS (Ikeda *et al.*, 2018; McDonald, 2007) and has an impact on what adolescents (Mandic *et al.*, 2022) and their parents (Mandic *et al.*, 2020) think about walking and cycling to school. In recent decades there has been evidence of a shift away from neighbourhood schools, which led to an increase in the distance that children and adolescents must travel to get to school (McDonald, 2007). The selection of a school other than the neighbourhood school has been enabled through the school choice education policies in some developed countries (Chumacero, Gómez and Paredes, 2011; Makarewicz, 2013), including New Zealand (Gordon, 2015; Mandic *et al.*, 2018).

School choice educational policy informed by neo-liberal economic theories is a global phenomenon found in Latin America, Africa, China, the USA, the UK, and India (Fox and Buchanan, 2017). Neoliberal theories emphasise the free market, individual choice, competition, and limited government intervention to deliver goods – in this case, education. In New Zealand, school choice educational policies instituted in the late 1980s (Gordon, 2015) sought to provide parents and students with "maximum choice" and develop competition between schools to increase education quality (Department of Education, 1988, p36). Proponents of school choice argue students benefit from the opportunity to select a school that best meets their needs, providing opportunities to increase academic achievement and enhance educational equity (Chubb and Moe, 1990). Critics, however, highlight unintended consequences including but not limited to decreased opportunities for physical activity due to increased travel distances to school and consequently reduced rates of ATS (He and Giuliano, 2018).

There is a wide range of school choice programmes on offer, making comparisons difficult across studies. Internationally, greater educational choice has been provided to parents and students through vouchers (Chumacero, Gómez and Paredes, 2011), magnet schools featuring a specialised curriculum, charter schools (Makarewicz, 2013) and intra-district transfers (Phillips, Hausman and Larsen, 2012). In New Zealand, the flexible construction of school zones and enrolment schemes for secondary schools delivers school choice to some families (Thomson, 2010). The flexibility means students may not have to live in the home zone to attend the school of their choice (Ministry of Education, 2019), although they have the right to attend their local school. For schools with an enrolment scheme due to the potential for overcrowding, a student may need to meet certain criteria (such as being accepted into a school's special programme or having a sibling at the school).

Numerous reasons drive parental school choice decision-making (Prieto *et al.*, 2019). Some studies suggest factors such as the ethnicity and social class of parents can influence parental school choice decision-making (Boterman, 2021; Gordon, 2015; Harker, 2000). Considerations include proximity from home and convenience of a school located closer to home (Bell, 2009; Wylie and Bonne, 2016), school characteristics such as co-educational status (Jackson and Bisset, 2005), school's character (or religious affiliation) (Jackson and Bisset, 2005), social connections (such as friends or siblings attending the chosen school) (Ruijs and Oosterbeek, 2019; Wylie and Bonne, 2016), school facilities and programmes (Bosetti and Pyryt, 2007; Prieto *et al.*, 2019; Wylie and Bonne, 2016), and information gathered through social networks (Altenhofen, Berends and White, 2016; Kosunen, 2014; Wylie and Bonne, 2016). Some New Zealand-based studies have found that parents use the Ministry of Education funding mechanism known as "school deciles" to select schools of a higher decile under the assumption that the school is of a higher quality (Gordon, 2015; Thomson, 2010).

School choice policies and consequent increases in distance to school inevitably have an impact on how children and adolescents travel to school, resulting in reduced rates of ATS and increased reliance on motorised transport to school (Easton and Ferrari, 2015; He and Giuliano, 2018; Van Ristell *et al.*, 2013). Research from Dunedin, New Zealand reported five times higher rates of ATS among adolescents who enrolled in the closest versus non-closest school (47% versus 9%) coupled with lower rates of motorised transport to school (40% versus 69%, respectively) (Mandic *et al.*, 2017b). In the same city, 43% of adolescents enrolled in the closest school (Mandic *et al.*, 2023b) half of adolescents attended a non-closest school beyond walkable distance from their home (Mandic *et al.*, 2023a) and one in ten car trips during school pick-up and drop-off times were related to secondary school travel (Keall *et al.*, 2020). School principals perceived that how adolescents travelled to/from school was a family decision and were unwilling to establish policies that might impact adolescents' or

parental choice regarding school travel (Sandretto *et al.*, 2020). More recent findings that took into account distance to school showed that the rates of ATS were higher among adolescents who lived within walkable distance to their school, regardless of whether they enrolled in the closest or a non-closest school (Mandic *et al.*, 2023b). Those findings showed that distance to school had a greater impact on how adolescents travel to school than the enrolment in the closest or non-closest school. Researchers have offered several solutions to increase ATS among adolescents including changes to educational policies for school zoning (Ikeda *et al.*, 2018), urban planning considerations for where schools are located (Ikeda *et al.*, 2018), social marketing campaigns (Wilson *et al.*, 2023), or addressing safety concerns (Easton and Ferrari, 2015). In addition, initiatives promoting mixed-mode travel (combining active and motorised travel as part of a single journey) may increase adolescent ATS (Egli *et al.*, 2020) and have been suggested as one of the strategies for encouraging ATS among adolescents who live beyond walking or cycling distance to their school (Mandic *et al.*, 2023a).

Studies have examined parental perspectives on school choice (Prieto *et al.*, 2019), the lack of adolescent uptake of ATS (Wilson *et al.*, 2023), and the increase in travel distance to school under school choice educational policies (Keall *et al.*, 2020; Mandic *et al.*, 2023b). While the literature is clear that the closer the school the more likely adolescents will use ATS (Ikeda *et al.*, 2018), the literature is less clear on the influence of parental perspectives on the choice of school and the subsequent follow-on effects on travel distance and adolescents' travel to school patterns. Our study addresses this gap. The purpose of this research is to contribute to sparse New Zealand and growing international literature to examine parental perspectives on school choice, travel to school decisions and modes of travel to school in adolescents enrolled in the closest versus non-closest school.

## 2 Methods

This research was conducted in Dunedin, New Zealand. A total of 365 parents were recruited as part of the Built Environment and Active Transport to School Study [BEATS] in 2014–2017 (Mandic *et al.*, 2016). Parent participants were recruited through schools, workplaces, social media and at sport events for adolescents and signed consent either online or on paper. Participants entered a draw for an iPad or one of three NZD$250 (~USD$180) grocery or petrol vouchers. The study protocol was approved by the University of Otago Human Ethics Committee (reference number: 13/203). In cases where two parents from the same address completed the survey, data from mothers (n = 8) were removed from the sample. In addition, participants who had an adolescent boarding at school or privately (n = 3) and did not answer school choice-related questions (n = 2) were excluded, resulting in 352 parents for this analysis.

Parents completed a 20- to 25-minute questionnaire online or on paper. Parents self-reported their sociodemographic characteristics (including their age, gender, ethnicity, marital status, employment status, education level) as well as family-related factors (home address, the number of individuals, children, vehicles and drivers in a household). Parents also reported age, gender and driving licence status of their eldest child enrolled in a secondary school. Ethnicity was categorised into five ethnic groups (Māori, Pacific, Asian, New Zealand European and Other) using prioritised ethnicity for New Zealand (Ministry of Health, 2004) and subsequently recategorised into three groups (Māori, New Zealand European and Other) due to the small number of participants in some categories. The home address was geocoded and used to determine a New Zealand index of deprivation, which is a measure of neighbourhood-level socioeconomic status (Salmond, Crampton and Atkinson, 2007). The New Zealand index of deprivation index was recoded from the original 10-point scale (1 = least deprived to 10 = most deprived) into five categories: lowest (1–2), middle-low (3–4),

middle (5–6), middle-high (7–8) and highest (9–10) deprivation score. The home address was also used to calculate the shortest network distance from home to the adolescents' school using Geographic Information System (GIS) network analysis (Mandic *et al.*, 2016).

School-related variables included co-educational status (co-educational, boys only or girls only schools), school's character (integrated (i.e., special character school) versus non-integrated (regular) school), and school decile. School decile is not a measure of the socioeconomic status or the quality of the school but rather a funding mechanism used by the New Zealand Ministry of Education based on the proportion of students with low socioeconomic status as defined by the student's residential address (Ministry of Education, 2022b). The 10% of schools with the highest proportion of students from low socioeconomic communities are Decile 1 schools and attract the most funding. In New Zealand, private schools with a religious or philosophical special character that teach the New Zealand curriculum are referred to as "integrated schools"(Ministry of Education, 2022a).

Parents reported adolescents' travel to school habits using the question "How does your child usually travel to school?" for different transport modes, using response categories "never", "rarely", "sometimes", "most of the time" and "all of the time". Transport mode(s) used by adolescents "most of the time" and/or "all of the time" were used as a basis for classifying adolescents into ATS, motorised transport or combined active and motorised transport users (Mandic *et al.*, 2023a). Parents were also asked who decided how their adolescents travelled to school.

Questionnaire items related to school choice asked parents if their child initially enrolled in the closest secondary school and who chose the secondary school (child, parent, child and parent together, or someone else). Using the stem "The reasons why this secondary school was chosen for my child are because…", parent participants were asked to indicate how much they agreed or disagreed with 14 items related to reasons for school choice. Parents were also given an opportunity to specify other reasons as an open-ended response. School choice related responses were recorded on a 5-point Likert scale ranging from 1 = strongly disagree to 5 = strongly agree and an additional "I don't know" response option was provided. "I don't know" responses were excluded from the continuous variable analyses. To provide a complementary view of the data indicating proportion of parents agreeing with each statement, four-category variables were created from the original variables by recoding original responses as follows: "strongly disagree" and "disagree" were recoded into "disagree"; "neither agree nor disagree" was coded as "neutral"; "strongly agree" and "agree" were recoded as "agree"; and "I don't know" responses were retained. School choice questions for the parental surveys were designed by the BEATS research team based on input from secondary schools and school principals in Dunedin, New Zealand and all participating schools had the opportunity to provide feedback.

Differences between parents whose adolescents enrolled in the closest versus non-closest school were compared using the $\chi^2$-test for categorical variables and the t-test for independent samples for continuous variables. A p-value of less than .05 was chosen to indicate statistical significance. Data are reported as frequency (percentage) for categorical variables and mean ± standard deviation for continuous variables. Data analysis was performed using SPSS Statistical Package (Version 27).

## 3 Results

### *3.1 Demographic characteristics of survey participants*

Parent participants were mostly married, females of New Zealand European ethnicity, living in low-deprivation neighbourhoods, and over half had a university education and worked full-time (**Table 1**). In comparison with the 2018 Census data for New Zealand, this study had a

**Table 1:** Parental sociodemographic characteristics and family factors.

| | Total sample | Child enrolled in the closest school | | | Census 2018 data[a] |
|---|---|---|---|---|---|
| | | Yes | No | p-value | |
| | (n = 352) | (n = 137) | (n = 215) | | |
| **Parent participants** | | | | | |
| Age (years) | 47.5 ± 5.1 | 47.5 ± 5.0 | 47.5 ± 5.2 | .482 | N/A |
| Gender [n(%)][b] | (n = 352) | | | | |
| Male | 79 (22.4%) | 31 (22.6%) | 48 (22.3%) | | 49% |
| Female | 273 (77.6%) | 106 (77.4%) | 167 (77.7%) | .947 | 51% |
| Ethnicity [n(%)][b,c] | (n = 342) | | | | |
| New Zealand European | 267 (78.1%) | 106 (78.5%) | 161 (77.8%) | | 64% |
| Māori | 22 (6.4%) | 11 (8.1%) | 11 (5.3%) | | 17% |
| Other | 53 (15.5%) | 18 (13.3%) | 35 (16.9%) | .427 | 35% |
| Neighbourhood deprivation score [n(%)] | (n = 347) | | | | |
| 1 (least deprived) | 125 (36.0%) | 42 (31.3%) | 83 (39.0%) | | N/A |
| 2 | 92 (26.5%) | 46 (34.3%) | 46 (21.6%) | | N/A |
| 3 | 65 (18.7%) | 23 (17.2%) | 42 (19.7%) | | N/A |
| 4 | 47 (13.5%) | 16 (11.9%) | 31 (14.6%) | | N/A |
| 5 (most deprived) | 18 (5.2%) | 7 (5.2%) | 11 (5.2%) | .133 | N/A |
| Marital status[d] | (n = 346) | | | | |
| Married | 255 (74.7%) | 103 (75.7%) | 152 (72.4%) | | 49% |
| Widowed/divorced/separated | 37 (10.7%) | 12 (8.8%) | 25 (11.9%) | | 16% |
| Single and never married | 13 (3.8%) | 7 (5.1%) | 6 (2.9%) | | 35% |
| Living with partner | 41 (11.8%) | 14 (10.3%) | 27 (12.9%) | .481 | N/A |
| Employment outside home[d] | (n = 346) | | | | |
| Unemployed | N/A | N/A | N/A | | 6% |
| 0–15 h/week (none or less than part time) | 36 (10.4%) | 15 (11.0%) | 21 (10.0%) | | N/A |
| 16–35 h/week (part time) | 122 (35.3%) | 51 (37.5%) | 71 (33.8%) | | 21% |
| ≥36 h/week (full time) | 188 (54.3%) | 70 (51.5%) | 118 (56.2%) | .690 | 73% |
| Highest level of education[d] | (n = 346) | | | | |
| Less than high school | 3 (0.9%) | 1 (0.7%) | 2 (1.0%) | | 24% |
| High school | 84 (24.3%) | 33 (24.3%) | 51 (24.3%) | | 32% |
| Polytechnic degree | 54 (15.6%) | 14 (10.3%) | 40 (19.0%) | | 19% |

(Contd.)

| | Total sample | Child enrolled in the closest school | | | Census 2018 data[a] |
|---|---|---|---|---|---|
| | | Yes | No | p-value | |
| | (n = 352) | (n = 137) | (n = 215) | | |
| University degree | 196 (56.6%) | 84 (61.8%) | 112 (53.3%) | | 25% |
| Other | 9 (2.6%) | 4 (2.9%) | 5 (2.4%) | .264 | 0% |

[a]The 2018 Census data were obtained from New Zealand Census 2018 dataset provided by StatsNZ (https://www.stats.govt.nz/).
[b]The 2018 Census data were based on the total resident population of New Zealand.
[c]The 2018 Census ethnicity data include multiple responses from individuals who identified with more than one ethnic group.
[d]The 2018 Census data were based on the resident population 15 years of age and over (without taking into account whether residents were parents or guardians of school-age children or not).

higher proportion of females (77.6% vs. 51%) married adults (74.7% vs. 49%), those who identified as New Zealand European (78.1% vs. 64%) and individuals with university degrees (56.5% vs. 25%) and a lower proportion of those who were employed in full-time work (54.3% vs. 73%) (**Table 1**). It is important to note that the 2018 Census data demographic data are not directly comparable to the demographic characteristics of the current study sample since the Census data are for New Zealand residents aged 15 years or older, not necessarily adults who are parents or guardians of school-age children, as in our sample. In addition, the 2018 Census ethnicity data contain multiple responses for those who identified with more than one ethnic group whereas ethnicity data reported in this study are based on prioritised ethnicity for New Zealand (Ministry of Health, 2004), which classifies participants into only one ethnicity category based on standard procedures. Nevertheless, a greater proportion of female participants in this study – and potentially also a lower proportion of individuals in full-time employment – compared to the general population in New Zealand is not unexpected given that mothers often take on the primary caregiver role for their children. A much higher proportion of individuals with university degrees in this study sample compared to the New Zealand general population is also not surprising given that the study city, Dunedin, is a university town.

On average, the children of survey participants were 14.9 ± 1.6 years of age, with a similar proportion of boys and girls (**Table 2**). The majority of participating households had two or more vehicles, and nearly one-fifth of the adolescents had a driving licence. Overall, 41.2% of adolescents enrolled in a co-educational school, 31.3% in a girls-only school and 27.6% in a boys-only school, while 27.6% of adolescents were enrolled in an integrated school. In the total sample, 38.9% of parents reported that their child initially enrolled in the secondary school closest to their home.

Most of sociodemographic and family characteristics of children enrolled in the closest versus a non-closest school were not significantly different. Adolescents enrolled in the closest school more frequently attended a co-educational school and a non-integrated school compared to their peers who enrolled in a non-closest school (**Table 2**).

### *3.2 Distance to school and adolescents' school travel patterns*

Researchers have identified large variability between countries concerning the range of distances considered reasonable for adolescents walking or cycling to school (Calverley *et al.*, 2022). The threshold distances for adolescents utilising walking for ATS range from 1.4 km to 3.0 km (Bere *et al.*, 2008; Chillón *et al.*, 2015; D'Haese *et al.*, 2011; Nelson *et al.*, 2008; Pocock *et al.*,

**Table 2:** Child, family and school characteristics.

| | Total sample | Child enrolled in the closest school | | |
|---|---|---|---|---|
| | | Yes | No | p-value |
| | (n = 352) | (n = 137) | (n = 215) | |
| **Child's characteristics** | | | | |
| Age (years) | 14.9 ± 1.6 | 14.9 ± 1.6 | 14.9 ± 1.6 | .389 |
| Gender [n(%)] | | | | |
| Boys | 168 (47.7%) | 70 (51.1%) | 98 (45.6%) | |
| Girls | 184 (52.3%) | 67 (48.9%) | 117 (54.4%) | .313 |
| Child lives at parents' address (days/week) | 6.9 ± 0.7 | 6.9 ± 0.7 | 6.9 ± 0.7 | .289 |
| Child has driving licence (%) | 69 (19.6%) | 26 (19.0%) | 43 (20.0%) | .814 |
| **Family characteristics** | | | | |
| Number of people in a household (n) | 4.0 ± 1.1 | 4.0 ± 1.0 | 4.0 ± 1.1 | .402 |
| Number of children | | | | |
| One | 52 (14.8%) | 19 (13.9%) | 33 (15.3%) | |
| Two | 172 (48.9%) | 63 (46.0%) | 109 (50.7%) | |
| Three or more | 128 (36.4%) | 55 (40.1%) | 73 (34.0%) | .500 |
| Highest level of education of most educated adult in household | (n = 346) | | | |
| Less than high school | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) | |
| High school | 56 (16.2%) | 21 (15.4%) | 35 (16.7%) | |
| Polytechnic degree | 54 (15.6%) | 17 (12.5%) | 37 (17.6%) | |
| University degree | 227 (65.6%) | 94 (69.1%) | 133 (63.3%) | |
| Other | 9 (2.6%) | 4 (2.9%) | 5 (2.4%) | .576 |
| Number of vehicles in a household (%) | | | | |
| None | 4 (1.1%) | 2 (1.5%) | 2 (0.9%) | |
| One | 86 (24.4%) | 37 (27.0%) | 49 (22.8%) | |
| Two or more | 262 (74.4%) | 98 (71.5%) | 164 (76.3%) | .586 |
| Number of licensed drivers in a household (n) | 2.1 ± 0.7 | 2.1 ± 0.7 | 2.2 ± 0.7 | .085 |
| **School characteristics** | | | | |
| Co-education status | | | | |
| Co-educational school | 145 (41.2%) | 86 (62.8%) | 59 (27.4%) | |
| Girls-only school | 110 (31.3%) | 25 (18.2%) | 85 (39.5%) | |
| Boys-only school | 97 (27.6%) | 26 (19.0%) | 71 (33.0%) | <.001 |

(Contd.)

| | Total sample | Child enrolled in the closest school | | |
|---|---|---|---|---|
| | | Yes | No | p-value |
| | (n = 352) | (n = 137) | (n = 215) | |
| School decile (1 = highest government funding; 10 = lowest government funding) | 7.8 ± 1.7 | 7.4 ± 1.6 | 8.0 ± 1.7 | <.001 |
| School's character | | | | |
| Integrated (special character school) | 97 (27.6%) | 25 (18.2%) | 72 (33.5%) | |
| Non-integrated (regular school) | 255 (72.4%) | 112 (81.8%) | 143 (66.5%) | .002 |

2019), while the cycling distances range from 3.0 km to 8.0 km (Bere *et al.*, 2008; Nelson *et al.*, 2008; Van Dyck *et al.*, 2010). In this study, walkable distance was defined as ≤2.25 km and cyclable distance as >2.25–4.0 km, based on previous research for reasonable walking (Pocock *et al.*, 2019) and cycling distances (Nelson *et al.*, 2008) for adolescents' travel to school. Overall, 47.5% of the adolescents who enrolled in the closest school lived within walking distance and 27.8% lived within cyclable distance to their school. Comparatively, 4.8% of students who enrolled in a non-closest school lived within walking distance and 20.3% lived within cyclable distance to their school ($p < .001$). However, it is important to note that 24.8% of adolescents who enrolled in the closest school also lived beyond cyclable distance from their school.

In the total sample, parents reported that nearly three-quarters of adolescents used motorised transport to get to school, just over one-fifth used ATS and a small minority used mixed modes (combinations of active and motorised transport) (**Table 3**). Adolescents who enrolled in the closest school had significantly higher rates of ATS, and lower rates of motorised transport and mixed modes (**Table 3**). Parents reported that school travel decisions were largely made by the adolescents and parents together with no significant difference between those whose adolescents enrolled in the closest versus a non-closest school. (**Table 3**).

### *3.3. School choice decision-making*

In this study, parent participants reported that 72.7% of school choice decisions were made by parent(s) and the adolescent together, 13.9% by the adolescent themselves and 13.4% by parent(s) alone. Who made school choice decision differed significantly between those who enrolled in the closest school versus enrolment in a non-closest school. For the adolescents who enrolled in the closest school, 74.5% of the decisions were made jointly, 8.8% of the decisions were made by the adolescent and 16.8% were made by the parent alone. In comparison, the decision to enrol in the non-closest school was made 71.6% jointly, 17.2% by the adolescent alone and 11.2% were made by parents alone ($p = .041$).

### *3.4. Parental perspectives on school choice*

In the overall sample, parents most frequently reported school facilities (80.6%) and positive comments from parents (75.1%) and students (68.5%) as reasons for their school choice (**Table 4**). For parents whose adolescents enrolled in a co-educational school, 69.4% also indicated that the co-educational status of the school was one of the reasons for choosing such a school. Approximately 40% of parent participants reported their child's friends going to a particular school (39.7%), while half of them reported cultural programmes offered at school (49.6%) to be reasons for choosing a particular school. In the total sample, one-third of parents reported proximity to home to be a reason for school choice.

**Table 3:** Distance to school, adolescents' travel to school patterns and school travel decision making in the total sample by enrolment in the closest versus non-closest school.

| | Total sample | Child enrolled in the closest school | | |
|---|---|---|---|---|
| | | Yes | No | p-value |
| | (n = 352) | (n = 136) | (n = 215) | |
| **Distance to school** | | | | |
| Walkable distance (≤2.25 km) (%) | 73 (20.7%) | 63 (47.4%) | 10 (4.8%) | |
| Cyclable distance (>2.25–4.0 km) (%) | 79 (22.4%) | 37 (27.8%) | 42 (20.3%) | |
| Beyond cyclable distance (>4.0 km) (%) | 188 (53.4%) | 33 (24.8%) | 155 (74.9%) | <.001 |
| Average distance (km) | 7.4 ± 7.7 | 4.1 ± 5.3 | 9.5 ± 8.3 | <.001 |
| **Travel to school** | | | | |
| Usual transport to school for adolescents (used most or all of the time) (%) | | | | |
| Active transport only | 76 (21.7%) | 56 (40.9%) | 20 (9.3%) | |
| Motorised transport only | 255 (72.6%) | 78 (56.9%) | 177 (82.7%) | |
| Combined active and motorised transport | 20 (5.7%) | 3 (2.2%) | 17 (7.9%) | <.001 |
| Who decided how student travels to school | | | | |
| Parent | 133 (37.9%) | 44 (32.1%) | 89 (41.6%) | |
| Adolescent | 25 (7.1%) | 14 (10.2%) | 11 (5.1%) | |
| Adolescent and parent together | 184 (52.4%) | 76 (55.5%) | 108(50.5%) | |
| Other(s) or circumstances | 9 (2.6%) | 3 (2.2%) | 6 (2.8%) | .137 |

School's proximity to home was more frequently reported as a reason for school choice by parents whose adolescents enrolled in the closest versus a non-closest school (78.1% versus 4.7%; $p < .001$; **Table 4**). Parents of adolescents who enrolled in the closest school more frequently reported social connections (child's friends' and siblings' enrolment in the school or parents/other family members previously attending the same school) and co-educational status of the school (for adolescents enrolled in co-educational school only) as reasons for choosing a particular school compared to their counterparts whose adolescents enrolled in a non-closest school. Although only a small proportion of parent participants reported negative comments from parents and students about the closest school as a reason for the school choice, not surprisingly most of those comments were reported by parents whose adolescents enrolled in the non-closest school and were therefore significantly different between the two groups ($p < .001$).

## 4. Discussion

The key findings of this study are: 1) overall, nearly half of parents whose adolescents enrolled in the closest school lived within walking distance and one-quarter lived within cycling distance from their child's school whereas three-quarters of parents whose adolescents enrolled in a non-closest school lived beyond cycling distance to their school; 2) four in ten adolescents enrolled in the closest school used ATS compared to one in ten of those who enrolled in a

**Table 4:** School choice decision-making and reasons for choosing a particular school.

| | Total sample (n = 352) | | Child enrolled in the closest school | | | | p-value |
|---|---|---|---|---|---|---|---|
| | | | Yes (n = 137) | | No (n = 235) | | |
| | Average (mean ± SD) | Agree n (%) | Average (mean ± SD) | Agree n (%) | Average (mean ± SD) | Agree n (%) | |
| **Proximity to home** | | | | | | | |
| Closest school to home | 2.5 ± 1.6 | 117 (33.4%) | 4.1 ± 1.1 | 107 (78.1%) | 1.5 ± 0.9 | 10 (4.7%) | <.001 |
| **Co-educational status** | | | | | | | |
| Preferred a co-educational school[a] (n = 143) | 4.0 ± 1.2 | 100 (69.4%) | 4.1 ± 1.1 | 62 (72.9%) | 3.7 ± 1.3 | 38 (64.4%) | .040 |
| Preferred a single-sex school[b] (n = 200) | 3.5 ± 1.2 | 95 (47.5%) | 3.4 ± 1.3 | 21 (41.2%) | 3.5 ± 1.2 | 74 (49.7%) | .398 |
| **Social connections** | | | | | | | |
| Child's friends were going to this school | 2.8 ± 1.5 | 138 (39.7%) | 3.2 ± 1.5 | 69 (51.5%) | 2.5 ± 1.5 | 69 (32.2%) | <.001 |
| Child's siblings went or go to this school[c](n = 304) | 2.2 ± 1.5 | 65 (22.0%) | 2.8 ± 1.6 | 40 (35.1%) | 1.8 ± 1.3 | 25 (13.8%) | <.001 |
| Parents or other family members went to this school | 2.1 ± 1.4 | 71 (20.5%) | 2.3 ± 1.5 | 36 (27.3%) | 1.9 ± 1.3 | 35 (16.4%) | .004 |
| **Programmes and facilities** | | | | | | | |
| Facilities at this school | 4.1 ± 0.9 | 282 (80.6%) | 4.1 ± 0.8 | 113 (82.5%) | 4.1 ± 0.9 | 169 (79.3%) | .350 |
| Sports programmes at this school | 3.6 ± 1.2 | 203 (58.3%) | 3.5 ± 1.1 | 75 (56.0%) | 3.6 ± 1.2 | 128 (59.8%) | .218 |
| Cultural programmes at this school | 3.5 ± 1.0 | 173 (49.6%) | 3.5 ± 1.0 | 65 (47.8%) | 3.5 ± 1.0 | 108 (50.7%) | .387 |
| **Positive comments about the school** | | | | | | | |
| Positive comments from parents of this school | 4.1 ± 0.9 | 260 (75.1%) | 4.0 ± 0.9 | 100 (74.1%) | 4.1 ± 1.0 | 160 (75.8%) | .176 |
| Positive comments from students of this school | 4.0 ± 1.0 | 237 (68.5%) | 3.9 ± 0.9 | 89 (66.4%) | 4.0 ± 1.0 | 148 (69.8%) | .275 |
| **Negative comments about the closest school** | | | | | | | |
| Negative comments from parents at closest school | 1.9 ± 1.1 | 26 (7.5%) | 1.6 ± 0.9 | 1 (0.7%) | 2.1 ± 1.1 | 25 (11.8%) | <.001 |
| Negative comments from students at closest school | 1.8 ± 1.0 | 18 (5.2%) | 1.5 ± 0.8 | 0 (0.0%) | 2.0 ± 1.1 | 18 (8.6%) | <.001 |
| Other reasons | 1.9 ± 1.6 | 85 (24.1%) | 1.6 ± 1.4 | 24 (17.9%) | 2.2 ± 1.8 | 61 (29.9%) | .005 |

Categorical data coded as "agree", "neutral", "disagree" and "I do not know".
Continuous variables used a 5-point Likert scale 1 = Strongly disagree to 5 = Strongly agree ("I don't know" category has been excluded).
[a]Data analysed only for students who attended co-educational school only; [b]Data analysed only for students who attended single-sex school only; [c]Data analysed only for students who have at least one sibling.

non-closest school; 3) in this study, parent participants reported that three-quarters of school choice decisions were made jointly by parents and their adolescents; and 4) parents whose adolescents enrolled in the closest school more frequently reported proximity of school, social connections and co-educational status (only for adolescents enrolled in co-educational school) as their reasons for school choice compared to their counterparts. Taken together, the findings from this study underscore the importance of considering the home-to-school distance in combination with the complexity characteristic of the educational policy environment when examining the implications of school choice decisions for ATS. Strong evidence suggests that home-to-school distance is the main determinant of whether adolescents use ATS (Ikeda *et al.*, 2018; McDonald, 2007). Therefore, the development of policies and practices designed to increase ATS rates in adolescents will need to consider home-to-school distance and the location of schools in proximity to residential areas, as well as the school type (co-educational, single-sex or special character). Importantly, initiatives will need to include parents and adolescents as they are jointly involved in school choice decision-making.

In this study, distance to school was significantly shorter for adolescents who enrolled in the closest school compared to those who did not. Specifically, approximately three-quarters of adolescents enrolled in the closest school lived within cycling distance to their school compared to only one-quarter of their peers who enrolled in the non-closest school. Given that home-to-school distance is the strongest correlate of ATS in adolescents (Ikeda *et al.*, 2018; McDonald, 2007), it is not surprising that rates of ATS were five times higher among adolescents who enrolled in the closest versus non-closest schools. Previous research has clearly demonstrated that school choice policies led to increased home-to-school distance and reduced rates of walking and cycling to school in children and adolescents (Wilson *et al.*, 2010; Wilson, Wilson and Krizek, 2007; Yang, Abbott and Schlossberg, 2012). In addition, school choice policies also contribute to increased reliance on motorised transport for school commute (Easton and Ferrari, 2015; He and Giuliano, 2018; Van Ristell *et al.*, 2013), which results in higher traffic volumes, traffic congestion around schools during school commute times, air pollution and intensified adolescents' and parental safety concerns for walking and cycling to school (Frank and Engelke, 2005; Hopkins and Mandic, 2017; Keall *et al.*, 2020; Mandic *et al.*, 2017a; Mandic *et al.*, 2020).

Interestingly, recent research from New Zealand showed that distance to school has a greater effect than school choice itself on how adolescents travel to school (Mandic *et al.*, 2023b). When school choice and adolescents' school travel patterns were examined while accounting for home-to-school distance, transport to school patterns were similar among adolescents who lived within walking distance to their school, regardless of whether they enrolled in the closest school or not (Mandic *et al.*, 2023b). Therefore, whether enrolment in the closest school enables reliance on ATS and whether choosing a non-closest school has negative consequences on adolescents' ATS rates depends on the school location relative to where adolescents live. In the current study, one-quarter of adolescents who enrolled in the closest school lived beyond cycling distance to school. Those adolescents are unlikely to use ATS to school (Mandic *et al.*, 2023a), even if they enrolled in the closest school. The highest rates of ATS could be achieved by locating schools in high-density residential areas coupled with a school zoning policy that requires students to attend the closest school (Yang and Diez-Roux, 2013).

In this study, three-quarters of school choice decisions were made by parent(s)/guardian(s) and their adolescent together. Some studies have examined school-choice decision-making from the point of view of parents (Jackson and Bisset, 2005; Prieto *et al.*, 2019). Other studies have considered the school choice decision-making process from the point of view of

adolescents (Mandic *et al.*, 2018). The finding that such a high proportion of adolescents are making the decision along with their parents suggests that a collaborative process might be leveraged to increase ATS. Long et al.'s (2015) survey study with 934 New Zealand high school students explored the influence of friends and parents on travel mode. Although Long et al.'s (2015) study did not consider school choice educational policies, they did find strong evidence that parental encouragement for active travel modes could predict adolescent use of ATS, even when travel by car was readily available. The finding in our study that adolescents and parents are making the decision together highlights the importance of comprehensive research working with relevant family members to better understand the relationship between who is making the school choice and what is influencing that choice in light of the impact of that choice on whether or not adolescents will use ATS.

Parental reasons for school choice varied for the closest versus the non-closest school enrolment. Parents whose adolescent was enrolled in the closest school preferred the closest school because of its proximity to home, which has important implications for ATS given that distance to school is the most powerful predictor of ATS (Ikeda *et al.*, 2018). Those parents also preferred schools where their child's friends or siblings attended, which is consistent with previous research from Amsterdam (Ruijs and Oosterbeek, 2019). Studies such as Long et al.'s (2015) in Auckland, New Zealand, suggest that peer groups may positively influence ATS choices through encouragement for physical activity and the positive social experience of actively travelling to and from school with friends. Approximately three-quarters of parents reported that hearing positive comments about school from other parents and students was a reason for the school choice for their child, with no statistically significant difference between those whose adolescents enrolled in the closest versus non-closest school. Similarly, parents in Espoo (Finland), Paris (France) and Milan (Italy) used positive and/or negative comments or "grapevine information" about either the enrolled or the closest school to influence their school choice (Kosunen, 2014). Although our findings about particular school preferences compare with other studies, we emphasise that each school choice and travel to school context is unique.

### *4.1 Implications of study findings*

The results of this research suggest that strategies aimed at increasing rates of ATS in adolescents cannot address transport in isolation from the school choice educational policy context. Parents and adolescents are accustomed to having a choice, with school choice policies in place in New Zealand for over 30 years (Department of Education, 1988). Educational policy changes aimed at increasing ATS in adolescents could address the number and location of schools (Yang and Diez-Roux, 2013). Increasing the number of schools could decrease the travel distance and increase opportunities for adolescent ATS.

One promising possibility involves promoting the greater use of mixed modes of transport (Voss *et al.*, 2015), especially for adolescents who live beyond walking and cycling distance to school (Mandic *et al.*, 2023b) and in the cities – like the city where this research has been conducted – in which a large proportion of adolescents live beyond cyclable distance to their school. Higher levels of physical activity were reported in adolescents who used ATS – either alone or combined with motorised transport – compared to their peers who relied solely on motorised transport (Kek *et al.*, 2019). Leveraging support for ATS from peers and parents may also contribute to increasing ATS (Long, Harré and Atkinson, 2015). At the policy level, "school policies to reduce 'door to door' chauffeuring by promoting use of public transport and mixed modes of transport to school (i.e. walk plus bus and walk plus car) would increase rates of active travel among children for whom car travel is a necessity" (Egli *et al.*, 2020, p678).

Finally, schools that tend to attract more students from further distances, such as single-sex and special character schools, should prioritise the development of initiatives that support choices conducive to greater uptake of ATS. These initiatives will likely need to include the wider community to increase public transport options (Ikeda *et al.*, 2020).

### *4.2 Study limitations and future directions*

The limitations of this study include its cross-sectional design, relatively small sample size, and non-probability sampling procedures, which resulted in a non-representative sample. Our study sample had a greater proportion of women, New Zealand European, married adults, part-time workers and highly educated individuals (i.e. holders of university degrees) compared to the 2018 Census data for New Zealand residents aged 15 years and older (see **Table 1**). It is important to note that the Census data demographic data are not directly comparable to the demographic characteristics of the current study sample since the Census data are not limited to adults who are parents or guardians of school-age children, as in our sample. Furthermore, the use of questionnaires cannot provide an in-depth exploration of the decision-making process. Finally, while school choice educational policies are an international phenomenon, such policies operate differently in different contexts, thus there is a "methodological danger involved in ripping choices out of context" (Ball and Vincent, 1998, p379). In other words, while we have identified the significance of these findings, they are not necessarily generalisable to other settings given the particularities of the study city.

Given that the majority of the school choice decisions were shared by parents and adolescents, future research should build on these findings and explore the relationship between school choice decision-making and adolescents' ATS in detailed and in-depth ways working collaboratively with parents and adolescents, using methods such as focus group interviews (Krueger and Casey, 2015) or photo-elicitation interviews (Harper, 2002) to contribute to the small but growing knowledge base. Additional research should explore the complex relationship between parental and adolescent perspectives, to better understand barriers, enablers and possible solutions for supporting ATS in adolescents such as combining active and motorised transport as part of a single school journey, incentivising public transport use for school travel or finding other ways to reduce reliance on private vehicles for school travel within the complex school choice educational policy ecosystem.

## 5 Conclusions

In New Zealand, the educational policy environment designed to provide greater choice will not be undergoing a significant overhaul any time soon (Tomorrow's Schools Independent Taskforce, 2019). The selection of the closest school can greatly increase opportunities for ATS, as this study has shown. In this study adolescents who enrolled in the closest school were five times more likely to use ATS compared to their peers who enrolled in a non-closest school. Parents whose adolescent enrolled in the closest school more frequently reported proximity to home, social connection and school's co-educational status (only for adolescents enrolled in co-educational school) as reasons for school choice compared to their counterparts. However, only 38.9% of adolescents were enrolled in the closest school. Furthermore, the closest school is not always within walkable or cyclable distance, as was the case for 53.4% of our participants. While these findings could promote policy interventions such as locating more schools in densely populated areas and mandating attendance at the local school, we suggest that initiatives that promote mixed-mode travel may be more feasible in terms of governmental budgetary constraints as well as more acceptable to parents and adolescents who have become accustomed to school choice. Building on our finding that the

majority of the school choice decisions were made by parents and adolescents together, we suggest that localised, collaborative initiatives focused on supporting mixed-mode school travel by working with parents and adolescents to increase adolescent ATS, can contribute to increasing physical activity in this age group and in the long run have positive effects on adolescents' health and wellbeing.

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## Competing Interests

Sandra Mandic is the founder and the director of the research consultancy AGILE Research Ltd. (www.agileresearch.nz) and Team Leader Transport Strategy at Wellington City Council (Wellington, New Zealand). Other authors have no conflict of interest.

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