Transport behaviours among older teenagers from semi-rural New Zealand

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Abstract

Objective: Transport impacts teenagers by affecting their autonomy and independent access to activities. This manuscript reports descriptive findings of transport behaviours among teenagers in Southland, New Zealand, and discusses the implications of these for public health and policy.

Methods: An online survey was implemented to investigate transport among respondents aged 16 years and older from twelve secondary schools. Two methods of survey distribution were used (in-class and at home). Descriptive results were analysed using Stata.

Results: Response rate was 71.5% (n=775). The most common forms of transport were as a passenger in a car and walking. Two-thirds of participants had some form of driving licence. Half the sample expressed frustration at being unable to access activities. Significant gender differences existed regarding transport and types of activities accessed. Licence status was associated with physical activity, screen time and transport frustration.

Conclusions: The transport decisions made by teenagers, in aggregate, have implications for policy and infrastructure, and findings provide a foundation for discussions around potential changes to driver education programming, the school uniform policy in New Zealand and further research.

Implications for public health: Inquiring about everyday transport habits, outside of the trip to school, and activities accessed provided data about an under-researched group, supporting the ecological approach to transport in the context of public health.

Key words: survey methods, independent mobility, transportation and health, licensing

The transport modes chosen by New Zealand (NZ) teenagers are based upon individual decisions that, in aggregate, have significant public health implications. Although vehicle crashes involving young people are dropping, teenagers continue to display a disproportionate amount of risk as drivers and passengers when compared to other age groups in NZ.[1,2] Consequently, the research emphasis with regard to teenagers and transportation continues to be on car use. While the disproportionate risk for teenagers is key to framing any discussion of youth and transport, traffic injuries are only one of the harms caused by over-reliance on the car as primary mode of transport. Other 'non-traffic' risks include, for example, obesity due to the inactivity caused by overuse of the car; alcohol/ drug use and risky sexual activity due to the private space a car provides; and poorer grades attributed to the distraction provided by access to a private car.[3] The health benefits of active transport are often a focus of transport research, and those who use active transport are generally healthier than those who do not.[4] Clearly, transportation is a public health concern, especially among older teenagers.

Measures of crash risk and licence status are only one part of the transport-related health equation and may not provide a comprehensive image of overall health status. Every-day transportation choices (or lack of) affect many things, such as older teenagers' health, autonomy, and their ability to independently access their friendship groups and key activities (leisure, social, civic, sporting and work).[5] At the same time, licensing and driving among older teenagers has been decreasing worldwide since 2005, inspiring thought-provoking questions about the future of transport and transport-related interventions, the reasons behind fluctuations in licensing and driving,[6,7] and the impact on broader health and wellbeing. This highlights the need for more descriptive data to understand how and why older teenagers travel, outside of their trip to and from school, in order to determine what transport habits might have an impact on public health.

The dynamics of various contributing factors and context are important when researching transportation among older teenagers (so-called 'transition teens') as they evolve into early adulthood and are on the cusp of making major life decisions.[8] Involvement in activities and hobbies strengthens community attachment and social bonds, and thus relates to health.[9-12] Among older teenagers, participation in sport has been positively associated with psychological health,[13] and participating in hobbies and activities creates an attachment to place and

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a sense of social wellbeing.[14-16] In this context, one's community has an immediate impact on one's daily life and health.[17] It follows, then, that transport plays a key role in this involvement, participation and strengthening of attachments. With this in mind, we used a qualitative photovoice project to examine the transport habits of older adolescents in a semi-rural region in NZ to inform further in-depth study.[18] We found consistent themes surrounding transport, such as financial costs, barriers and safety issues, and the satisfaction arising from using active transport (such as walking, cycling and skateboarding). All of these issues relate to health.

The current study describes the methods and preliminary descriptive findings of an original online survey of older teenagers in Southland, NZ. The aims of the current study were to examine the transport habits and activities accessed by rural youth in NZ and highlight gender differences, in order to discuss implications for public health and to advise future research.

Methods

Preliminary investigations

The content of the online survey was informed by preliminary qualitative research via a photovoice project (April–August 2014).[18] Design and distribution of the survey was tested via a pilot study (October 2014) that was implemented to assess the feasibility of the online survey method.[19] The pilot study was distributed to two secondary schools that were not included in the current study. During the pilot study, two methods of survey delivery were used. Both methods allowed for respondent feedback about the survey content and process, and this feedback served to inform content changes to the final survey described in the present study. As a result of feedback during the photovoice and pilot studies, the survey was also translated into *te reo* Māori (the Māori language) in co-operation with an immersion school, and that process is detailed elsewhere.[20]

Research environment

The finalised survey was distributed to participating secondary schools in Southland, NZ, between January and June 2015. Southland is a mainly rural region, with a population of about 98,000; however, it includes two main city centres, Invercargill (population 50,000) and Gore (population 12,500), which are urban in comparison to the rest of the region they inhabit. The 'semi-urban, semi-rural' nature of Southland creates an interesting setting for the study of transport.[21] Walking and cycling infrastructure, while present within some of the towns in Southland, does not connect the towns to each other; some towns are separated by many kilometres. For example, towns in the rural northern part of the region are approximately 100 km from the relatively urban centres in the south. Southland was also chosen for this research because the area is unique in transport issues; by population, Southland has a higher crash risk among older adolescents than other regions of NZ. Also, the area presents a uniquely diverse population of the South Island of NZ; Southland is comprised of mostly European New Zealanders but has the largest Māori population (about 12%) of any other region in the South Island.[22]

Sampling and recruitment

Sampling and recruitment were identical to practices in the pilot study.[19] Secondary schools were chosen as a means of recruitment to access the age group of interest. Each principal at all thirteen secondary schools in Southland was sent a letter offering information about the survey and requesting participation. A follow-up phone call was made to those who did not respond; ultimately, twelve of the thirteen schools agreed to participate. Participants were recruited from Years 12 and 13, in order to encompass mainly those old enough to qualify for the first stage of a driving licence (aged 16 years).

Survey design and measures

The Qualtrics online survey tool was used to design, preview and distribute the survey.[23] As far as possible, we sought to include questions from existing surveys. Questions about transport modes used and licence status were adapted from Schoettle and Sivak, and Kamargianni et al.[24,25] Respondents were asked, "In the last month, which of these have you used to get to places? Tick as many as apply to you." They could choose from *school bus, public bus, walking, cycling, skateboarding, car (as driver), car (as passenger),* and *motorbike or scooter*. Respondents were then asked why they chose their transport mode and were required to tick reasons from a brief list. They were then asked, "What sort of driver's licence do you have?", and could choose one of four options: *none, learner's, restricted,* or *full*. If they did not have a licence, they were queried as to the reason. Transport frustration was assessed with the question "In the last month, how often have you been frustrated because you can't get where you want to go?" It has been suggested that the use of technology and social media may be a reason for low levels of licensing,[6,7] thus screen time was measured using questions adapted from the New Zealand 2012 Youth Insights Survey.[26] A single-question physical activity query was included to assess physical health.[27,28]

Questions about activities outside of school were also included, and these were grouped into four categories: sports activities (such as team sports and sporting events); cultural activities (for example, creative activities and/or involvement in the arts); social/leisure activities (for example, going to the beach or a party); and community activities (for example, clubs outside school, volunteering, and part-time jobs). Ethnicity was assessed using a question from the New Zealand census.[29] Respondent addresses were gathered and entered into Google Maps© to directly assess distance lived from the nearest city centre. Based on results from the photovoice study that found uniforms to be a deterrent to cycling,[18] the survey included a question about whether or not wearing a school uniform affected what transport mode respondents chose. While participants were encouraged to answer every question, questions could be skipped.

While some questions were amended based on feedback after the pilot survey,[19] the design of the final version of the survey contained the same question formats and the same use of personalised invitations, incentives and reminder emails, as informed by the literature and the pilot study.[19,30-32] Question response lists were randomised to average out any order bias. To maintain attention and interest among respondents, six different question formats were used.

Survey distribution, procedures and consent

Two methods of survey dissemination were offered, the 'in-class' and 'at-home' methods. As informed by the pilot study, the in-class method resulted in a better response rate.[19] Consequently, the in-class method was presented as the preferred format to school principals, with the at-home method offered as a secondary option if schools were not willing to dedicate class time to the survey.

Eight schools chose the in-class method of survey delivery and four chose the at-home method.

For the in-class method, student email addresses were provided by the schools. Students were then each sent a personalised invitation to the survey on the day it was to take place on campus, and students accessed their email during designated class time to complete the survey, for which the main researcher was present. For the at-home delivery method, student email addresses and consents were collected directly from interested students at approved senior assemblies that were scheduled in advance. These students were either emailed a personalised invitation to the survey or invited to the study's Facebook page to access the survey link, as per their request as stated on the consent form.

Ethical approval was obtained from the University of Otago Human Ethics Committee (reference number 14/163). Ethical approval allowed for consent to be given online after participants had read the information page of the survey.

Analysis

Descriptive findings were analysed, including frequencies and proportions for the measures of interest included in the analysis. Means, ranges of observed values (min/max) and standard deviations (SD) were reported where appropriate, along with the number of responses. Unpaired *t*-tests (indicated by *t*) were performed on the mean scores to assess differences between genders. Pearson's chi-squared tests (indicated by χ^2) were performed on categorical data, to assess associations between gender and transport behaviours, and licence status and some activities. All statistically significant results are reported in the text.

Results

The overall response rate was 71.5% (n=775). The average time to complete the survey was 16 minutes. The in-class method of distribution resulted in a better survey response rate (77.2%) than the at-home method (65.6%). While females had a slightly higher response rate than males overall, gender response rate varied based on the delivery method. With the in-class method, males had a higher response rate than females (62.3% and 37.7%, respectively), while the at-home method showed females had a higher response rate than males (67.1% and 33%, respectively). Reminder emails increased response rate by 8.8%. Complete data for all of the survey questions of interest and their subsequent results were available for 82% of respondents (n=636). Incomplete surveys were included in all analysis and results.

Sample characteristics

Table 1 describes the 775 respondents who participated in the online survey (49% male). The average age of respondents was 16.7 years. Because NZ has mixed-age secondary school classes, the survey inadvertently captured 51 respondents who were 15 years of age, and one aged 19 years; their surveys were included in the analysis. Eighty-five per cent of survey respondents self-identified as New Zealand European, and 19.5% self-identified as Māori, which is representative of the NZ population as a whole.[33]

Transport modes and licence status

The modes of transport that respondents used, their level of frustration with access to transport and their licence status were assessed to gain insight in their ability to access their key destinations; the results are shown in Table 2. More than one-third (34%) of respondents reported living within walking distance (less than or equal to 3 km) of the nearest city centre; 30% lived within cycling distance (4–12 km); and 37% lived within driving distance (more than 13 km away). The most common reported mode of transport was being a passenger in a car (86.2%), followed by walking (69.3%).

Table 1: Survey respondent characteristics (n=775).

	n	%
Gender		
Male	380	49.0
Female	395	51.0
Age (yrs)		
15	51	7.9
16	381	49.2
17	315	40.7
18	17	2.2
19	1	0.1
Area		
Urban	552	71.2
Rural	223	28.8
Ethnicity[a]		
NZ European	592	85.1
Māori	136	19.5
Samoan	18	2.6
Cook Island Māori	17	2.4
Tongan	13	1.9
Niuean	6	0.9
Chinese	10	1.4
Indian	5	0.7
Other	66	9.5
Self-reported weekly income		
$0–50	414	59.7
$51–99	82	11.8
Over $100	198	28.5

Note:

a: This measure adds up to more than 100% because per the NZ Census, respondents could self-identify as more than one ethnicity

Fifty-eight per cent of those with a paying job reported driving as a mode of transport, while 31% of those without a job reported driving. Chi-squared tests were conducted for each transport mode, and significant associations existed for six of the eight modes, with more males than females cycling (χ^2=14.14, p<0.001), skateboarding (χ^2=11.35, p=0.001)

Table 2: Respondents' transport and access.

	Total		Male	Female
	n	%	%	%
Transport mode in the last month				
Walk	537	69.3	32.8	36.5
Cycle	207	26.7	16.1	10.6
Skateboard	50	6.5	4.6	1.8
Public bus	87	11.3	4.3	7.0
School bus	332	42.8	19.1	23.7
Drive	374	48.3	23.2	25.0
Passenger in car	668	86.2	40.5	45.7
Motorcycle/Scooter	55	7.1	5.0	2.1
Transport frustration in the last month				
Never frustrated	308	43.7	51.3	36.4
Sometimes frustrated	397	56.3	48.7	63.6
Licensing				
No licence	247	35.4	36.6	33.7
Learner's licence	248	35.3	36.6	34.1
Restricted licence	186	26.5	22.7	30.1
Full licence	22	3.1	4.1	2.2

and riding a motorcycle or scooter (χ^2=11.15, p=0.001). More females than males were a passenger in a car (χ^2=10.056, p=0.002) and took the school bus (χ^2=5.04, p=0.025) or a public bus (χ^2=5.00, p=0.025). While some male and female respondents reported their school uniform as a reason for not walking or cycling, females were more affected (about 1 in 10), and a chi squared test showed a significant association (χ^2=6.05, p=0.01).

Table 2 also shows findings for transport frustration and licensing. Half of respondents (50.5%) felt frustrated sometimes during the preceding month with regard to transport and being able to get where they wanted to go, with females expressing significantly more frustration than males (χ^2=15.93, p<0.001). There was no significant association between gender and licence status. Licensing results were split roughly by thirds: 35.4% of respondents reported having no licence, 35.3% had their learner's licence, and 29.6% had either their restricted or full licence. There was a significant association between licence status and transport frustration overall (χ^2= 32.73, p<0.001), as well as by gender (males: χ^2= 10.44, p=0.015; females: χ^2= 30.25, p<0.001). Among males, 47.6% of those with no licence reported being frustrated, while those with a restricted or full licence were less likely to be frustrated (43% and 15%, respectively). Among females, 67.8% of those with no licence reported being frustrated, while those with a restricted or full licence were less likely to be frustrated (45% and 38%, respectively). Interestingly, there was a spike in transport frustration among both males and females after getting their learner's licence (from 47.6 to 57%, and 67.8% to 78%, respectively). Among those respondents without a driving licence in this study, about one-third stated they were "too busy to be bothered" getting a licence, one-quarter cited financial reasons for not having a licence or driving, and one-fifth of respondents reported they "didn't feel ready" to drive. These explanations for not having a licence or driving were also present in the preliminary photovoice study.[18]

Activities

The activities that respondents participated in were assessed to establish what types of key destinations they regularly accessed. The total mean score of all activities (sporting, cultural, social, and community) participated in during the previous month was 15.8; females had a higher activity mean score than males (16.0 and 15.5, respectively). The mean and standard deviation of the activities that respondents participated in during the previous month are presented in Table 3.

Males had a higher mean sports participation than females (t=3.92, p<0.001), but the reverse was true for social and cultural activities (t=-3.28, p=0.001, and t=-4.45, p<0.001, respectively). The most represented activities in this sample were of a sporting (89%), social (98%), and community (89%) nature. The most commonly reported sports were *water sports, athletics*, and *team events and practices*, while the most commonly reported social activities were *going shopping*, *going out with friends*, *going to the beach, going to the movies, going to a party*, and *going to the park*. The most commonly reported community activities were *participating in a club*, *volunteering,* and being part of a *church group*. Relatively speaking, reported participation in cultural activities was low (31%), with the most common activities being *visiting a place of worship, dancing,* and *playing an instrument*. Overall, 65% of respondents reported having a job, which is twice the national average for this age group.[34]

Just 13% of respondents met the recommended screen time guidelines set by the New Zealand Ministry of Health of two hours per day or less, and 58% of the sample met or exceeded weekly recommended physical activity requirements. As seen in Table 3, the mean of screen time was 4.9 hours per day, and the mean of physical activity was 4.3 days of exercise per week. Males reported more days per week of physical activity than females (t=4.39, p<0.001), but also reported more screen time; however, the difference in reported screen time was not statistically significant.

There were some significant associations between licence status and both screen time and physical activity within each gender. There was a significant association between licence status and screen time use among males (χ^2= 14.45, p=0.002); only 11% of those with no licence met screen time recommendations (≤2 hours per day), while those with their leaner's, restricted, or full licence were more likely to meet recommendations (27%, 31% and 38%, respectively). Among females there was a statistically significant association between licence status and physical activity (χ^2= 8.67, p=0.034); 53% of those with no licence met physical activity recommendations (one hour on four or more days per week), while those with a learner's, restricted, or full licence were more likely to meet recommendations (57%, 71% and 75%, respectively). Those without a licence reported participating in a mean of 14.6 activities during the last month, fewer than those who had a learner's, restricted or full licence (means of 15.7, 17.6 and 17.9, respectively.

Table 3: Respondents' activities in the previous month.

	Total	Total			Male		Female	
	n	Mean	SD	Min/Max[a]	Mean	SD	Mean	SD
Activities								
Sports	747	4.0	2.7	0/12	4.4	2.8	3.7	2.5
Cultural	738	1.8	1.9	0/9	1.5	1.9	2.1	2.1
Social	739	4.8	1.6	0/7	4.6	1.7	5.0	1.5
Community	735	2.5	1.8	0/7	2.5	1.9	2.5	1.7
Total	747	15.8	5.6	0/36	15.5	5.9	16.0	5.1
Screen time (hours/day)	682	4.9	5.0	1/24	5.2	6.4	4.7	3.3
Physical activity (days/week)	677	4.3	2.1	0/7	4.7	2.1	4.1	2.1

Note:

a: "Min/Max" refers to observed minimums and maximums among the sample

Conclusions

Because 92% of available schools participated in this study, this research presents descriptive information about an entire geographical area of NZ not before targeted for transport research. Significant gender differences were found in the survey outcomes. Key findings emerging from this study of rural teenagers included transport choice, activity participation, licence status, and cycling and school uniforms.

Transport choice

The most common mode of transport in this study was being a *passenger in a car*, followed by *walking*. Walking as a mode of transportation is well-researched, but the lack of research on car passengers (beyond how passengers affect the driver), is noteworthy, especially when considering its prevalence in this sample, particularly among females.

More than half of this sample reported that they used active transport because it was their exercise; almost half reported walking and cycling because it was safe and easy; and one-third reported that walking was a social activity. Barriers to active transport included inclement weather, traffic and safety issues, and living too far from town. These reasons echo findings from the photovoice research that preceded the current study.[18]

The Southland sample presented an interesting case with respect to transportation mode share, as it was quite different than what has most recently been reported NZ-wide. The New Zealand Ministry of Transport released 2015 household travel survey statistics of young people of comparable age with this study sample, with regard to overall transport modal share.[35] The sample in the present study exhibited much higher car use (as driver and as passenger), more than three times as much walking, more than ten times as much cycling, and slightly more public transport use than the age group they are included in with the household study, as well as when compared to the overall mode share that includes all age groups in NZ. These findings are inconsistent with the New Zealand Ministry of Transport figures that state those living in urban areas walk more than those in rural areas,[35] highlighting the need for rural descriptive data. Other recent studies in NZ report that in some urban areas, 50% of adolescents walked to school and 2–19% cycled to school.[36,37] It is possible that the higher use of active transport modes among this study sample is due to the nature of Southland's geography, as it is relatively flat. Active transport could also be increased among this sample because one-third of respondents reported living three km or less from the nearest city centre; research shows young people find about three km an acceptable distance for walking, and 12 km an acceptable distance for cycling.[38-40] This interesting modal split, and the reasons behind it, require further exploration.

Licence status

In this study, those without a licence reported less physical activity, more screen time use and less participation in activities. They also exhibited more transport frustration, with the exception of those with a learner's licence, who showed more frustration; this is interesting and may reflect their new status as drivers still dependent on others. These are new findings that show while those without a licence may face less crash risk, they in fact face other risks, such as the physical health risks related to sedentary behaviour and the wellbeing-related risks that come from decreased participation. This may mean that in a rural area such as Southland, the access provided by a driving licence is important to public health, and is important when considering that Ministry of Transport figures indicate that the number of driving licences issued each year had been increasing in NZ until 2010, before dropping back to levels of more than a decade ago.[41] This corresponds with the increase in the driving age in NZ, from 15 to 16 years, instituted in 2011; however, licensing numbers have not recovered. (NZ population statistics categorise older adolescents in the 15–24 year age bracket,[42] while NZ licence statistics categorise older adolescents separately, in a specific 16–19 year age bracket.[41] This makes comparisons between licensing and population difficult.) Reasons for non-licensure have been speculated about but rarely studied, and these new rural findings suggest more research is warranted.

Activity participation

Based on the number of activities these respondents participated in, and their level of transport frustration, the ability to access key destinations has an impact on older adolescents by affecting their autonomy and independence. Thus, their transport habits have implications for their health, because participation in activities (and thus being able to get to them) are related to aspects of wellbeing.[43] Screen time use was higher than recommended, with nine out of ten respondents reporting a screen use pattern of more than two hours per day. The literature suggests that screen time may be replacing physical activity among adolescents, and that may be the case here.[44] The finding of high amounts of screen time, in concert with lower licensing numbers, may support the notion found elsewhere in the literature that the use of technology is affecting driver licensing and driving.[6,7] This could have particular ramifications for the wellbeing of this sample of rural youth; for example, if they put off getting their licence and live in an area with little public or active transport infrastructure, their ability to access important destinations will be negatively affected.

Two-thirds of the sample reported having a job. More than half of those with a paying job reported driving as a mode of transport, while just one-third of those without a job reported driving. A recent study found that university students transitioning into working life from student life saw corresponding changes in their commuting mode, which often favoured the car. This transition is a key window of opportunity to affect behaviour change to active or public transport use or to support current active or public transport habits.[45] As many in the current sample reported already having a job, this may suggest that they have already solidified their future transport habits. If this is true, then less of this sample may be driving than expected, as only half of those with jobs reported driving. This is especially interesting considering the semi-rural environment of Southland, NZ.

Cycling and school uniforms

Gender differences with regard to cycling are well-documented in the literature, with males cycling more, regardless of trip purpose.[46] Heesch et al.'s findings about barriers to cycling (weather, traffic, and safety) were mirrored in the current study and the findings from the photovoice study project that informed it.[18,46] The NZ school uniform of a skirt and flat shoes for females was found to negatively affect cycling among female adolescents in the current study and in two other studies as well.[18,36] Females also showed a significantly higher level of transport frustration; this is interesting in light of the fact that slightly more females than males held some sort of driving licence, which would theoretically provide them with an additional mode of transport. Taking into account the lower prevalence of cycling among females, their transport frustration and their direct comments about their uniform being a barrier to cycling, these findings suggest that the compulsory school uniform in NZ may act as a deterrent to active transport, particularly cycling, among female students.

Strengths and limitations

Thirty-six per cent of all students in years 12–13 were not available on the day of the survey or on the day of the assembly, due to being absent from school. Their omission from the survey means that there is the potential for non-response bias. Fifty-one students surveyed were 15 years of age, meaning that they did not have access to a car licence and therefore did not have access to all modes of transport. While they make up a small

percentage of the sample, this could bias some of the results, such as those related to transportation mode used. It is also important to note that as this was a self-report survey social desirability bias could be present, leading to over- and under-estimation in some instances.

While research shows that the gender gap in response rate is less for online surveys that include email administration when compared to mail or telephone surveys, the literature provides little in the way of reasons behind gender disparities in survey research.[47] In the current study, female respondents had roughly twice as many missing values than male respondents, which contradicts much of the literature that reports that in addition to having consistently lower response rates, males are also most likely to have missing values in surveys.[47-49] This could be partially explained by the fact that the solitary all-boys school opted for the in-class method of survey delivery, a method proved in this study to have a higher response rate. Future studies are needed to indicate what methods might assure that the genders are equally represented in survey research. More completed surveys emerged during the in-class versus the at-home method. Some research shows that completion rates are higher when the survey sender is known to the respondent, thereby giving a 'face' to the survey,[50] and the in-class method did afford the opportunity for the main researcher to spend more time with the respondents. More missing values resulted from questions offered to respondents later in the survey, and this can be explained by survey fatigue.[51]

The high response rate of this survey (71.5%) provided sufficient power for analysis in this survey, and the results are likely generalisable to the Southland province of NZ, because all but one school in the area participated in the survey. The purpose of this article is to present details about the methods used in this survey research and provide descriptive data, and while these univariate results make final conclusions limited in this manuscript they do pave the way for future work, as this is preliminary data and not all survey questions have been analysed. The survey tool methods proved robust, and both the English and *te reo* Maori versions of the survey are available to other researchers, via the corresponding author.

Implications for public health

The high number of respondents that travelled by car as a passenger, particularly female respondents, suggests future study about this transport mode (outside of a passenger's effect on the driver) is desirable. There are many public health implications of being a passenger, such as the obvious physical health issues surrounding crash risk, risk behaviours and safety. Beyond that, there are other health implications regarding this transport mode as it relates to attachment and wellbeing, such as the parent-child relationship, or the peer-to-peer relationship, as the time spent in a car during a commute allows for time to chat. Also, more than one-third of the current sample lived rurally; this suggests limitations with regard to available transport options to reach key destinations and activities. It would be interesting to pursue further research about the experience of car passengers from these perspectives, given the prevalence of this travel mode among this sample.

While many studies report car licensing is declining among teenagers worldwide, it is still surprising to find this trend in rural NZ. It does not appear that public health approaches are changing along with licence rates. For example, if young people forego their licence, measures of crash risk and licensure may not present a comprehensive image of health status with regard to transport, leading to questions about current driver's education methods in NZ. The finding that one-third of our study sample had not begun the licensing process may provide a foundation for discussions around potential changes to driver's education programming to include all modes of transport, and to include everyone, whether they drive or not. This type of education, a multi-modal approach known as "mobility education", is gaining ground in other developed countries, such as the United States.[52]

Additionally, if licensing continues to drop, more public or active transport infrastructure may be necessary, especially in rural areas, to promote health and wellbeing. Findings of this study illustrate that those without a driving licence report less physical activity, more screen time and less participation in activities. This implies that public transportation in rural areas should be better established and perhaps subsidised, providing access so that teenagers are able to sustain their wellbeing until they become more autonomous travellers. The findings of significant gender differences with regard to activity participation may have implications for interventions, as this suggests different correlates of physical activity for the genders. Another finding from this research is that school uniforms seem to be a deterrent to cycling among females. Decreased active transport could lead to decreased physical activity and decreased overall health. The custom of school uniforms in NZ seems to be discouraging females from engaging in active transport and suggests that gender-neutral uniforms (or discontinuation of uniforms) should be debated as a public health matter. This finding, which is substantiated by others,[36] makes a strong case for policy change.

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