

UDC: 911.3:331.556.2-057.87(497.4)
DOI: 10.5379/urbani-izziv-en-2017-28-02-006

Received: 16 June 2017
Accepted: 16 Oct. 2017

Aljaž PLEVNIK
Mojca BALANT
Luka MLADENVIČ

Alarming changes in youth mobility: Primary school pupils in Novo Mesto

This article explores the travel habits of young people in Slovenia over the past thirty years and seeks to explain the reasons for a complete change in their travel patterns. It focuses on the travel habits of primary school pupils as a special group of traffic participants and urban space users. We compared data from 1991, 2001 and 2016 on primary school pupils' travel habits, car ownership, school locations and catchment area sizes, along with traffic regulation around primary schools. Based on this, we established that the patterns for Slovenia correspond to patterns from abroad. The substantial changes in children's travel patterns coincide with the intense motorisation of Slovenian towns, which has grown to proportions that

even exceed those in many developed countries. This increase in car ownership is reflected in growing car use. The activities currently carried out in schools regarding traffic management are not helping stop this trend. A change is required in the traffic safety paradigm. Consideration of children's mobility must become part of comprehensive transport planning, which should be geared towards reducing and calming traffic in school areas by setting up infrastructure that discourages car use and encourages safe alternatives.

Keywords: active mobility, routes to school, changes in travel patterns, traffic safety, motorisation

1 Introduction

For several decades, active mobility – in which people use only physical effort to move – has been at the centre of endeavours towards sustainable mobility. This is the most sustainable type of mobility and is the least environmentally detrimental, the most economical and the socially fairest. It is also the healthiest type because regular walking and cycling offer many health benefits. For many people, active mobility is the simplest and most accessible way to maintain a healthy lifestyle, which should include at least thirty minutes of moderate activity a day (UK active, 2017). A range of serious health problems are caused by the modern sedentary lifestyle and its lack of physical activity. Health experts warn that insufficient physical activity increases the risk of various diseases. An active lifestyle substantially reduces the risk of cardiovascular diseases and stroke, and also lowers blood pressure and cholesterol levels. Physical activity can prevent Type 2 diabetes and even breast and prostate cancers. An active lifestyle helps maintain healthy muscles and bones (Ministry of Health, 2015).

Children's and teenagers' problems resulting from physical inactivity are a particularly topical issue. The share of overweight and obese children and teenagers has doubled over the last thirty years, and this increase has been more evident in boys, among whom the share of overweight individuals has risen from 13.3% to 19.9%. The share of obese children in general has increased from 2.7% to 7.5% (Ministry of Health, 2015: 11). In addition to inappropriate nutrition, the increase in obesity among young people is due to declining physical activity. Research in Slovenia has shown that the share of regularly physically active young people is low and is decreasing with age. On a daily basis, 26% of boys and only 15% of girls are sufficiently physically active (Jeriček Klanšček et al., 2011). Children's and adolescents' inappropriate diets are also reflected in their lack of physical activity (Strel et al., 2011). Research suggests that physically more active adolescents have greater academic success (Starc, 2014).

As with adults, in young people active mobility can significantly contribute to sufficient daily physical activity. Several authors (Davison et al., 2008; Van Sluijs et al., 2009; Grize et al., 2010; Chillón et al., 2011; Schoeppe et al., 2013) have established a direct correlation between children's walking or cycling to school and their physical fitness. They also found a strong correlation between active travel to school and children's physical activity after school. Active mobility also ensures independent mobility, which Stephanie Schoeppe et al. (2013) define as the opportunity for people under eighteen to move and use public space without parental supervision. This offers

psychological and social benefits to children through interactions and connections with peers and others where they live.

Little information is available about youth mobility in Slovenia and about how young people's modes of travel have changed over the past decades. Some recent studies (Kobe Tavčar, 2015; Moscholidou & Colclough, 2017) highlight the fact that as many as three-quarters of primary school pupils ride to school: most are driven, and others take public transport. However, the results of the 1991 census reveal a completely different picture. At the time, over 90% of primary and secondary school children travelled to school actively. This article examines how children's mobility has changed over the last thirty years and the reasons for these changes.

This article focuses on the travel habits of primary school pupils as a special group of traffic participants and urban space users. Due to their youth, they have a limited choice of travel modes and thus become independent traffic participants only during schooling. This population group is among the most imperilled, which is why traffic planning and spatial planning devote particular attention to it (Plevnik, 2002). We analysed how children travel to primary school in Novo Mesto using cross-sectional data for 1991, 2001 and 2016. The 1991 data were gathered as part of the 1991 census, and those for 2001 and 2016 were obtained based on a survey conducted in primary schools. We also collected information for 2001 and 2016 to explain what caused the considerable changes in primary school pupils' travel habits and what could be done to increase their active mobility.

2 Methods

The changes in travel habits of Novo Mesto primary school pupils were analysed using empirical research (analysis of time series and cross-sectional analysis). The analysis of time series identified the changes in travel habits between two time cross-sections (2001 and 2016). These results were compared against those of the 1991 census (Statistical Office of the Republic of Slovenia, 1992). A cross-sectional analysis was conducted to establish how variation in travel-habit variables correlates with variation in socioeconomic variables (car ownership) and variables of towns' physical structure (distribution of schools, size of their catchment areas and traffic regulation around schools).

2.1 Travel habits of primary school pupils

The first chronological cross-section of travel habits for schoolchildren in Novo Mesto is based on the 1991 census. The census results were analysed in a doctoral dissertation (Plevnik, 2002) and are based on the census questions about places of

work and school and travel modes (Statistical Office of the Republic of Slovenia, 1992). From among the individual data related to routes to school, we selected those that referred to the routes of children that started and ended in Novo Mesto. By processing this data, we extracted the data on the mode of travel to school within settlements of permanent residence. Unfortunately, the data on primary school pupils could not be extracted from the data on all routes to school; however, the aggregated data within the settlements studied also provided a clear picture of young people's travel habits in 1991.

The second cross-section of travel habits for Novo Mesto primary school pupils is based on the 2001 data collected for a doctoral thesis (Plevnik, 2002). Data collection was based on the study "State roads and traffic safety of pupils" (Sln. *Državne ceste in prometna varnost učencev*, Polič et al., 2001), which was conducted in primary schools in ten Slovenian settlements, including Centre Primary School in Novo Mesto. The data on travel habits and the situation in the area surrounding Centre Primary School were taken from this study, and the discussion was expanded to include two other primary schools in Novo Mesto: Bršljin and Grm. We surveyed the third, fifth and seventh grades from both primary schools. In all grades the questionnaire was administered by a researcher with the help of class teachers. The children completed the questionnaires by themselves. They specified their sex and how they usually travel to and from school and whether anyone accompanies them, and they also marked the location of their homes on a map. The lower grades were given more detailed explanations, and the researcher monitored their understanding of the questions and completion of the survey. The survey was conducted on the morning of 10 April 2001. The weather was suitable for any mode of travel that day. The survey conducted at Centre Primary School took place in a classroom during a class, and first-grade pupils were also included. The questionnaire for third, fifth and seventh grades was more comprehensive, and it also included some questions on traffic safety.

Another survey on travel habits was administered in June 2016 as part of an analysis for the Sustainable Urban Mobility Plan of the City Municipality of Novo Mesto (Sln. *Celostna prometna strategija Mestne občine Novo mesto*, Balant et al., 2017). The survey covered seven primary schools in the Municipality of Novo Mesto: four from Novo Mesto itself (Centre, Šmihel, Grm and Bršljin) and three from smaller places in the municipality (Otočec, Brusnice and Stopiče). The study focused only on the four primary schools in Novo Mesto. The survey covered the third, fifth and seventh grades; if one of these grades was away that day, the sixth grade was surveyed. In the four Novo Mesto primary schools two classes in the same grade were surveyed, and only one in smaller schools. The data in the 2016 survey were collected by verbally surveying children

in classrooms; questions were asked, raised hands counted and the results noted. The researchers used a pre-defined form. The questionnaire asked how the children got to school that day (during warm weather), how they usually go to school in the winter and how they would prefer to travel to school. The children were also invited to suggest changes and improvements to simplify their journeys to school.

2.2 Car ownership

The data on the development of motorisation and/or car ownership in Slovenia and in the Municipality of Novo Mesto were calculated from the data provided by the Statistical Office of the Republic of Slovenia (SORS), which publishes them annually in its *Statistical Yearbook of the Republic of Slovenia* and on the SI-STAT data portal. The motorisation rate is calculated based on annual data on the population (as at 1 January for the past year) and the number of cars (as at 31 December for the current year). The number of cars registered in Slovenia is taken into account. According to SORS data, the term *cars* encompasses vehicles in the category M1 (motor vehicles with at least four wheels intended for passenger transport, which in addition to the driver's seat have eight seats at most) excluding any special passenger vehicles (i.e., a vehicle designed for special purposes and not for passenger transport; e.g., fire vehicles, ambulances, hearses, etc.; Statistical Office of the Republic of Slovenia, 2016).

2.3 Location of primary schools and the size of their catchment areas

Another point of interest was whether during the period studied there was any change in the location of primary schools and school catchment area sizes in Novo Mesto that could cause changes in primary school children's travel habits. Such changes were identified through interviews with administrators at the schools surveyed conducted during the formulation of the Sustainable Urban Mobility Plan (Sln. *Celostna prometna strategija*, Balant et al., 2017).

2.4 Traffic regulation around primary schools

Through interviews with administrators at the schools surveyed, we also gathered data on recent changes in traffic management around the schools (e.g., new traffic infrastructure for vehicles, cyclists and pedestrians, traffic-calming devices, parking areas that children are driven to, etc.) that could affect the primary school pupils' travel habits. These interviews were also conducted while preparing the Sustainable Urban Mobility Plan (Balant et al., 2017).

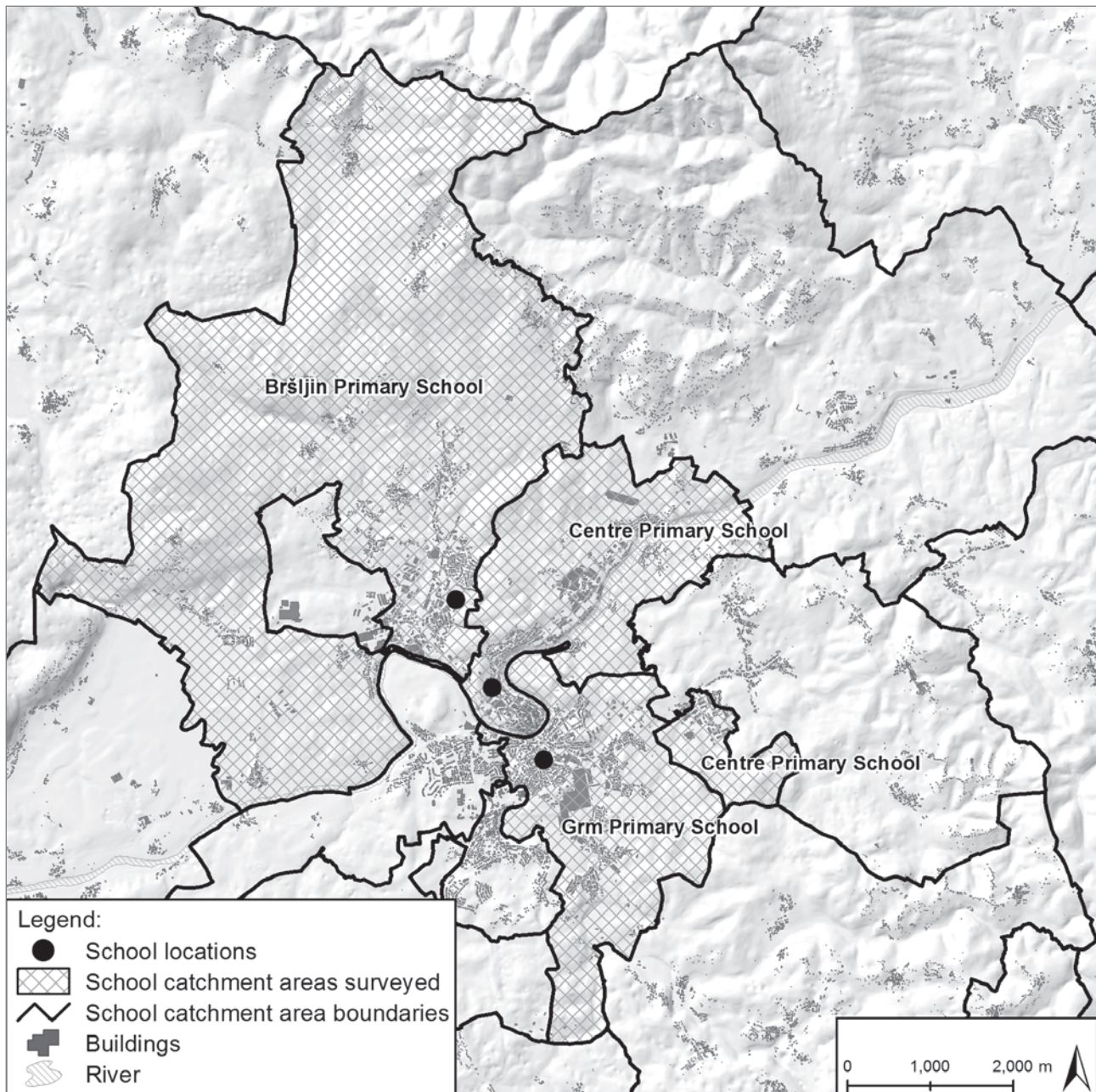


Figure 1: Primary schools surveyed and their catchment areas (author: Simon Koblar; source: Surveying and Mapping Authority of the Republic of Slovenia, 2017 and Copernicus, 2012).

3 Results

3.1 Travel habits of primary school pupils

3.1.1 Mode of travelling to school in 1991

Nearly all schoolchildren travelled to school actively (i.e., on foot or by bicycle) in 1991. In the twenty largest Slovenian towns, the share of active travel accounted for as much as 91% of active travel modes (and commuting to work only 61%).

Eight percent of children took the bus (41% of workers) and only 1% of children were driven to school (25% of workers). The shares of using individual modes differed considerably among the twenty towns studied. Active modes of travelling to school were predominant in Ravne na Koroškem (100%), followed by Domžale and Kočevje (99%) and then Kamnik, Nova Gorica, Postojna and Ptuj (98%). Active travel in Novo Mesto was 92%, whereas 4% of journeys to school were made by car (the highest figure among the twenty largest Slovenian towns) and 4% by bus.

3.1.2 Mode of travelling to school in 2001

In 2001, children in the third, fifth and seventh grades of Centre, Bršljin and Grm primary schools mostly walked to and from school (55%), whereas 22% travelled by bus and 23% were driven. None of the survey participants cycled. The mode of travel to school differs considerably from the mode of travel home from school. In the morning, 46% of the children walked to school, 21% took the bus, and 33% were driven to school. Journeys back home saw considerably less travel by car and more walking (63%). The share of travelling by bus remained similar (23%). In the morning, many parents drive their children to school on their way to work. Because most parents' working hours do not coincide with the school timetable, many children that were driven to school had to walk home or take the bus. No examples of cycling to school were found for Novo Mesto primary schools in 2001.

Travel habits differed substantially between grades. The Road Traffic Safety Act requires that first-grade pupils be accompanied by an adult to and from school. Therefore, the above-average share of journeys by car among first-graders at Centre Primary School (this was the only grade for which data were collected) was not surprising. Travel by car was predominant on the way to school (63%) and also back home (58%). Thus in 1991, among all age groups, journeys by car were predominant only among first-graders. The difference between the share of journeys to and from school by car was small, which suggests that first-graders' parents arranged their time so as to be able to drive their children home after school as well. Just over one-third (34%) of first-graders walked to school, and only a few took the bus (3%). None of the first-graders took the bus to return home, but many more walked (42%), at the expense of a lower share of travel by car and bus. In higher grades, the share of car journeys by third-graders was predominant (45% on their way to school and 20% back from school), but this decreased in higher grades on account of walking and then levelled off.

Children's travel habits also differed substantially between schools. The most active travel patterns were established among children at Grm Primary School, where 70% walked to and from school (3% took the bus and 27% were driven). The next was Centre Primary School, with 64% walking (15% by bus, 21% by car), and the fewest pedestrians were at Bršljin Primary School (30%), where travel by bus was predominant with 49% (21% by car). To explain the differences between schools, we analysed individual elements of the physical structure of space and their influence on school route characteristics. We established that the strongest influence was exerted by the network or distribution of primary schools, which is indirectly reflected in the size of their catchment areas as well

as population density and building density in the surrounding countryside. A denser network and smaller school catchment areas with a greater population and building density result in shorter school routes and, consequently, a higher share of active journeys to school. An important element is also organised school transport, which covers both long routes that would otherwise be covered mainly by parents driving their children to school (so that children do not have to make long journeys in more dangerous active ways) as well as short routes (exceeding 1,000 m) because children that are not entitled to school transport often walk. We established that, in the case of Novo Mesto, every primary school in the surrounding countryside had at least one very busy road a maximum of 1,000 m away. Such roads are particularly problematic in terms of primary school pupils' routes to school. Walking is the most sustainable travel mode, but for primary school children safety is more important and organised school transport offers greater safety.

In terms of sustainable traffic, the worst is probably a sparse school network with school catchment areas too small to be eligible for organised school transport (distances within 4 km). In these cases, many children depend on morning travel with the most problematic means of transport in terms of sustainability (i.e., cars), whereas on their way home they are often left to themselves, which is problematic particularly in terms of their safety (Plevnik, 2002: 188–189).

3.1.3 Mode of travelling to school in 2016

For the sake of comparison with the previous cross-section, the data for 2016 included three primary schools from Novo Mesto that were covered by the 2001 research (Centre, Grm and Bršljin); however, our survey also included another primary school from Novo Mesto (Šmihel) and three primary schools from smaller settlements in the municipality (Otočec, Brusnice and Stopiče).

In 2016, more than half of the third, fifth and seventh graders (53%) were driven to school by parents (33% in 2001). Nearly 32% walked (46% in 2001), 21% went by bus (the same share as in 2001) and just over 1% cycled (in 2001 0%). Children were asked whether they changed their travel mode in winter. The results do not show any major changes in travel habits, except for a higher percentage of journeys by bus (28%) at the expense of walking (27%) and to some extent car rides (44%). One-third of children in Novo Mesto (53% in 2001) travel actively to school, whereas two-thirds ride to school (one-half in 2001), with the majority being driven by their parents. A comparison between grades revealed similar characteristics as in 2001. The highest share of travel by car was established for third-graders (58%), followed by fifth-graders (46%), whereas the lowest was that of seventh-grad-

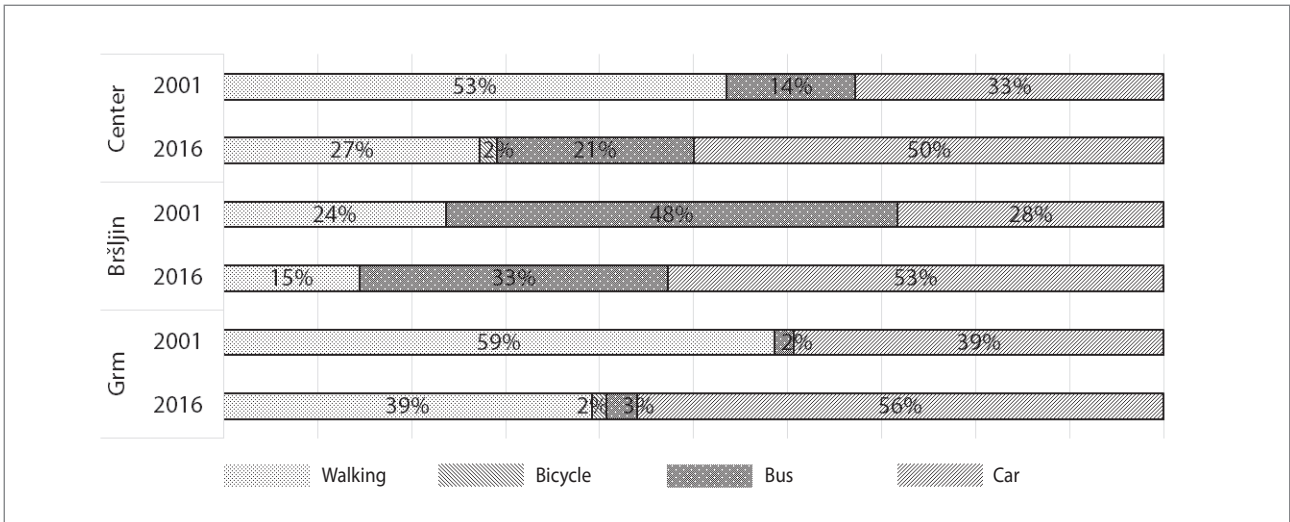


Figure 2: Comparison of travel habits to school, by school and year (author: Luka Mladenovič, 2017; source: Statistical Office of the Republic of Slovenia, 1992; Plevnik, 2002; Balant et al., 2017).

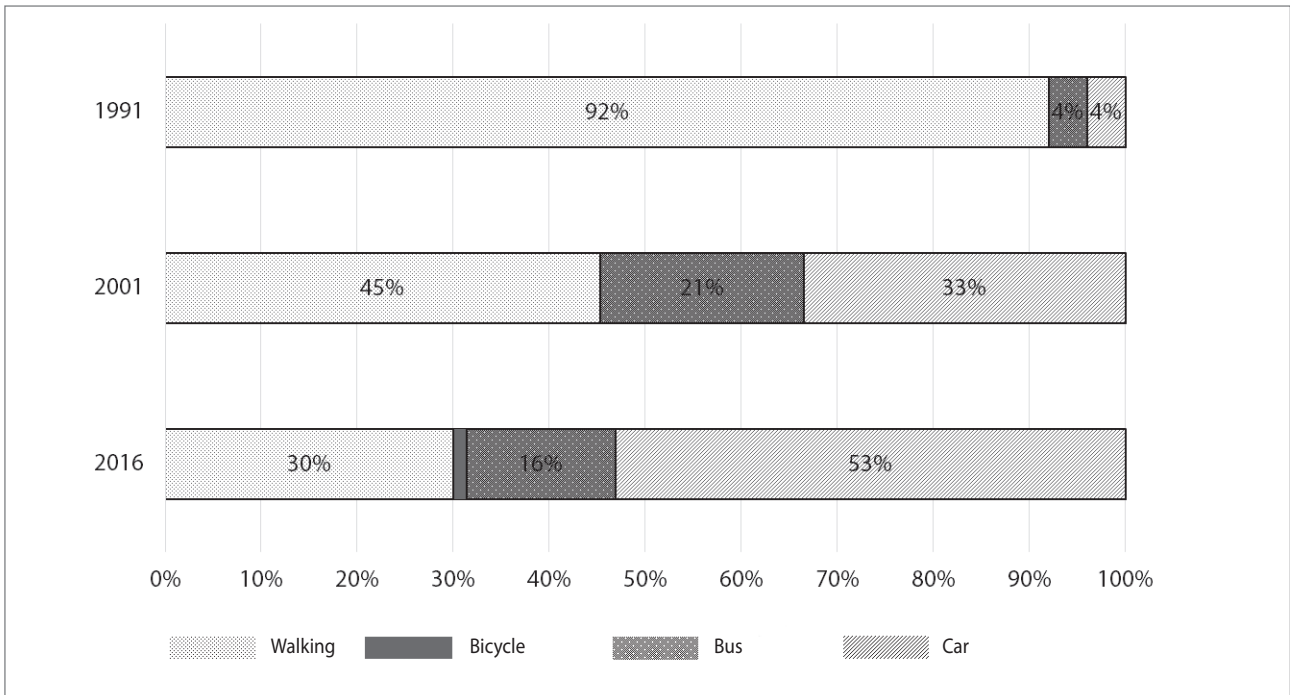


Figure 3: Total changes in travel habits (author: Simon Koblar).

ers (30%). In contrast, the majority of seventh-graders travelled to school actively (41% on foot, 3% by bicycle), and then the percentage dropped considerably for fifth-graders (31% on foot, 1% by bicycle) and third-graders (only 20% on foot).

Again, children’s travel habits differed substantially among schools. As in 2001, the most active travel patterns in 2016 were again established with children at Grm Primary School, where 39% of them walked to school (70% in 2001) and fewer than 2% cycled (none in 2001). The share of car travel increased substantially: from 27% in 2001 to 56% in 2016. The share of travel by bus remained unchanged (3%). At Centre Primary School the share of active travel fell to less than half,

from 64% pedestrians in 2001 to 27% pedestrians and 2% cyclists in 2016. The share of car use surged from 27% to 50% and the share of bus use increased from 16% to 21%. The share of walking at Bršljin Primary School fell by half from 30% to 15% over fifteen years and there were still no children cycling. The travel mode that was predominant in 2001 also decreased considerably: bus travel dropped from 49% to 33%. At this school, the share of car use increased the most: from 21% in 2001 to 53% in 2016.

In the 2016 survey, we added a question about how children would like to travel to school. The children’s desires are completely opposite to their usual behaviour and correspond to

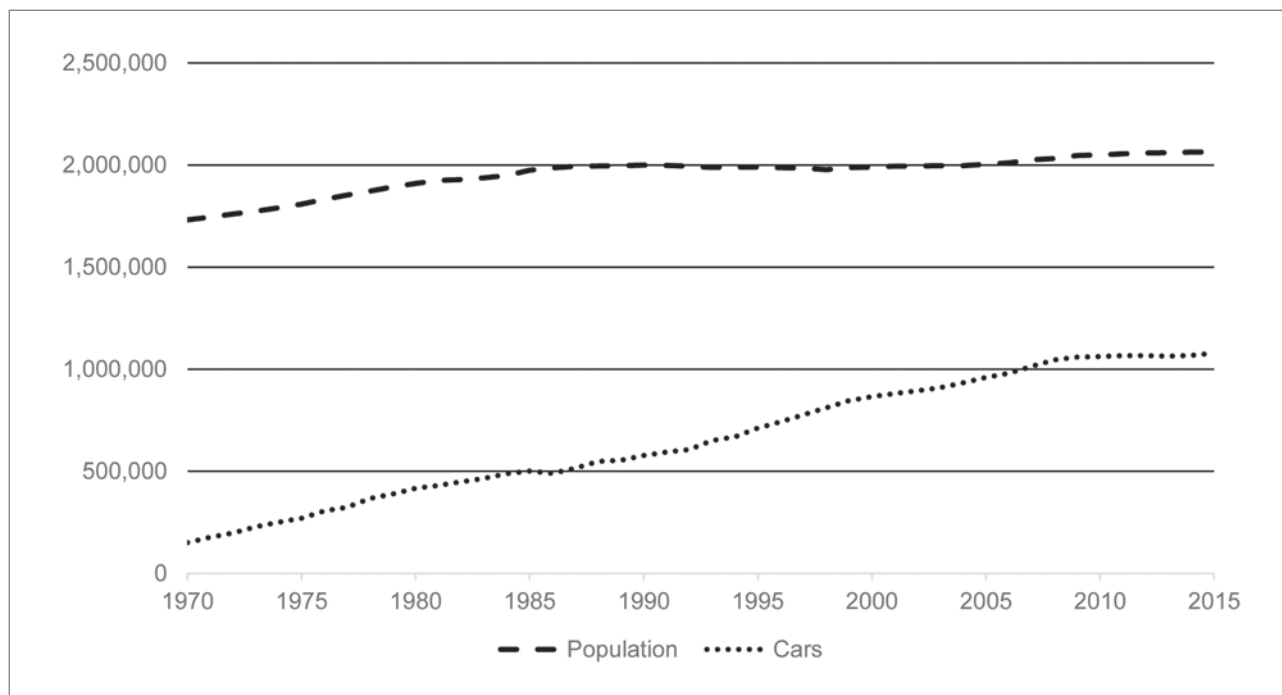


Figure 4: Number of cars and population in Slovenia between 1970 and 2015 (source: Plevnik, 2016).

efforts toward active mobility because most children would like to travel to school by bicycle (40%) and on foot (40%). Only 12% wish to be driven to school and 7% wish to take the bus. Especially regarding cycling, the difference between the actual state of affairs and the desire is so great that it would make sense to explore the reasons that prevent children from cycling to school and to start gradually eliminating them.

The travel characteristics of primary school pupils in Novo Mesto are very similar to the results of related recent studies that have been conducted in other parts of Slovenia. The children at schools that participated in the Traffic Snake national campaign in 2015 had similar travel patterns before the campaign as those found in Novo Mesto. Active travel to school was established for 29% of pupils (3% of them cycled). A large majority rode to school: 42% were driven and 29% took public transport (Moscholidou & Colclough, 2017).

3.2 Car ownership

Over the past decades, the development of motorisation in Slovenia has been particularly intense. Between 1970 and 2015, the number of cars in Slovenia rose seven-fold, exceeding 1,070,000. The motorisation rate in 2015 was 523 cars per 1,000 inhabitants, which was nearly 50% more than in 1995 (Plevnik, 2016). This ranks Slovenia among the countries with the highest increase in car ownership because for many years the motorisation rate has exceeded the average of the new EU members and candidate countries, including many economically more developed countries (e.g., in Scandinavia).

The Municipality of Novo Mesto has exceeded the Slovenian average in terms of motorisation rate since 2001, with the highest motorisation rate recorded in the municipalities in western Slovenia. In 2006 the motorisation rate exceeded five hundred vehicles per thousand inhabitants, which means that every other inhabitant owned a car. In 2015 the motorisation rate was 541 vehicles per thousand inhabitants (in Slovenia 523).

3.3 Primary school locations and school catchment areas

To explain the differences between schools, already after the first survey in 2001 we analysed individual elements of the town's physical structure as well as their influence on the characteristics of school routes, using data obtained after the 2001 survey. We established that the strongest influence was exerted by the network or distribution of primary schools, which is indirectly reflected in the size of school catchment areas, density of population and property development in the surrounding countryside. A denser network and smaller school catchment areas with higher population and building density result in shorter school routes and, consequently, a higher share of active travel to school. On the other hand, large school catchment areas, such as that of Bršljin Primary School, already have a more developed network of school bus transport because of compliance with regulatory requirements, and this increases the share of bus journeys. We also checked changes in school locations and school catchment area sizes after 2001. The main change was the construction of Drska Primary School, which took over part of Šmihel Primary School's catchment area and

did not influence the catchment areas of the schools surveyed. Therefore, the change in the density of the network of primary schools and their catchment areas did not influence the travel habits of children at the schools surveyed.

3.4 Traffic regulation around primary schools

Traffic regulation around the schools was examined on-site while preparing the Sustainable Urban Mobility Plan of the City Municipality of Novo Mesto, and the changes after 2001 were verified during interviews with people responsible for traffic safety at the schools surveyed. All of the schools regularly address the issue of safe routes to school and measures to ensure this. Schools have a plan of safe school routes, including a record of risky spots that are being eliminated in cooperation with the municipality. Several measures to ensure children's safety were implemented in the areas around all of the schools, particularly concerning traffic calming and safe crossings. Such measures are geared towards increasing children's traffic safety and could contribute to an increase in the share of active school routes. With support from expert organisations, schools hold regular educational and promotional events related to traffic safety, particularly at the beginning of the school year.

4 Discussion

The results of the comparison of three cross-sections of modes of travel to primary schools in Novo Mesto and comparison with data from other schools in Slovenia revealed considerable changes in the travel habits of Slovenian children and their parents. The main contribution of this article is quantification of the scope of the trend of change in how children travel to school. Experts from various fields have observed this trend and warned about it, but due to a lack of systematic data collection on primary school pupils' travel habits we were unable to define the actual scope of the change. As part of this research, we collected comparable data using the same method as applied in 2001, which resulted in two cross-sections for the first time in this area.

In 1991 more than 90% of children in Slovenian cities and towns travelled actively to school (walking or cycling), but the share of active routes in Novo Mesto dropped to less than half by 2001 and to one-third by 2016. Data for thirty-one other schools in Slovenia for 2015 confirm that this alarming trend is characteristic of the entire country. Similar trends have also been established in many other developed countries around the world. In Switzerland, children's active travel to school between 1994 and 2005 decreased from 78% to 71% in favour of car rides. The share of those cycling to school decreased in

particular, whereas the share of walking remained high. Researchers mainly ascribe this decrease to considerable growth in car ownership during this period (Grize et al., 2010). Data for the UK show that the share of five- to ten-year-olds that walked to school declined from 60% to 51% from 1991/93 to 2002 (Department for Transport, 2004), and fell further to 46% in 2014 (Department for Transport, 2014). Simultaneously, the share of those driven to school rose from 29% to 46% (Department for Transport, 2014). In the United States, the decrease is even greater in some areas, due to early and more intense motorisation. Kirsten Davison et al. (2008) reported that in the state of Washington the share of children five to fifteen years old actively travelling to school decreased from 48% in 1969 to 16% in 2001.

The reasons for these changes in children's travel habits are manifold, and the explanations of these changes, as can be found in the literature, are often contradictory. In addition to the basic reasons, such as greater availability of cars and thus increased car ownership and use as well as larger distances between children's homes and schools that limit the use of active school routes (Chillón et al., 2011), the literature lists a number of other factors that influence the choice of mode of travel to school. A frequent obstacle to active travel, as perceived by parents, is traffic safety and/or the feeling that pedestrians and cyclists are at risk in traffic (Loukaitou-Sideris, 2006; Ahlport et al., 2008; Dimaggio & Li, 2013). The feeling of risk is connected with the speed and number of vehicles as well as available pedestrian areas. A study from Switzerland (Grize et al., 2010) showed that, in addition to distance, major obstacles to walking and cycling include crossing large roads. Davison et al. (2008) also added the differences between rural and urban environments as well as weather to these obstacles.

Leticia Grize et al. (2010) claim that the choice of travel mode is a result of the family decision-making process, which is influenced by combining travel to school with travel to work, comfort, parents' concerns regarding traffic safety, and the social and cultural acceptability of an individual travel mode. Among important elements influencing the choice of travel modes, Davison et al. (2008) list parents' working hours and children's afternoon activity schedules, whether parents travelled actively to school when they were children, whether they walk or cycle to work and whether they appreciate their children's physical activity and the accompanying social interactions as well as the cultural and social acceptability of an individual travel mode. Grize et al. (2010) explain the differences in the cultural and social acceptability of an individual travel mode with large differences in the active travel to school between the German- (80%), French- (56%) and Italian-speaking (52%) regions of Switzerland.

The results in Slovenia partly agree with the findings from abroad. The considerable changes in children's travel patterns coincide with the intense motorisation of Slovenian cities and towns, which has grown to proportions unseen even in many developed countries. This increase in car ownership is reflected in growing car use. Work on a large number of sustainable urban mobility plans reveals that only two cities in Slovenia (Ljubljana and Maribor) successfully cope with growth in motor traffic, whereas in small- and medium-sized towns this share has mostly been on the increase. We established that in Novo Mesto the car is the predominant travel mode (78%), followed by walking (9%), public transit (8%) and bicycles (less than 1%; Balant et al., 2017). In Ljubljana the shares were much less in favour of cars in 2015, at 42%. In the capital city people walk (35%), cycle (11%) and use buses (13%) much more (City of Ljubljana, 2017).

5 Conclusion

In 2001 it was possible to establish a potential correlation between the length of school route and the share of active routes, but this relation is becoming increasingly weaker. An increasing share of children are driven over increasingly shorter distances (even less than 1 km) that they could easily cover actively.

Some of the reasons for the trends discussed are explained by warnings from international experts that the traffic safety paradigm should be changed because focusing intensively on traffic safety as part of the current paradigm can cause a reduction in active travel modes. Todd Litman (2017) found that the traffic safety paradigm assumes that the use of motor vehicles is generally the safest and that accidents are a consequence of risky behaviour by certain groups of people, such as young or elderly drivers, distractions while driving (e.g., using a mobile), and failure to use seatbelts or bike helmets. Therefore, the current approach focuses on target strategies and programmes that seek to reduce specific risks (e.g., speed, using mobiles while driving, failure to wear a seat belt, failure to wear a bike helmet, poor visibility, etc.). The new traffic safety paradigm proceeds from the assumption that any use of a means of transport entails a specific risk and that most drivers engage in small risks that can result in an accident. Therefore, all strategies that are not aimed at reducing motor traffic increase the risk of accidents; alternatively, approaches involving reduction of motor traffic and promoting other alternatives help eliminate the risk of accidents. The new paradigm also builds on the realisation that it is unreasonable to reduce car use without offering quality alternatives. The new approach thus expands the range of possible measures for improving traffic safety and involves more comprehensive traffic

planning that encompasses all travel modes as well as better management of mobility and measures integrated with spatial planning (Litman, 2017).

In Slovenian primary schools, traffic safety is addressed in line with the old paradigm. Although this is an important, centrally managed and well-organised area that yields good results in terms of traffic safety, it seems that the old paradigm is contributing to a decrease in active mobility among primary school pupils, along with all the negative health implications mentioned in the introduction. Slovenian schools address traffic safety by focusing on reducing drivers' risky behaviour in areas around schools and eliminating conflicts between drivers and pedestrians and cyclists near schools. However, this approach also creates a basis for parents to believe that the safest way for children to get to school is by car. Such an understanding, combined with providing car-parks for parents to deliver children and for school staff (a trend established in all sustainable urban mobility plans in Slovenia), increases the volume of motor traffic in the immediate vicinity of schools, especially during morning peak hours, all of which increases the risk of accidents. This is paradoxical because the current traffic safety paradigm unintentionally creates potentially dangerous traffic situations near schools and jeopardises the safety of schoolchildren, along with increasing the share of children travelling to school in a safe but unhealthy manner (i.e., by car).

The new traffic safety paradigm delivers a full set of solutions. The focus of addressing traffic safety must shift from safe driving to reducing motor traffic near schools. Consideration of children's mobility must become part of comprehensive traffic planning, which should be geared towards reducing and calming traffic in school areas by setting up infrastructure that discourages car use and encourages safe alternatives. Access and parking for cars must be limited, including for school staff. In addition to physically redesigning the areas around schools, significant efforts should be directed toward mobility management and changing the habits of all people: children, parents and school staff. Mobility management is a concept promoting sustainable traffic and active mobility as well as regulating the demand for car use by changing the views and travel habits of the population. Its essence is "soft" measures, including informing, communicating, organising services and coordinating activities of various partners. "Soft" measures most often strengthen the efficacy of "tough" measures in traffic (e.g., new passenger areas or cycling paths, and limiting access to or eliminating parking facilities). Soft measures (compared to tough ones) usually require little financial input and often have a very favourable cost-benefit ratio. A typical example of mobility management is the Traffic Snake initiative (Moscholidou & Colclough, 2017), which also confirmed in Slovenia that a

way back to higher active mobility for children is possible and urgently needed.

Aljaž Plevnik

Urban Planning Institute of the Republic of Slovenia, Ljubljana, Slovenia

E-mail: aljaz.plevnik@uirsi.si

Mojca Balant

Urban Planning Institute of the Republic of Slovenia, Ljubljana, Slovenia

E-mail: mojca.balant@uirsi.si

Luka Mladenovič

Urban Planning Institute of the Republic of Slovenia, Ljubljana, Slovenia

E-mail: luka.mladenovic@uirsi.si

References

- Ahlport, K. N., Linnan, L., Vaughn, A., Evenson, K. R. & Ward, D. S. (2008) Barriers to and facilitators of walking and bicycling to school: Formative results from the non-motorized travel study. *Health Education & Behavior: The Official Publication of the Society for Public Health Education*, 35(2), pp. 221–44. DOI: 10.1177/1090198106288794
- Balant, M., Mladenovič, L. & Plevnik, A. (2017) *Celostna prometna strategija Mestne občine Novo mesto: enostavne poti do živahnih središč*. Novo Mesto, City Municipality of Novo Mesto.
- Chillón, P., Evenson, K. R., Vaughn, A. & Ward, D. S. (2011) A systematic review of interventions for promoting active transportation to school. *The International Journal of Behavioral Nutrition and Physical Activity*, 8(10), pp. 1–17. DOI: 10.1186/1479-5868-8-10
- City of Ljubljana (2017) *Celostna prometna strategija Mestne občine Ljubljana. Predlog*. Ljubljana, Ljubljanski urbanistični zavod d. d.
- Copernicus (2012) *Corine land cover, version 18.5.1*. Available at: <http://land.copernicus.eu/pan-european/corine-land-cover/clc-2012> (accessed 12 June 2017).
- Davison, K. K., Werder, J. L. & Lawson, C. T. (2008) Children's active commuting to school: Current knowledge and future directions. *Preventing Chronic Disease* 5(3). Available at: http://www.cdc.gov/pcd/issues/2008/jul/07_0075.htm (accessed 29 May 2017).
- Department for Transport (2004) *Transport statistics bulletin. National travel survey: 2002*. Revised July 2004. London.
- Department for Transport (2014) *National travel survey 2014: Travel to school*. London.
- Dimaggio, C. & Li, G. (2013) Effectiveness of a safe routes to school program in preventing school-aged pedestrian injury. *Pediatrics*, 131(2), pp. 290–296. DOI: 10.1542/peds.2012-2182
- Grize, L., Bringolf-Isler, B., Martin, E. & Braun-Fahrlander, C. (2010) Trend in active transportation to school among Swiss school children and its associated factors: Three cross-sectional surveys 1994, 2000 and 2005. *The International Journal of Behavioral Nutrition and Physical Activity*, 7(28), pp. 1–8. DOI: 10.1186/1479-5868-7-28
- Jeriček Klanšček, H., Roškar, S., Koprivnikar, H., Pucelj, V., Bajt, M. & Zupanič, T. (2011) *Neenakosti v zdravju in z zdravjem povezanih vedenjih slovenskih mladostnikov*. Ljubljana, National Institute of Public Health.
- Kobe Tavčar, A. (2015) *Izvajanje celostne prometne strategije – varne poti*. Paper presented at the symposium of the project TRADOMO: Potujmo drugače and regional conference of the project PUMAS, 22 Apr. 2015, Šempeter, Slovenia. Typescript.
- Litman, T. (2017) *The new traffic safety paradigm*. Victoria, Australia, Victoria Transport Policy Institute. Available at: <http://www.vtpi.org/ntsp.pdf> (accessed 21 May 2017).
- Loukaitou-Sideris, A. (2006) Is it safe to walk? Neighborhood safety and security considerations and their effects on walking. *Journal of Planning Literature*, 20(3), pp. 219–232. DOI: 10.1177/0885412205282770
- Ministry of Health (2015) *Resolucija o nacionalnem programu o prehrani in telesni dejavnosti za zdravje 2015–2025*. Ljubljana, Ministry of Health. Available at: http://www.mz.gov.si/fileadmin/mz.gov.si/pageuploads/javna_razprava_2015/Resolucija_o_nac_programu_prehrane_in_in_tel_dejavnosti_jan_2015.pdf (accessed 28 May 2017).
- Moscholidou, I. & Colclough, J. (2017) *The traffic snake game network. Final results report. EU IEE project*. Available at: <http://www.trafficsnakegame.eu/wp-content/uploads/2014/05/D5.5-Final-Evaluation-Report-February-2017.pdf> (accessed 21 May 2017).
- Plevnik, A. (2002) *Povezanost fizične zgradbe mest in prometa v mestih v Sloveniji*. Doctoral thesis. Ljubljana, Faculty of Arts, Department of Geography.
- Plevnik, A. (2016) *Lastništvo osebnih avtomobilov*. Ljubljana, Ministry of the Environment and Spatial Planning, Slovenian Environment Agency. Available at: http://kazalci.arso.gov.si/?data=indicator&ind_id=756 (accessed 15 Jun. 2017).
- Polič, M., Zabukovec, V., Žlender, B. & Markl, M. (2001) *Državne ceste in prometna varnost učencev – OŠ "Center" Novo mesto. Poročilo o tretji fazi*. Ljubljana, Faculty of Arts, Psychology Department.
- Schoeppe, S., Duncan, M. J., Badland, H., Oliver, M. & Curtis, C. (2013) Associations of children's independent mobility and active travel with physical activity, sedentary behaviour and weight status: A systematic review. *Journal of Science and Medicine in Sport*, 16(4), pp. 312–319. DOI: 10.1016/j.jsams.2012.11.001
- Starc, G. (2014) Zdrav življenjski slog 360° za dobro otrok. In: Scagnetti, N. (ed.) *Skupaj za boljše zdravje otrok in mladostnikov – ohranjanje in zagotavljanje enakih možnosti*, pp.12-19. Ljubljana, National Institute of Public Health.
- Statistical Office of the Republic of Slovenia (1992) *Rezultati popisa 1991. Obdelani osnovni podatki*. Ljubljana.
- Statistical Office of the Republic of Slovenia (2016) *Prve registracije cestnih vozil glede na vrsto vozila, Slovenija, mesečno*. Ljubljana. Available at: <http://pxweb.stat.si> (accessed 21 May 2017).
- Strel, J., Starc, G., Kovač, M. (2011) *SLOFIT sistem – analiza telesnega in gibalnega razvoja otrok in mladine slovenskih osnovnih in srednjih šol v šolskem letu 2010/2011*. Ljubljana, University of Ljubljana, Faculty of Sport.
- Surveying and Mapping Authority of the Republic of Slovenia (2017) *Portal prostor*. Available at: <http://www.e-prostor.gov.si/brezplacni-podatki/> (accessed 12 Sept. 2017).
- UK active (2016) *Active travel. UK active's blueprint for an active Britain*. London. Available at: http://www.ukactive.com/downloads/managed/Blue_print_PDF/active_travel_online.pdf (accessed 28 May 2017).
- Van Sluijs, E. M., Fearn, V. A., Mattocks, C., Riddoch, C., Griffin, S. J. & Ness, A. (2009) The contribution of active travel to children's physical activity levels: Cross-sectional results from the ALSPAC study. *Preventive Medicine*, 48(6), pp. 519–524. DOI: 10.1016/j.ypmed.2009.03.002