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How children view their travel behaviour: a case study from Flanders (Belgium)

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**Abstract**

Understanding how children travel nowadays, their thoughts about travel and their opinions on different transport modes, may provide important answers for policy makers on how to respond to current and future needs of children. But obviously, children do not act autonomously and their travel behavior also strongly influences their parents' travel behavior. A better understanding of children's travel behavior seems therefore necessary.

This paper reports on the results of a large-scale, self-reporting survey (N=2 546) that was conducted to examine the concept and meaning of travel and travel behavior for children between 10 and 13 years old in Flanders. It was found that children are able to complete a travel diary on their own, that their travel differs in different ways and that the social aspect of travel is the most important part of travelling for them.


**Key words:** children, self-reporting survey, travel behavior

## 1. INTRODUCTION

In the domain of transportation children are not typically considered to be the main actors. And even when they do 'act', their travel behavior is often evaluated in terms of their traffic safety (Meire and Vleugels, 2004), their health (Mackett, 2001), their inability for developing the skills to travel and their desire to travel independently (Hillman, 1999; McDonald, 2005). When analyzing the (in)dependent travel behavior of children the studies by Hillman (Hillman, 1997, 1999; Hillman et al., 1990) are important. Also O'Brien (2001) and Mackett and his team (Mackett et al., 2005; Mackett, 2001) have investigated different topics regarding children's travel. More recently, modeling efforts regarding children's travel have been carried out by Copperman and Bhat (2007), Sener and Bhat (2007), Müller et al. (2008) and Jensen (2008).

It is broadly accepted that very young children are fully dependent on their parents when it comes to organising their daily life activities, their nourishment and their travel. Children fully rely on their parents to drive them or to escort them to where they want to go, which in turn strongly influences parents' travel behavior and intra-household decision making (Copperman and Bhat, 2007). At a certain age children are considered able and old enough to travel independently, by bike or on foot. Over the last years, the children's age at this turning point has been increasing, which in turn has led to a dramatic decrease in children's independent travel (Pooley et al., 2005; Tillberg Mattson, 2002; Hillman, 1997; Hillman et al., 1990;).

The literature consulted demonstrated how different aspects influence the (independent) mobility of the children. Traffic unsafety was found to be the parents' most important reason for escorted travel, mostly by car (van der Houwen, 2003;

Karsten et al., 2001; van der Spek and Noyon, 1993). In addition, social safety[1] turned out to be a second parent-related factor in the prevention of independent travel (Johansson, 2002; Karsten et al., 2001; O'Brien et al., 2000). Furthermore, the growing availability of cars in families eases the use of the car (van der Houwen et al., 2002), which is reinforced by the time-pressured way of living in a growing number of double-income households (Pol and Need, 2003). The time-space path of organized leisure activities leaves children less space for independent travel (Christensen and O'Brien, 2003; van der Spek and Noyon, 1993) and also the decreasing family size offers children fewer opportunities to learn to cope with independent travel (van der Spek and Noyon, 1993). Finally, a number of demographic and socio-economic variables, such as age and gender, the home location and the socio-economic family situation influence children's (independent) travel behavior (van der Houwen et al., 2002; O'Brien et al., 2000; Van der Spek and Noyon, 1993).

The result of all these evolutions is an increase in overall car travel and less independent travel (Tillberg Mattson, 2002; Hillman et al., 1990). This process is also likely to continue growing because current children's travel behavior will affect the future travel behavior of these children as grown-ups (McDonald, 2005; Clifton, 2003; Tillberg Mattson, 2002; Karsten, 1995).

The more, understanding how children travel nowadays, their opinions on different transport modes and where they stand on travel will no doubt be relevant for policy makers. For instance, it can result in that children's views on travel are taken into account in local mobility projects. It also gives policy makers a means to potentially change these preferences and travel behavior, in order to promote the use of more

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[1] Social safety is term used here to describe the protection or the feeling of being protected against the dangers caused by human actions in public spaces. Examples of these incidents are agressive behavior, public drunkenness, vandalism, drug trade and use, assaults, murder, ... .

sustainable (and independent) transport modes (e.g. a policy towards promoting bicycle use).

In order to grasp these problems the travel behavior and the attitudes towards different transport modes for children aged between 10 to 13 in Flanders, Belgium is examined in this paper. This is done so using a descriptive statistical analysis. Based on this study a framework for participation of children in the local mobility plans and environmental planning processes was already created. In this domain the Flemish public bus company already used the results for a new marketing campaign for the youth season ticket.

This study focuses on 10 to 13 year olds. There are several good reasons why it seems particularly interesting to choose this particular age category as target group. First, children at this age are in the middle of the turning point process. They are pushing very hard to act more autonomously, while their parents tend to be protective because of their perception of the risks and dangers in e.g. public space (social and traffic safety risks). Second, in Belgium, due to the educational system[2], 12 year olds are often for the first time confronted with an important change in their school-going travel when they go from primary school to secondary school, which often goes along with a transit from a school close by to a school located further away. And finally, public authorities on different policy levels are specifically targeting children at this age to use public transport (through the introduction of special discounted public transport fares)

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[2] The education system in Flanders starts at the age of two and a half years with pre-school kindergarten. From the age of six years, children are at school age and start in primary school. Primary schools consist of six grades and upon completion of the sixth grade, children advance to secondary school. These secondary schools also consist of six grades, starting again at the first grade. The grades of the children in our sample correspond to the 5th to 8th grades in the U.S. school system. The children aged 10 to 13 can be found in the 5th and 6th grade of primary school, and in the 1st and 2nd grade of secondary school.

or to go to school by bike (governments create cycle-paths, stimulate cycle-pooling, make school environments safer), which is not always compatible with the demands of the parents.

Another issue involves the ability of children to self-complete surveys, and this specific in the field of transportation. Different national travel studies include children from 6 or from 10 years on in their sample. In most cases, the survey design is tailor-made for adults and not adapted to children's travel and activities. Completion of the surveys by the children themselves is almost impossible. The focus of these travel studies is mainly on travel patterns and travel characteristics and most of them are not interested in opinions, and therefore leave out children's opinions. In our study a self-reporting survey for children between 10 and 13 was developed and used.

The remainder of the paper is structured as follows. Section 2 describes the data collection process used to obtain information on children's travel behavior and travel opinions. In Section 3, a descriptive analysis of the survey results is made. These findings are compared with results from other travel behaviour studies in order to check their overall validity. Finally, in Section 4 our major conclusions are summarized and avenues for future research identified.

## 2. DATA COLLECTION

The first important issue relates to data collection and the design of a suitable questionnaire. The input for the questionnaires was based on an extensive literature overview of the literature by Meire and Vleugels (2004), complemented with the results of the qualitative phase (Meire, 2005).

In order to analyze the critical factors in the best possible way, three different questionnaires were developed: (i) a questionnaire for the child, (ii) one for the parent(s) and (iii) a two-day trip-based travel diary for the child. In what follows a short description of the questionnaires is given and organisational aspects of the survey are explained.

- The childrens questionnaire was split into different themes to allow for a maximum of logic and reasoning. This was especially important because the children had to complete the questionnaire without any help from an adult. Most of the questions were closed questions but some open questions were also incorporated to bring forward the child's opinion in his/her own words.

- The parents' questionnaire was also constructed thematically. Similar to the child questionnaire, the composition of the parent questionnaire included the critical factors that emerged from the literature and the qualitative phase. Furthermore, some questions from the children's questionnaire were repeated in the parents' form, enabling a linkage between the child's and his or her parents' answers. The parents' questionnaire ended with an open question where concerns and remarks related to traffic and mobility could be made. Parents were not asked to complete a travel diary.

- Every participating child was asked to complete a travel diary over two fixed days. These two fixed weekdays were chosen at random by the researchers. In this diary the child had to write his or her trips, and for each trip the destination, departure time, transport modes used, travel time, escorted or not and arrival time, with a maximum of eight trips per day. In order to keep the travel diary form as simple as possible, no distances were asked for.

A second important issue has to do with sample selection. A random sample of schools was composed, based on a complete list of all (5$^{th}$ and 6$^{th}$ grade of) primary schools and (1$^{st}$ and 2$^{nd}$ grade of) secondary schools in Flanders. In total, 198 schools were contacted. At the school level, 48 schools did not wish to participate. These refusals were however not linked to specific school characteristics. For budgetary reasons, 76 schools from the 150 non-refusing schools were selected at random. In total 3 049 questionnaires were distributed to the children in the grades mentioned above. It was stated explicitly that the questionnaires had to be filled out by the child at home, so schools did not had to reserve school time and that the class room bias could be avoided. This action resulted in a gross response rate of 86.7% (2 644 questionnaires received). The high response rate may be explained by the 'social pressure' of the schools' initial consent to participate in this project. About 52% of the respondents were girls, the other 48% boys. Some 95% of the respondents was part of the target group of 10 to 13 years old. The 5$^{th}$ graders accounted for 27.9% of the respondents, 6$^{th}$ graders for 29.3%. First graders from secondary school make up 23.2% of the respondents while second graders form 19.5% of the sample. The distribution of these variables was compared to school population statistics (Ministerie van Onderwijs, 2005). Significant differences were found for gender, year of birth, grade and the governing board. In order to ensure a better representation of these variables a weighting scheme has been adopted using WEIGHT 2.1 (Hajnal, 1995), resulting in weighing factors for each respondent. These weighing factors were used in the descriptive analysis

The encoders received a training on the survey content and on data cleaning while coding. All the instructions were collected in a data cleaning document that had to be followed rigorously. Coding errors were avoided by the use of closed answering possibilities in the input program. This operation resulted in a net response rate of 83.5% or 2 546 filled out questionnaires.

## 3. DESCRIPTIVE ANALYSIS AND COMPARISON

In this part, the results found are presented. The results in this paper form just a small part of all available results, In the first subsection some general findings will be presented. The following subsections will deal with more specific findings of the survey (travel behavior and views on travel modes, gender differences, class group differences, home location differences and generation differences), each of them followed by a comparison with the outcomes of other and earlier travel behavior studies from different countries. The basis idea is to validate our findings but also to show in which respect the Flanders' case is different from other countries.

3.1 General findings

As mentioned earlier the questionnaires of 2 546 respondents were taken into account for the analysis of the 2004-2005 survey on transportation dependence and autonomy (TDA 2004-2005). Nearly 19% of the children lived in "a town, in a built-up area", 8% "in a town, outside a built-up area", 39% "in the country, in a built-up area" and 35% "in the country, outside a built-up area"[3]. Some 42% of the children live not more than 2 km from school, while for 19% of them school's location is between 5 and 10 km. Almost 9% of the children has to travel more than 10 km to arrive at school.

3.2 Travel behavior

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[3] "The built-up area" is legal term in Belgium, indicating the area comprised between the signs that indicate the begin and the end of this area. Specific traffic (including speed) rules are valid in this area. The categories "in a town, in a built-up area", "in a town, outside a built-up area", "in the country, in a built-up area" and "in the country, outside a built-up area" equate to "central city/town", "suburban area", "rural town or village" and "rural dispersed homesteads".

On average the children reported 2.8 trips on the first day and 2.6 trips on the second

day. The difference in the number of trips between the first and second day is

significant (t=5.67; p < 0.01)[4] and is probably due to response fatigue. About 41% of all

trips are made by car, almost 27% by bike and 13% on foot. Some 43% of the trips is

made escorted by at least one of the parents, one fourth are made alone. Trips with

friends (and without adults) account for 17% of the trips.

More than 44% of all trip motives[5] are school related (a home-school or school-home

trip). The motive "other" accounts for 18% of the motives, indicating mainly the amount

of trip chaining in children's travel. Trips between home and organized leisure activities

make up 14% of the trips. Trip duration is rather short: some 66% of the trips last no

longer than 10 minutes, 87% no longer than 20 minutes.

< INSERT TABLE 1 HERE >

The percentages found in the TDA 2004-2005 survey are similar to the results of the

last Flemish Travel Behavior Study of 2000 (TBS 2000) (Zwerts and Nuyts, 2002).

There it was found that 58% of the trips by six- to eleven-year-old children are made by

car, as car passenger. Their average number of trips made during one day is 3.6. In

the age group '12 to 15 years' the percentage of car use during trips decreases to

36.14%.  The average number of trips per day was 2.6. These results can be found in

Table 1. From the comparison it was learned that children in this age group are able to

self-report their travel behavior.

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[4] Student's t-test was used to compare two means in this sample.
[5] The variable trip purpose was recoded into trip motives. For trips with the purpose "going home", the motive was the trip purpose of the preceding trip.

For an international comparison, the Netherlands, the United Kingdom and the United States were chosen. The methodology and the age groups for children differ for these studies, but nevertheless these figures give an indication, and form a base for comparison.

In the Netherlands, a country that is physically comparable to Flanders, the children's age groups in the MON-study (Ministerie van Verkeer en Waterstaat, 2006) are 0-12 years and 12-16 years. The results are only separately available for boys and girls. The boys in the first category make on average 2.82 trips per day while the girls make 2.93 trips. In the second age class this number decreases for both age groups and gender: to 2.71 for the boys and 2.79 for the girls.

Weston (2005) used the figures from the US National Travel Survey (US–NHTS) to take a closer look at the teens aged 13 to 15. Their percentage of trips made by car is very high with 65.7% and also the number of car trips to school is rather high with 45.7%. In the National Travel Survey of the United Kingdom (UK-NTS) (Department for Transport, 2006) children aged under 17 are taken by car for on average 55% of their trips. For the trips to school a decrease in the use of the car is perceived when children become older (from 43% to 22%).

If these different studies are considered as positions on a continuous scale, children travel the most independently in the Netherlands (lowest share of travel by car), whilst the children from the US are at the opposite side. The Flemish children can be positioned between the Dutch and the UK children.

In addition to the focus on the (effective) trips children make, another part of the questionnaire asked for children's views on travel modes. For walking, biking, car and public transport, children were asked if they agreed or not, with positive and negative propositions based on travel modes characteristics.

<INSERT TABLE 2 HERE>

Walking and biking are preferred transport modes. Items that were contributed to the attractiveness of these modes are the social aspects, health and environmental aspects and perceptions and experiences while being "en route". After each set of questions children could write some remarks on the previous set of questions. For both biking and walking, these experiences form the principal part of the remarks, with a wide range of experiences to write about. "*You can see birds and other animals, sometimes they are dead*", "*You can enjoy nature*", "*Walking is fun because you can smell the nature*","*The rustling of little stones*". On the other hand, some children do indicate being responsible as an element too:"*I feel myself tall when I'm walking alone*", "*I can do what I want when I'm alone*", "*I like it when my mum trusts me*", "*Your parents do not mix up*".

From the results over all the transport modes, it was learned that the social aspect of being on the way (for any mode) is very important to these youngsters, and that it is even more important for girls than for boys. 'Being on the way without an adult' and 'doing other things during travel' are items that are more important to boys. These results are in line with the results from Brown et al. (2008), who found that travelling in groups of friends is more important for girls than for boys. This collective independence achieved through peers is often overlooked and can possibly compensate the loss of freedom (Brown et al., 2008).

<INSERT FIGURE 1 HERE>

Most children appreciate the comfort of the car, and girls are more impressionable to these comforts elements than boys. The older the child, the more he or she appreciates the comfort of the car, but they use it less .  Girls and primary school children are more sensitive to the negative environmental aspects of the car. But when it comes to effective travel mode choice, girls are far more driven to different places then boys. This gendered result has also been found by Brown et al. (2008), Rodriguez and Vogt (2009) and Larsen et al. (2009).

Public transport has to cope with the "unknown, unloved" problem. Whereas almost all children (more than 92%) indicate that they feel themselves old enough to travel alone by bike or on foot, this percentage decreases to 58% for public bus and 39% for train. Children use public transport less than other modes, and the overall appreciation is less positive than for other modes. However, children who use bus or train evaluate the public transport modes more positively (for the positive items) and less negatively (for the negative items).

<INSERT FIGURE 2 HERE>

Secondary school children tend to use public transport more often (partly explained by the greater distance to school) and the older the children get the more they appreciate the characteristics of these modes.

3.3 Differences between children: boys and girls

Boys and girls differ in the way they travel. Firstly, girls make on average 2.96 trips per day, while the boys travel less with 2.76 trips per day (t = 2.84; p < 0.01). However, the small difference in number of trips hides other interesting differences in mode use and in escorting.

< INSERT TABLE 3 HERE>

Almost 46% of all the trips girls make are made as car passenger. For boys the car accounts for 37% of their trips (Z=4.67; p < 0.01)[6]. On the other hand boys take the bike for 32% of their trips, compared to 22% for the girls (Z=5.62; p < 0.01).

A closer look at the trip to school learns that for both boys and girls, the bike is the most important travel mode. Here again, a significant difference between boys and girls for bike (Z=3.49; p < 0.01) and car use (Z=4.48; p < 0.01) was found. In the questionnaire was asked specifically for escort on the home-school trips. Boys travel to school more often alone (35%) versus 22% of the girls. More than 31% of the girls come to school escorted by their parents compared to 24% of the boys (of course this results from the fact that more girls than boys are being brought to school). Furthermore, girls travel more accompanied by (school) friends than boys. Also in Flanders the collective indepence through peers for girls (Brown et al., 2008) was found.

If these results are compared with other studies, identical trends were found in the UK (Department for transport, 2002). They also found that girls make more trips than boys

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[6] The Z-test for proportions is used to compare the proportions from two independent groups to determine if they are significantly different from one another.

and that boys are more likely to make trips by bicycle. Unlike the situation in Flanders, bike use amongst children is rather low in the UK. The same results hold for the Netherlands: as indicated above, girls make more trips per day than boys, in both age groups (0-12 years and 12-16 years).

3.4 Differences between children: class group

Differences in age groups were already found in the studies mentioned in section 3.1. The age groups used in these studies were rather large defined. In the study at hand analyses were performed for the different ages in the sample. For reasons of clarity the school level (primary or secondary school) was used here, which results in a less gradual transition of the results compared to the situation with the age groups.

<INSERT TABLE 4 HERE>

5th and 6th graders (primary school) make on average 2.98 trips per day, significantly different from the 2.72 trips of the 1st and 2nd graders (secondary school) (t=3,67; p <0.01). Primary school children (aged 10 – 11) make 48% of their trips by car and 23% by bike. More than 14% of their trips are made on foot, while public bus accounts for 1%. The share of trips by car decreases to 33% for the children in secondary school (aged 12 – 13).  At the same time, bike use and public bus use increases to respectively 32% and 10%.  From these figures it was learned that the shift in age leads to a shift in mode use, and more in particular to a shift towards more independent travel modes. The differences in escort during trip making is also clear: children in primary school make more than 50% of their trips escorted by parent(s) and 21% alone. Secondary school children make one third of their trips alone, they are escorted

by their parents for 33% of their trips and they make 25% of their trips together with their friends. Here again, the shift to more independent travel when becoming older is clear.

In the British study (Department for Transport, 2002), it was found that 29% of the children aged 10-13 were accompanied by an adult in their home-school trips. In the study at hand it was found that 31% of the children are escorted (44% of the primary school children and 18% of the secondary school children). For the US and the Netherlands no comparable results were found, as escorting was not asked for in the travel behavior studies.

3.5 Differences between children: home location

Obviously, spatial characteristics have an influence on travel behavior (Handy et al., 2002; Saelens and Handy, 2008), and this is also the case for children's travel behavior. For example, the availability of different transport modes is totally different for city centers and the countryside, and thus influences mode use.

< INSERT FIGURE 3 HERE>

Figure 3 shows the travel mode to school for the four available areas (see 3.1 and footnote 5). For all four areas, the bike is the most important travel mode. But the differences with the other travel modes are obvious. For the areas outside the built-up area a high share of car use is found, while in a town in the built-up area walking to school accounts for almost 30%. Moreover the tram is reserved for urban environments, while the public bus is relatively spoken more important to children who live in the country in a built-up area.

For the policy makers the travel differences found for the home locations are useful to differentiate in actions that promote sustainable transport. In particular for home-school trips this could be possible. Home-school distance is rather low for primary school children, so it would be possible to focus in rural areas on biking and walking. In urban areas an important role could be reserved for public transport, when walking and biking are not possible.

3.6 Children and their parents

Parents are an important influencing factor in the travel behavior of the child. Different questions in the questionnaire asked for the influence of the parents on the child's travel behavior. In addition to the current travel mode to school, the child's preferred way of coming to school was asked for and, if the child did not use this preferred mode, for the reasons why the child did not use it.

<INSERT FIGURE 4 HERE>

More than 49% of the children indicated they would like to go to school in a different way, preferably by bike. The reasons for the non-use were asked in an open question, but the broad lines are clear. Children indicate traffic and social safety as the most important reasons for using another travel mode, followed by the home-school distance. However it is unclear to what extent it is their own opinion, as they state: "*My mum finds the distance too long and too dangerous*", "*My mum is afraid that something happens*", "*My mum is too worried*". Mothers are mentioned more than fathers or parents as 'influencing factor', indicating that mothers have a greater protective and decisive influence on the child's mode choice than fathers. Not remarkable, as mothers

take more escorting responsiblities compared to fathers (Zwerts et al., 2007; Sener and Bhat, 2007; McDonald, 2005). Furthermore, children were asked "who or what decides how you go to school". About 47% of the children (N=2 372) indicate that their parents decide for them on how to go to school. This percentage turns from 56% in primary school to 36% in secondary school, indicating again the influence of age in the process to transport autonomy. About 80% of the parents agreed with the child's current travel mode to school. In the open question parents indicated traffic and social safety as important factors in the mode choice decision ("The road from home to school is too dangerous with fatal accidents every year", "Dangerous route"). However, in this open question parents also draw the attention to the independency and the need to develop traffix experiences: "*Development of independency, fighting spirit, and health*", "*Learning to become independent*", "*The maturity of the child: Jolien is capable to go alone to school. She is attentive to traffic safety and she is able to do things independently*". The same items were also found by Ross (2007) in Scotland, specifically for journeys to school.

In order to have an idea how parents view their children's travel autonomy it was asked how far the child felt it was allowed to travel on his own. This indicative distance was measured as follows: the same street, some streets further (same neighborhood), the other side of the village/town, another village/town. Most of the children indicate that their parents do allow them to travel independently (65%) but for 54% of the children this independent travel could not be made by public transport, and for 53% not when it is dark outside. Most parents (total N = 2 178) state that the same street and the same neighborhood are allowed for independent travel. For "the other side of the village/town" parents feel hesitations to allow independent travel, no matter which mode is used. At the same time, parents are more confident in going alone on foot and

by bike than with public transport. Apparently, the "unknown, unloved" image of public transport applies for the parents too.

## 4. CONCLUSION

In this paper an overview was given of the most important findings in our study. Firstly, the trip data and comparisons of the outcomes with other studies and surveys in other countries were reported. From the results it was learned that children from 10 to 13 years old are able to self-report their travel behavior in a conscientious way. Further, it was found that boys travel more and more independently than girls, that secondary school children make less but more independent trips compared to primary school children and that the home locations influences greatly the child's transport mode to school. The importance of the social aspect of traveling for youngsters is an item to keep in mind. The results are in line with earlier results found in other studies and countries and

Parents and child do agree on most items concerning independent travel, but children are not aware of how gradually their parents think about independent travel:  most of the parents think in different distance zones (the same street, same neighborhood, the other side of the village/town, another village/town), the farther the distance from home, the more restrictions to independent travel. Both parents and children look rather negatively at public transport. Informative and educative actions can help to convince both parents and children of the positive features of these transport modes.

The results of this study already contributed to the creation of a framework for participation of children in the local mobility plans and environmental planning processes, where children's opinions were taken into account in different pilot projects.

Moreover, the Flemish public bus company used the results for a new marketing campaign for the youth season ticket. However, different policy actions remain possible; sustainable transport use is one of such actions that can be elaborated on at different (policy) levels.

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TABLE 1: CHILDREN'S TRAVEL BEHAVIOR: COMPARISON OF THE SURVEY ON TRANSPORTATION DEPENDENCE AND AUTONOMY (TDA 2004-2005) AND THE FLEMISH TRAVEL BEHAVIOR STUDY (TBS2000)

| | TDA 2004-2005 | TBS 2000 | |
|---|---|---|---|
| | Children aged 10-13 | Children aged 6-11 | Children aged 12-15 |
| Average number of trips per day per person | 2.8 | 3.6 | 2.6 |
| % trips by car (all trip purposes) | 41.55 % | 58.00% | 36.14% |
| % school trips by car | 27.58 % | 39.20% | 19.83% |

TABLE 2: LIST OF POSITIVE AND NEGATIVE PROPOSITIONS ON TRAVEL MODE

CHARACTERISTICS

| POSITIVE PROPOSITIONS | NEGATIVE PROPOSITIONS |
|---|---|
| **Walking**<br>• You are on the way without an adult<br>• You can choose your own way<br>• You can do other things while walking<br>• You see a lot more<br>• On the way you can talk with friends<br>• If you walk, you have physical exercise<br>• Walking is healthy<br>• Walking is environmental friendly<br>• It is cheaper to walk than to be brought by car<br>**Biking**<br>• You are on the way without an adult<br>• You can choose your own way when biking<br>• You can feel the wind through your hair, you can smell the grass, you can hear the leaves rustle<br>• You can do other things while biking<br>• You see a lot more<br>• On the way you can talk with friends<br>• On your bike, you are free to enjoy yourself<br>• If you bike, you have physical exercise<br>• Biking is healthy<br>• Biking is faster than walking<br>• Biking is environmental friendly<br>• Biking is just fun, you can free your mind<br>• It is cheaper to bike than to be brought by car | **Walking and biking**<br>• Sometimes I have to walk or bike a long way to arrive at my destination<br>• On my way there are older teenagers who shout and make silly remarks<br>• When the weather is bad, it is not funny to walk or to bike<br>• I am afraid of having an accident<br>• When I have to bike or to walk I am tired before I arrive at my destination<br>• I don't have a bike<br>• The bicycle shed in my school is not safe<br>• I have to cross a busy street with little pedestrian crossings<br>• On the way to my school or hobby, the quality of bicycle tracks is not good - I do not feel myself safe<br>• I am afraid of being attacked or kidnapped<br>• Walking is slow<br>• In my opinion traffic is too heavy, it is too busy on the street to go out alone<br>• I do not like to walk or to bike when it is dark without the presence of an adult |
| **Car**<br>• If you are brought by car, you can have a pleasant chat<br>• You can take friends with you in the car<br>• Going by car is practical, especially when you have to go to somewhere else immediately after school<br>• When you have to go to football or music class after school, you can take all your things in the car - that is practical<br>• When it rains or snows, you are kept warm and dry in the car<br>• If you are brought by car, you reach your destination faster<br>• If you are brought by car, you can sleep longer in the mornings then when you have to take the bike or have to go on foot<br>• In the car you can listen to music<br>• Being brought by car is much more comfortable than walking or biking<br>• Traffic is very dense and for that reason it is safer to be brought by car<br>• When it is dark outside, I appreciate being brought to and taken from school | **Car**<br>• When you drive a lot, you pollute the environment<br>• In the car you can not chat with friends<br>• With a car you can get in a traffic jam<br>• If you want to go by car, you have to ask your parents or other adults<br>• If you are driven around by car too often, you get insufficient physical exercise |
| **Public transport** | **Public transport** |

| | |
|---|---|
| <ul><li>You can have a chat with your friends</li><li>You have a lot of responsibility, you have to make sure that you take the right bus, tram, underground or train</li><li>You can go far away on your own, without an adult</li><li>On bus, tram or underground, nobody tells you what to do: you can do your own thing</li><li>When the weather is bad, you keep dry</li><li>You are free, you can take the next bus, tram or train</li></ul> | <ul><li>It is usually very busy on the bus, tramway, metro or train, and I do not like that</li><li>You have no privacy on bus, tramway, metro or train: you can not always do the things you want to do at that moment</li><li>Sometimes there are scary people on the bus, tramway, metro or train</li><li>You need money or a buzzy pazz to travel</li><li>With the bus you can get in a traffic jam, and then it takes a long time to arrive</li><li>You have to know how the public transport system works: where the stops are, which bus number goes to where</li><li>On the bus you can be ragged</li><li>The train, tramway or bus is sometimes delayed and then you arrive too late</li><li>You can take the wrong train or you can miss the connection with another train</li><li>The train wobbles all the time, I am afraid that the train will be derailed</li><li>The school bus takes a long time</li></ul> |

TABLE 3:  AVERAGE TRIPS PER DAY AND TRIP MODES FOR BOYS AND GIRLS
(TDA 2004-2005)

|  | Boys | Girls |
|---|---|---|
| **Average trips per day** °° | 2.76 | 2.96 |
|  |  |  |
| **Trip modes** |  |  |
| On foot | 12.00% | 13.91% |
| Bike** | 32.09% | 21.63% |
| Car passenger** | 36.64% | 46.40% |
| Scooter/Moped passenger | 0.03% | 0.28% |
| Skateboard** | 0.98% | 0.18% |
| Scheduled service bus/tram | 5.57% | 5.28% |
| School bus | 1.55% | 1.27% |
| Train | 0.51% | 0.47% |
| Other/not reported mode | 10.63% | 10.64% |

°° Difference significant at p<0.01 (t-test for means)
** Difference significant at p<0.01 (Z-test for proportions)

TABLE 4: AVERAGE TRIPS PER DAY AND TRIP MODES FOR THE DIFFERENT
SCHOOL LEVELS (TDA 2004-2005)

|  | Primary school | Secondary school |
|---|---|---|
| **Average trips per day** | 2.76 | 2.96 |
|  |  |  |
| **Trip modes** |  |  |
| On foot | 13.89% | 12.01% |
| Bike** | 22.88% | 31.34% |
| Car passenger** | 48.62% | 33.25% |
| Scooter/Moped passenger | 0.18% | 0.12% |
| Skateboard | 0.73% | 0.44% |
| Scheduled service bus/tram** | 1.28% | 10.23% |
| School bus** | 2.10% | 0.58% |
| Train* | 0.16% | 0.87% |
| Other/Not reported mode | 10.17% | 11.16% |

* Difference significant at $p < 0.05$ (Z-test for proportions)
** Difference significant at $p < 0.01$ (Z-test for proportions)

FIGURE 1: PERCENTAGE AGREEMENT ON PROPOSITIONS ABOUT THE CAR
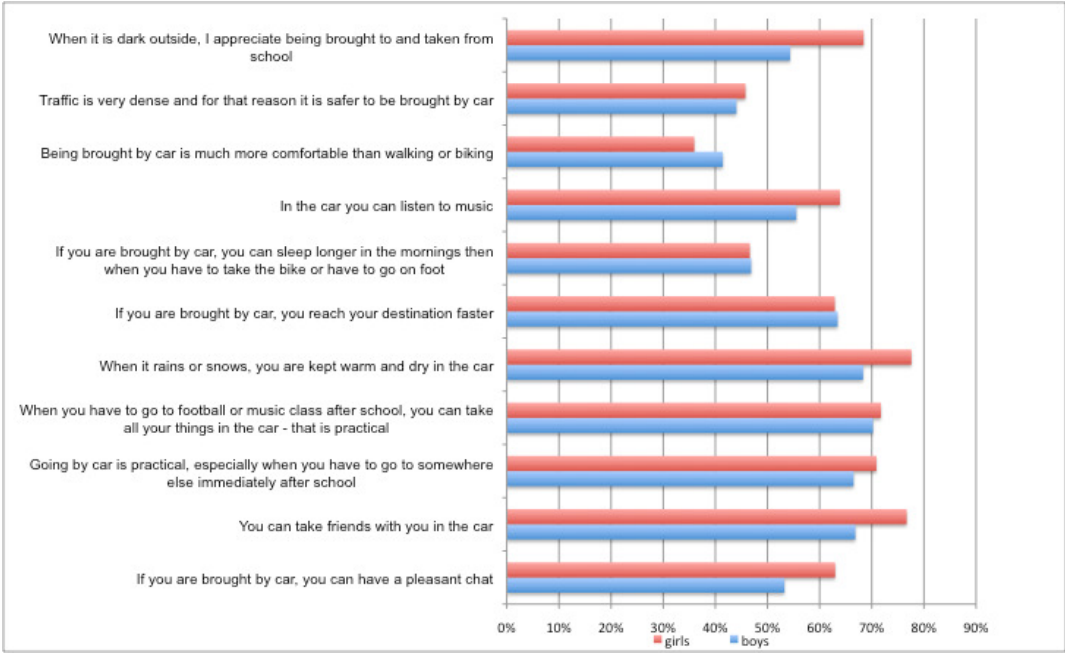
FOR BOYS AND GIRLS

FIGURE 2: PERCENTAGE AGREEMENT ON PROPOSITIONS ABOUT PUBLIC
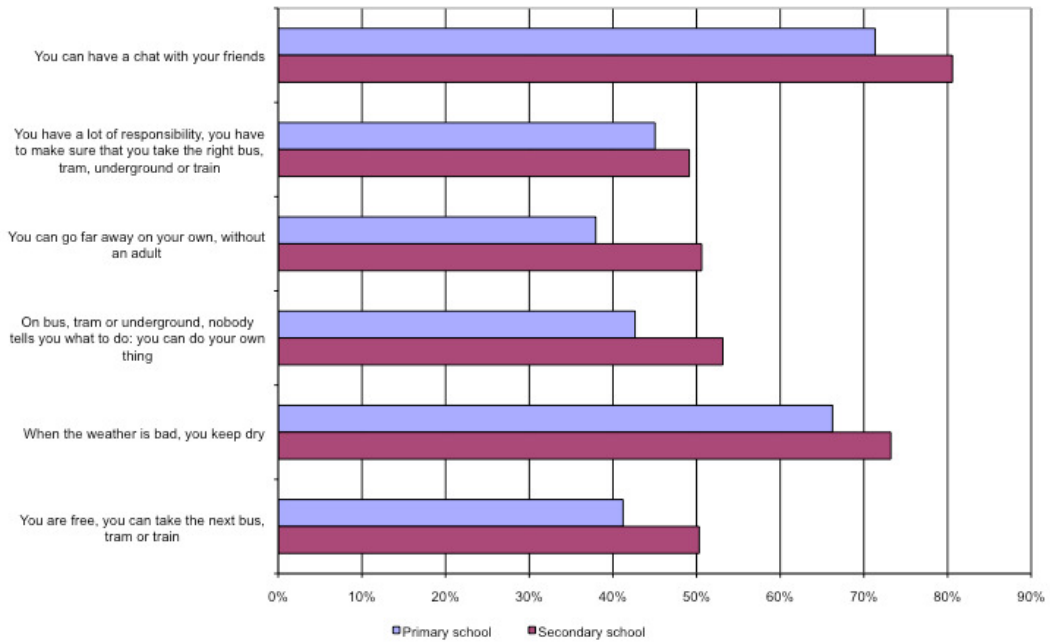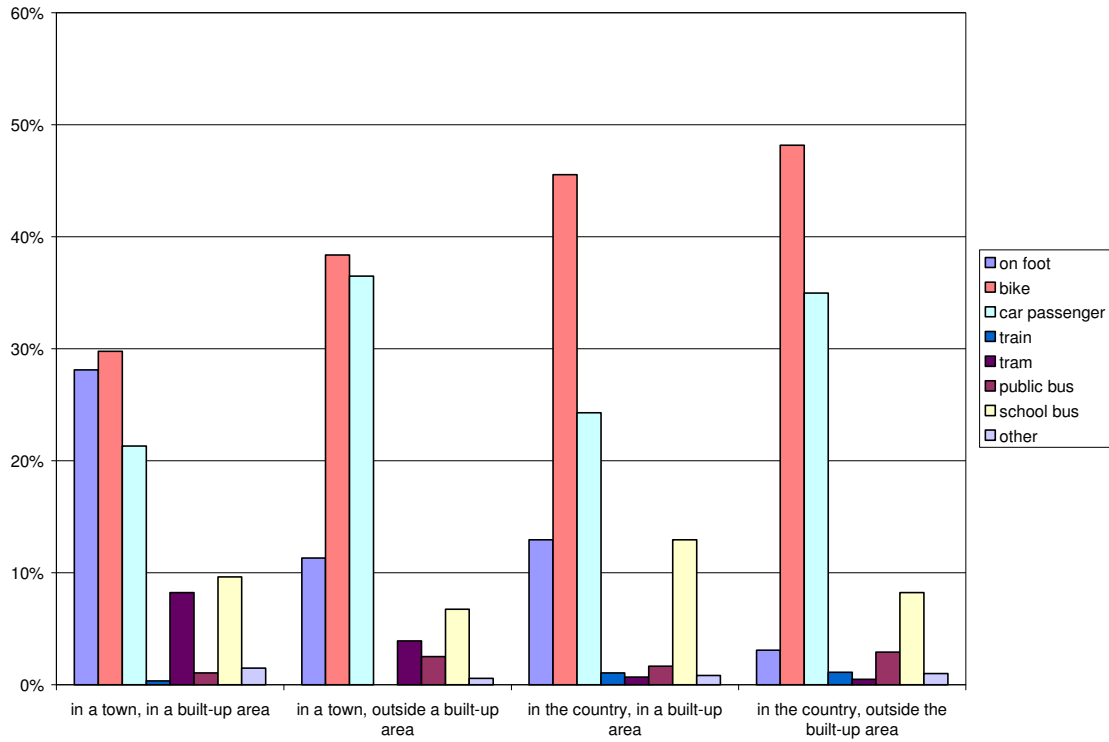TRANSPORT FOR PRIMARY AND SECONDARY SCHOOL CHILDREN

FIGURE 3: TRAVEL MODE TO SCHOOL FOR FOUR DIFFERENT HOME
LOCATIONS



(N=2 252; $X^2$= 299.4, df=36, p<.001)

FIGURE 4: PREFERRED MODE TO SCHOOL AS PERCENTAGE OF CURRENT
MODE TO SCHOOL PERCENTAGE