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## **Children's Independent Mobility: Survey in French Brittany (2011)**

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**CHILDREN'S INDEPENDENT MOBILITY:  
SURVEY IN FRENCH BRITTANY (2011)**



*VERSION 1*



## Authors and affiliation

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## Executive summary

The general objective of this study is to investigate how children's independent mobility develops between age 7-15. The degree of independent mobility is assessed through the examination of children's statements about six licences related to outside trips without adult supervision. The objective is to provide a detailed picture of the current state of independent mobility in primary and secondary school children of French Brittany (North-West of France). In this respect, the study contributes to an international survey carried out in 16 countries (Shaw & Watson, 2010). The international survey was initiated by the Political Study Institute of London as an extended geographical replication of the original study of Hillman & al (1990).

### Method

A total of 947 children participated in the French survey. Specifically, in primary school 484 children—48,8% girls, 51,2% boys—filled up the questionnaire, age ranging from 6 to 12, mean = 8,79 (sd =1,27). In secondary school 463 young people—49,7% girls, 50,3% boys—responded to the questionnaire, age ranging from 10 to 16, mean = 12,9 (sd =1,29).

The survey was conducted in different types of living environment varying in relation to the size and density of the dwelling area. Five types of areas were considered: (1) inner district of a major city, (2) suburban area of a major city, (3) small town, (4) rural market town and (5) rural area. In the French survey, the five types of areas were selected in the same region, namely the district (département) of Ille-et-Vilaine in French Brittany. Therefore, the survey design, which gathered data from different types of areas, was likely to provide a comprehensive picture of the independent mobility of the children living in that particular region.

Children's independent mobility was assessed through the examination of six licences: (1) Licence to cross roads alone, (2) Licence to travel to and from school alone, (3) Licence to go on their own to places other than school, (4) Licence to cycle on main roads, (5) Licence to use buses, (6) Licence to go out after dark.

### Results

The comparison of the licences granted by parents to Psc and to Ssc reveals marked difference for all the six licences. This denotes important changes in the parental attitude towards these children's independent mobility within the considered age range. Interestingly the hierarchy of the six licences is almost the same for the two groups. For both groups the licence to cross main roads is the most frequently granted, whereas licence to go out after dark is the least granted. Even in the secondary school, only a few French children are allowed to go out after dark.

The analysis of the children's responses also puts forward that independent mobility develop markedly after 11 years when children are in secondary school. Specifically, four of the six licences are held by a large majority of the secondary school children: to go to other places than school on their own, to cross main roads, to use public transport, and to cycle on main roads. However, only one third of these older children declared to go to and from school on their own. This result is probably due to the size of the secondary school catchment areas which were particularly large in four of the five survey areas. Therefore, the distances from the children's homes to secondary school constrained the older children to use the school bus or to be driven by their parents.

The primary school children's independent mobility is particularly restricted; four of the six licences examined were held by less than one third of these children. The licence to go to other places than school is the most frequently mentioned by the 7-to-11-year olds. But only half of primary school children can benefit from such a basic and critical licence that can be seen as a prerequisite to the development of activities independently from adults in the dwelling area. For the other half of the primary school children, this result supports the idea that most out-of-school activities are likely to take place in adult-controlled settings, where children must be accompanied by their parents.

Both primary and secondary school children claim to have a particular licence more often than parents declare to grant their children that licence. The differences between children's and parents' responses are particularly obvious as regard to the licence to ride on main roads and, to a lesser degree, the licence to go out after dark.

A cluster analysis permitted to isolate five contrasted types of independent mobility defined by various combinations of licences ranging from a quasi-total dependent mobility to the largest independent mobility. Age is the principal factor significantly associated with each of the five clusters, whereas gender is only associated to one cluster. The type of area and the children's perception of safety in their local area also seem to account for the nature and degree of independent mobility. Overall, these results support the view that a complex array of factors intervenes in the development of children independent mobility, including environmental attributes of the living context such as city size, density and outdoor urban facilities.

## Introduction

Over the last century, the environments in which children have been growing up have considerably changed all over the world. In the main, children nowadays live in urban environments. Since the early nineteen thirties, these changes in the children's living environments have elicited researches to understand how children develop and deal with the opportunities and constraints encountered in these urban contexts.

The pioneer study conducted on “the life space of the urban child” by Martha Muchow (Muchow, 1935) in Hamburg has been followed by many other studies investigating the different cognitive and emotional aspects of the transactions that children establish with their urban environments (Görlitz, Valsiner, Harloff, & Mey, 1998; Hart, 1979; Lynch, 1977). Some of these researches examined more particularly how these environmental changes affected children's behaviours (Wridt, 2004). Within this body of researches, the study conducted by Hillman, Adams & Whitelegg draws our attention on children's independent mobility (Hillman, Adams, & Whitelegg, 1990). This study, which explores changes over time in English children's mobility, was the first one to clearly demonstrate a drastic reduction of children's outdoor independent movements within a twenty-year interval—i.e., from 1970 to 1990. This study received a heightened academic attention and has led to the development of policies supporting children's independent mobility (Whitzman, Worthington, & Mizrachi, 2010).

Since 1990, numerous investigations have been carried out to accurately analyse the degrees and forms of children's independent mobility in different countries. On the whole, the studies conducted in western countries consistently report that children's and teenagers' independent mobility is currently quite restricted, many of the children being commonly accompanied by adults to and from school, but also to sport and leisure activities. It has even been argued that organized leisure activities contributed to less walking and cycling in relation to high time pressure in families, increased access to car(s) and easier access to parents as a 'transport service (Fyhri, Hjorthol, Mackett, Fotel, & Kyttä, 2011). On the other hand, parents' willingness to act as “facilitators” for the transportation of their children is stimulated by the perception of the social and traffic dangers their children might be exposed to while moving without any adult supervision (Veitch, Bagley, Ball, & Salmon, 2006). Children's activities seem to be increasingly controlled by adults and inscribed within very constrained daily and weekly schedules. Regarding the spatial issue, time restrictions and obligations are manifested by frequenting an “archipelago of spaces” which children are unable to visit on their own (Karsten & van Vliet, 2006). This implies that children must be accompanied and taken from one area of activity to another by their parents (Bachiri, Després, & Vachon, 2008). This evolution leads to increased distances between children's places of activities (Witlox & Tindemans, 2006), associated with a reduction of autonomous movement, as well as a declining frequentation of nearby public spaces (Prezza, 2007).

- **Importance of independent mobility during childhood**

Such an observed reduction in children's independent mobility can entail detrimental effects on children's health, development and well-being. Because getting lifts from parents involves a very passive form of transport, many studies focused on the consequences for children's health of a decrease of "active" mobility and subsequently of physical activities (Page, Cooper, Griew, Davis, & Hillsdon, 2009). Passive mobility associated to sedentary plays—e.g., screen games—are likely to promote children's overweight and obesity which are linked with a quantity of diseases (Giles-Corti, Kelty, Zubrick, & Villanueva, 2009; MacDougall, Schiller, & Darbyshire, 2009). However, beyond the legitimate interest for children's health, Whitzman and colleagues stressed that "independent mobility" must not be confounded with "active mobility", and thus must not be reduced to a narrow public health approach (Whitzman, Worthington, & Mizrachi, 2010). Independent mobility and free access to outdoor spaces contribute to the primary mechanism by which children become familiar with their physical and social environment and appropriate it (Valentine, 2004). Outdoor autonomous movements and development of spatial representations are closely interrelated. On the one hand, the growing ability to conceive spatial relations within the living environment facilitates the child's independent mobility, while on the other hand free movements consolidate the elaboration of cognitive mapping of that living environment (Ramadier & Depeau, 2010; Villanueva et al., 2011). Along with cognitive and motor development free access and movements outdoors seem to have positive effects on the emotional equilibrium and well-being of children (Bagot, Kuo, & Allen, 2007). Moreover, being able to go to friends' homes on their own as well as meeting friends outside without adult supervision are crucial for the construction of social relationships among peers and more generally for the development of social competences (Delalande, 2009; Prezza et al., 2001).

- **Factors shaping children's independent mobility**

Beyond the general trend pointing to a reduction in children's independent mobility, results of various empirical studies also revealed some variations in the licenses granted to different children. Certainly, age stands as a primary factor of difference in children's independent mobility (Fyhri, Hjorthol, Mackett, Fotel, & Kyttä, 2011; Legendre, 2010); nevertheless, how the diverse components of children's independent mobility evolve with age still requires a closer scrutiny. Gender differences are regularly reported in the literature as well; boys generally showing earlier and more extended independent mobility than girls (O'Brien, Jones, Sloan, & Rustin, 2000). However, closer analyses suggest that the pathways to attain independent mobility are different in boys and girls, girls gaining a similar level of independence from adults by travelling more in groups (Brown, Mackett, Gong, Kitazawa, & Paskins, 2008). Moreover, the gap between gender in access to outdoor public spaces seems to vary depending on the amenities of the local environment (Legendre, Chouaïeb, Hermelin, & Forget, 2011). This draws the attention to the specific urban design attributes that may enable, support or restrict the development of unsupervised travelling to activity places.

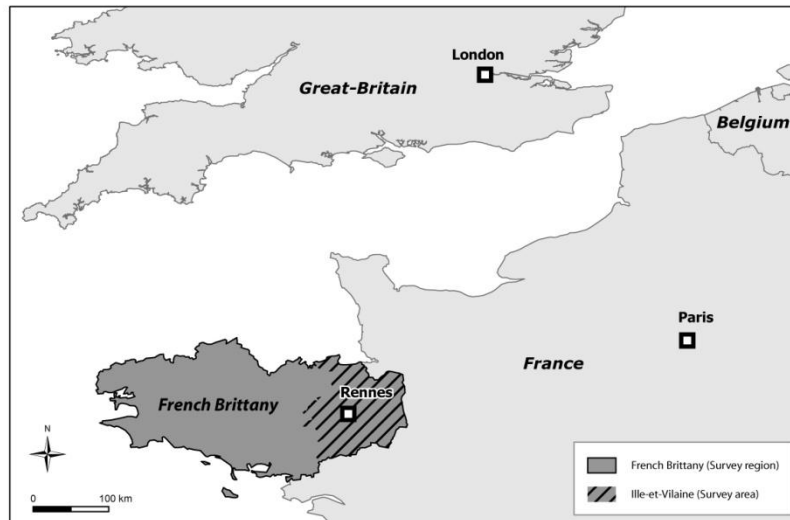
Urban infrastructure, residential density and streetscape attributes can also shape children's mobility (Oliver et al., 2011). The vicinity of play areas and green spaces in particular are likely to promote outdoor plays and to foster walking or cycling around freely in the neighbourhood (Blinkert, 2004; Burke, 2005; Gearin & Kahle, 2006). Other studies focused on the role of the social characteristics related to the family context. For instance, the type of housing (apartment vs. house) has also been shown to modulate the use of outdoor public space (Legendre & Gómez Herrera, 2011). Moreover, although the results of certain studies may present some variations, factors as income level, parents' socio-cultural background, family-size or sibling-rank seem to intervene in the level of restrictions and licenses applied by the parents to their children's for unsupervised movements (Pooley, Turnbull, & Adams, 2005).

Overall, the findings of the current studies incite to carry out further researches accurately examining the respective role of the various individual, social and geographical factors likely to influence the development of independent mobility. Especially, insufficient attention has been paid to the size and the spatial configuration of the cities as well as to the amenities the local areas provide to the young inhabitants.

Moreover, the effect of each factor can be modulated by others as they are embedded in complex systems of interdependences (Bronfenbrenner, 1979). Therefore, to gain a more comprehensive image of the development of independent mobility throughout childhood, it seems particularly relevant to set up analyses addressing how these factors combine to generate various profiles of children's outdoor play and autonomous travelling.

- **Aims of the study**

The general objective of the survey is to investigate how children's independent mobility develops between seven and fifteen years of age. Specifically, one of the main purposes is to compare the degree of independent mobility of primary versus secondary school children. The degree of independent mobility is assessed through the examination of both children's and parents' statements about six licences related to outside trips without adult supervision. The objective is to provide a detailed picture of the current state of independent mobility in primary and secondary school children of French Brittany (North-West of France see fig 1).



**Figure 1** Survey area: The district of Ille-et-Vilaine in French Brittany

In this respect, the study contributes to an international survey carried out in 16 countries (Shaw & Watson, 2010). This international survey was initiated by the Political Study Institute of London as an extended geographical replication of the original study of Hillman & al (1990). It is noteworthy that the comparison between countries is not the only aspect of the geographical extension. Within each country—accordingly in French Brittany—the survey is carried out in five areas ranging from the inner district of a big town to a rural area. Thus, the effect on children’s independent mobility of the urban density of the dwelling area can be assessed.

Particular to the French investigation, the second objective is to examine whether the six licences of independent mobility evolve from non to all licences gained in a unique pattern, or if different patterns of development can be observed. In the first case, the number of licences reported by children or parents would mainly grow depending on age and the succession of stages towards independent mobility would only show minor differences, starting for instance with licence to cross roads and ending with licence to go outside after dark. Conversely in the second case, the showing different profiles of independent mobility; for example some children could report a large autonomy of movement in the local neighbourhood but not the licence to go to school on their own, whereas other children of the same age would report a reverse pattern. This would evidence that beyond age, the access to a particular set of licences is tangibly modulated by other components of the living context. Therefore, our second objective is twofold. Firstly to identify and define the different profiles of independent mobility reported by the children as well as those reported by their parents. Secondly to find out whether particular arrays of individual, social or environmental factors are associated with these different profiles.

## Methodology

The survey on children independent mobility carried out in France in 2010-2011 replicated the survey conducted in England in 1971, in England and Germany in 1990 and 2010 (Hillman, Adams, & Whitelegg, 1990). Specifically, the British and the German versions of the questionnaires 2010 were used as template for the French version (Shaw et al., 2013).

### 1. Translation, adjustments and modifications of the questionnaires

The first stage consisted in a literal translation of the British version of the two questionnaires: “How you get about” and “How your child get about “. Then, in view of the German version, we adapted the French version rephrasing the questions to take into account French circumstances, as well as cultural and linguistic differences<sup>1</sup>.

For instance, regarding the question on children’s out of school activities, we added new activities, we changed the icons of some activities, and more significantly we also changed the time scope of the question, which was extended from the week-end to the whole week. The French school-schedule largely differs from both the English and German ones. In primary schools, the school day lasts longer, starting at 8:30 a.m. and finishing at 4:30 p.m., and there is a day off in the middle of the week on Wednesday. In secondary schools the timetable varies from one day to the other, but Wednesday afternoons are free, whereas the Saturday mornings are not necessarily off. This means that it is on Wednesday rather than at week-end that most French children’s activities take place—e.g. supervised sport or art activities.

In the parental questionnaire, some questions that could have been perceived as intrusive as regard to the French conception of privacy were removed, especially when they were not directly related to children independent mobility. This was the case for the question on the partner’s gender or the question whether the home was rented or owned with or without mortgage—we noted that these questions were also removed in the German version.

Instead, we asked the parents about the type of housing: flat vs. house. A study conducted in suburban towns in France evidenced that the autonomous access to outdoor public spaces is significantly related to the children’s type of housing (Legendre, 2010; Legendre & Gomez, 2011). We also asked the respondent parents about their diplomas and level of education and whether their household was a single parent family.

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<sup>1</sup> It has to be considered that any translation from English into French leads to a noticeable size increase (10% to 15%). Moreover, some questions that seemed simple and evident in English, once translated appeared too vague and could be interpreted in different ways. We had to make them more precise, French language requiring a greater accuracy in the formulation of the questions. Thus, as compared to the English version of the children’s questionnaire the French one is longer (7 pages vs. 6 pages). Of course, it had an incidence on the duration necessary to fill up the questionnaire in the classrooms (filling up durations range from 30 to 60 minutes). This led us to adapt the survey procedure, especially with the younger children (see hereafter survey procedure).

An explicit question on potential functional impairment that might affect the child's independent mobility was added in both children's and parents' questionnaires. In the latter we asked parents to explain how and to what extent the impairment affects their child's independent mobility. In this respect it is noteworthy that the French sample involved two classes for special need children, most of them with major learning difficulties.

A few other minor modifications were also inserted in the questionnaires, but the greater part of the French questionnaires was similar to the Anglo-German questionnaires in order to make possible an international comparison.

### *Questionnaire proofing*

Once the translation and the adaptation of the questionnaires were realized, we tested them with children of different ages and genders as well as with their respective parents. A few additional linguistic adjustments were made after these questionnaires were individually filled up. Finally, the last adjustments in the questionnaire for children were made after the start of the survey in two primary classes. Namely, we changed negative interrogative questions—grammatically complicated in French—for direct interrogative questions, and we changed the order of question 10. This question is complicated to answer; it was placed at the beginning of the questionnaire when children were the most inclined to pay attention to explanations. (The final French versions of the questionnaires are presented in annexes 1 and 2 respectively for children and for parents.)

## **2. Survey procedure**

### **Children's questionnaires.**

The children's questionnaires were completed in their respective schools. Three modes of completing the questionnaire were designed depending on age.

- **Self completion.** Two researchers were present in the classroom. They introduced the general aims of the study and explained how to fill up the questionnaire. Then children completed the questionnaires by themselves, the two researchers answering any individual questions. This procedure was used with secondary school children.
- **Step-by-step completion.** The procedure was basically the same as the previous one, but instead of letting the children answer the questionnaire alone, one researcher read each question before the whole group answered that question. This procedure permitted to better adjust to the children's interrogations about a specific question; this was particularly helpful as regard to conditional questions that are difficult to handle for primary school children. It avoided simultaneous questions on different points of the questionnaire. The other researchers—at least one but most often two, sometimes assisted by the teacher—helped the children who encountered difficulties. This step-by-step completion permits to maintain the same timing and

thus the cohesion of the whole group. This procedure was used with fourth and fifth graders (CM1 CM2) and sometimes with sixth graders (6<sup>ème</sup>) in secondary school.

- **Assisted completion in small groups.** The children completed the questionnaire under the form of a directive interview conducted by a researcher with a small group—generally in groups of 4 to 6 children, but in dyads with the special need children. The researcher read and explained the questions, helped the children to select which case to tick and if necessary wrote the children’s answers. Three small groups worked simultaneously in a room next to the classroom. This procedure necessitated 90 minutes per class. It was used with second and third graders (CE1, CE2) and special need children (CLIS). Although time-consuming, this procedure provided us with interesting insights into the younger children’s understanding of the questions. Furthermore, children’s commentaries permitted a deeper understanding of the contexts and activities associated with independent mobility. This interview mode was particularly interesting regarding their perception of safety, as children wished to describe the experiences related to their answers.

A total of 947 children participated in the French survey. Table 1 indicates the number of children surveyed per area and school type.

### Parental questionnaires.

The parental questionnaires were distributed to the children in the classrooms. They were given to the children in an envelope with a letter for the parents explaining the aims of study and the measures taken to guarantee that the responses will remain anonymous. The same code appears on both the child’s questionnaire and on the corresponding parental questionnaire, so that it was possible to match them without any mention of the participant names.

The children took the questionnaire home so that their parents filled it as soon as possible, optimally the very same day. Once the parents had completed the questionnaire, children brought them back to school either to their teachers in primary school or to the office in secondary school. The parental questionnaires were sealed in an envelope, thus nobody else than the research team could have a look at them.

A total of 672 parental questionnaires were returned, that is 71%. However, the percentage of returned parental questionnaires is markedly higher in primary school (84.3%) than in secondary school (57.0%). Table 1 shows that the percentage of returned parental questionnaires also varies depending on the area, the highest rate is observed in the suburban new-town whereas the lowest rate is observed in the inner city of Rennes the major town.

**Table 1 Children's and parents' questionnaires per area and school types**

Areas		Questionnaires		
		Children	Parents	
		Number	Number	% returned
<b>Inner city Major town</b>	<i>Rennes</i>	193	108	56,0%
	Primary	85	53	62,4%
	Secondary	108	55	50,9%
<b>Suburban new-town</b>	<i>Le Rheu</i>	222	183	82,4%
	Primary	126	116	92,1%
	Secondary	96	67	69,8%
<b>Small town</b>	<i>Fougères</i>	191	144	75,4%
	Primary	98	77	78,6%
	Secondary	93	67	72,0%
<b>Rural market town</b>	<i>Combourg</i>	201	146	72,6%
	Primary	106	96	90,6%
	Secondary	95	50	52,6%
<b>Rural village</b>	<i>Pleine-Fougères</i>	140	84	60,0%
	Primary	69	59	85,5%
	Secondary	71	25	35,2%
<b>TOTAL</b>	<b>Total</b>	<b>947</b>	<b>672</b>	<b>71,0%</b>
	Primary	484	408	84,3%
	Secondary	463	264	57,0%

### *School selection and recruitment*

All the primary schools (n= 8) involved in the survey were state funded schools. In all the five areas a state-funded secondary school participated in the survey; in one of the area—rural market town—two secondary schools participating in the study: one state funded school (6th and 8th grades) and one private school (7th and 9th grades). The primary schools were all 'feeder' schools for the secondary schools that were surveyed.

The French research team asked permission for the research from the relevant local authority (*Éducation Nationale, Inspection d'Académie d'Ille-et-Vilaine*), then liaised with the head-teachers to explain the research objectives and procedure. None of the primary schools refused to participate in the study. The head-teachers asked the teachers of the different year groups whether they were willing to participate. On two occasions, it was not possible to have a complete sample of all the year groups in the same school; thus we contacted the nearest primary school in the same area. Once the teachers had agreed, information about the survey was sent to the pupils' parents for their consent, giving them the opportunity to opt out (see annexe xx).

A similar procedure was used in secondary schools; the only difference was that we did not have to ask the teachers for agreements because the survey was not conducted during teaching periods but during free periods on schooldays. From all the parents asked very few

of them opted out ( $n = 5$ ). The children were also given the opportunity to opt out; which some of them used because they preferred to do their school work ( $n = 6$ ). On the whole, less than 1% of the children or parents refused to participate in the survey.

The junior schools were all 'feeder' schools for the secondary schools that were surveyed (e.g. once the children left their junior school at age 11, they usually joined the secondary school in their area that was surveyed). A more detailed description of the surveyed English areas in 1990 can be found in *One False Move*, p113-116 (ref).

### Participant recruitment and data collection

In line with accepted ethical guidelines on involving children in research studies, consent was sought from the 'responsible adult' in each school (the Head Teacher or Principal) to survey the children. A letter drafted by the researchers was then sent home to each child's family at least two weeks in advance of the study by the Head Teacher, on school headed paper, outlining the nature and objectives of the study and providing an option to opt their child out of the study without any consequence for their child, with a prepaid envelope addressed to the school. The outline of the letter provided to the schools can be seen in appendix xxx.

These opt-out forms were collected on the day of the survey, and used by the researcher to ensure that only children with parental consent were surveyed.

In each class, the researcher explained the research to the children using a pre-prepared script pitched to the appropriate level, which can be seen in appendix xxx. Each child was given the option to opt-out of any or all questions. No children in England or Germany refused to participate in the study on the day. After the study, each child was given an envelope to take home to their parents containing a questionnaire. They were also given a participant information sheet to let them who conducted the research and its purpose. This participant information sheet can be seen in appendix xxx.

### The areas surveyed

In the French survey, the five types of areas were selected in the same region, namely the district (département) of Ille-et-Vilaine in French Brittany. Therefore, the survey design, which gathered data from different types of areas, was likely to provide a comprehensive picture of the independent mobility of the children living in that particular region. Furthermore, insofar as the data were collected in a homogeneous geographical feature (i.e., similar political, cultural, physical and climatic environment), the design enhances the possibility to assess the specific impact of city size and urban density on children's independent mobility.

### *Specification of the five survey sites*

- 1) **Rennes: inner district of a major city.** Rennes is the major town of French Brittany. Yet, it is not a very big town in itself (208 000)<sup>2</sup>, but it is an attractive city and the population of Rennes and its suburbs (578 000) has steadily increased over the last decade. The city of Rennes has the highest density of the five survey sites with 4159 inhabitants per Km<sup>2</sup>. Among the inhabitants of the city, 7 to 10 year-old children and 11 to 15 year-old-children represent respectively 3.4% and 5.2% of the population. These percentages are lower than the corresponding percentages for France (4.9% and 7.3%) and other French towns of the same size (4% and 6.2%). This is mainly due to the fact that in Rennes university students represent 20% of the population. Regarding social and occupational categories, Rennes does not tangibly differ from other French towns of the same size although it has a slightly higher rate of unemployment (8% vs. 6.5%). It is noteworthy that the survey was carried out in primary and secondary schools of the north-eastern district of the town that is inhabited by a higher proportion of lower and lower-middle class people. Flats represent 85% of the type of housing and 74% of the households have at least one car. This is the lowest percentage of car-owning among the five survey sites; it may be related to a good quality network of public transport in the city (underground and buses).
- 2) **Le Rheu: suburban new town.** Le Rheu is a small town located in the suburban area of Rennes (9km from Rennes center). There are 7300 inhabitants and the density is 380 inhabitants per Km<sup>2</sup>. The population has multiplied by 2.5 during the last forty years. In contrast with Rennes, the proportions of both 7 to 10 year-old children (6.5%) and of 11 to 16 year-old children (8.3%) are noticeably higher than in overall France and slightly higher than in similar suburban cities (5.7% and 8.2%). They are the highest among the five survey sites. Le Rheu is also characterized by higher percentages of professional, administrative and managerial occupations (18.1%) as well as intermediate occupations (21.6%) than the other survey sites. Another particularity is the higher rate of mono-parental families (9.6%). Housing mainly consists of houses (60%). The level of car-ownership (92%) is the highest of the five survey sites. It is noteworthy that the urban planning of the city associates urban development to green spaces. In particular, this means that all over the city many pathways for walking and cycling have been designed.
- 3) **Fougères: small town.** Fougères has 20680 inhabitants and its density is of 2070 inhabitants per Km<sup>2</sup>. It is worth mentioning that the population has been constantly

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<sup>2</sup> Statistics mainly rely on data available on <http://www.insee.fr/fr/> that is the official site of INSEE (National Institute for Statistics and Economical Studies). They have been retrieved in May 2011, and correspond to the yearly statistical data adjustment made by INSEE in 2010.

decreasing since 1968. Comparatively to same sized towns, the proportion of children in the population is lower regarding either 7 to 10 year olds (4% vs. 4.9%) or 11 to 16 year olds (6.8% vs. 7.4%). Moreover, the proportion of retired people is important and represents 37% of the households. The percentage of workers (21%) is also higher than in other towns of the same size. Flats correspond to the main type of housing (57%) and 79% of the households have a car. The city offers a bus service but there is no special urban design of pathways likely to promote walking or cycling.

- 4) **Combourg: rural market town.** There are 5400 inhabitants in Combourg and the density is of 84 inhabitants per Km<sup>2</sup>. The population is slightly but constantly increasing. The percentages of 7 to 10 year-old children (5%) and of 11 to 16 year-old children (7.2%) are a little higher than in other French market towns. Regarding, In Combourg social and occupational categories do not noticeably vary from other market towns. It is worth mentioning that more than 90% of the households are living in a house and that 83.8% of them have a least one car.
- 5) **Pleine-Fougères: village in a rural area.** There are 1800 inhabitants in Pleine-Fougères, which shows the smallest density of the five survey site with 56.5 inhabitants per Km<sup>2</sup>. The population has remained quite stable over the last forty years. The percentages of 7 to 10 year-old children (4.8%) and of 11 to 16 year-old children (6.6%) are slightly lower than in other French rural areas. The percentage of retired people is quite high (43.6%). As in Combourg, 91% of the households are living in a house and 84.1% of them have a least one car. Most of the children attending the primary school live in the village or close nearby, but the children attending the secondary school come from a large rural area around Pleine-Fougères. Some of these children spend up to 2 hours per day in school-bus journey to and from school.

## Findings

### 1 Findings grouped by primary and secondary school children

#### i. The six licences of independent mobility

Table 2 shows the percentages of positive responses regarding each of the six licences of the French sample. These percentages are based on the responses of 485 primary school children [**Psc**] and 463 secondary school children [**Ssc**], as well as on the responses of the parents of these children--i.e., 406 parents of **Psc**, 259 parents of **Ssc**. Therefore it is possible to compare the children's and parents' responses as regard to the six licences.

Table 2 shows that, in general, children claim to have a particular licence more often than parents declare to grant their children that licence. For both primary and **Ssc**, the differences between children's and parents' responses are particularly obvious as regard to the licence to ride on main roads and, to a lesser degree, the licence to go out after dark. One can also observe a marked divergence between **Psc** and parents regarding the licence to go on their own to places other than school.

The data collected does not permit either to explain these differences or to establish the respective role of the various factors that may trigger different responses in parents and children. Differences might be related either to actual children's behaviours that parents ignore, to social postures—children's claims for independence versus parents' desire to show concern and control for their child security--, or divergent cognitive representations—e.g., "main roads" might correspond to different environmental features for children and parents.

A reverse pattern can be observed for two licences. Regarding the licence to cross main roads, this might be due to a different meaning for parents and young people of what a "main" road is. Regarding the licence to go to school and come back home alone this is related to the fact that the percentages are not computed for parents and children on an equivalent basis (see note b Table 2).

**Table 2 The Six Licences: Comparison of Children and Parents' Responses**

Licence	Primary			Secondary		
	Children	Parents	Difference	Children	Parents	Difference
To cross roads	41,2%	36,9%	4,3%	84,0%	91,2%	-7,2%
To go on their own to places other than school <sup>(a)</sup>	50,6%	26,7%	23,9%	83,6%	79,8%	3,8%
To come home from school alone <sup>(b)</sup>	22,5%	22,9%	-0,4%	33,7%	83,4%	-49,7%
To go out after dark	15,7%	2,0%	13,7%	20,3%	5,0%	15,3%
To use buses	7.80%	4,7%	4,3%	55.9%	54,2%	14,7%
To ride on main roads	24.1%	6,6%	19,0%	67.6%	42,5%	28,3%

**Notes.**

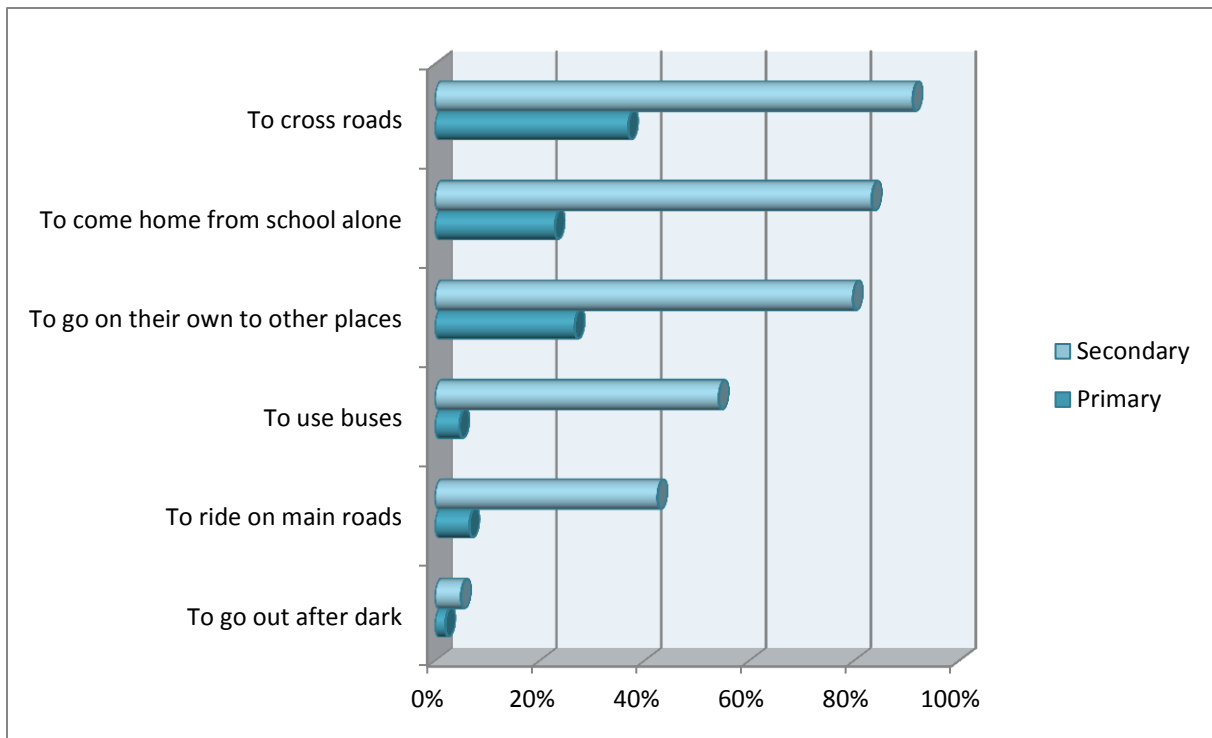
Percentages are based on the total number of respondents taking into account positive, negative or missing responses.

Difference = children's percentage – parents percentage

<sup>(a)</sup> Regarding the licence "to go on their own to places other than school", in the parents' columns the percentage corresponds to the sum of the responses "usually goes alone" and "varies". If we consider only the most restrictive response "usually goes alone", these percentages are respectively 8.6% and 43.3% for primary and secondary school children.

In the columns "children" the percentage corresponds to the proportion of children that declared that they went out for an activity on their own or with another child. The licence was counted when at least one activity was ticked.

<sup>(b)</sup> Regarding the licence "to come home from school alone", we considered the children's response as positive whenever a child responded that they either travelled home or to school alone or with children of the same age or younger. It is noteworthy that in the children's questionnaire these two questions (to school, back home) were associated with the particular day on which the child responded to the questionnaire. Thus, these percentages do not take into account the possibility that the child travelled on their own on other occasions. On the opposite, the question addressed to the parents was not restricted in time. Thus the percentage corresponds to the fact that the licence has been granted to the child to go to school or to come back home on their own, even if it is only on an occasional basis (primary school children) or that the child ordinarily have to take the school bus because the school is too fare (secondary school). This certainly explain why the proportion of positive response is higher in parents' responses than in children's ones for this licence.

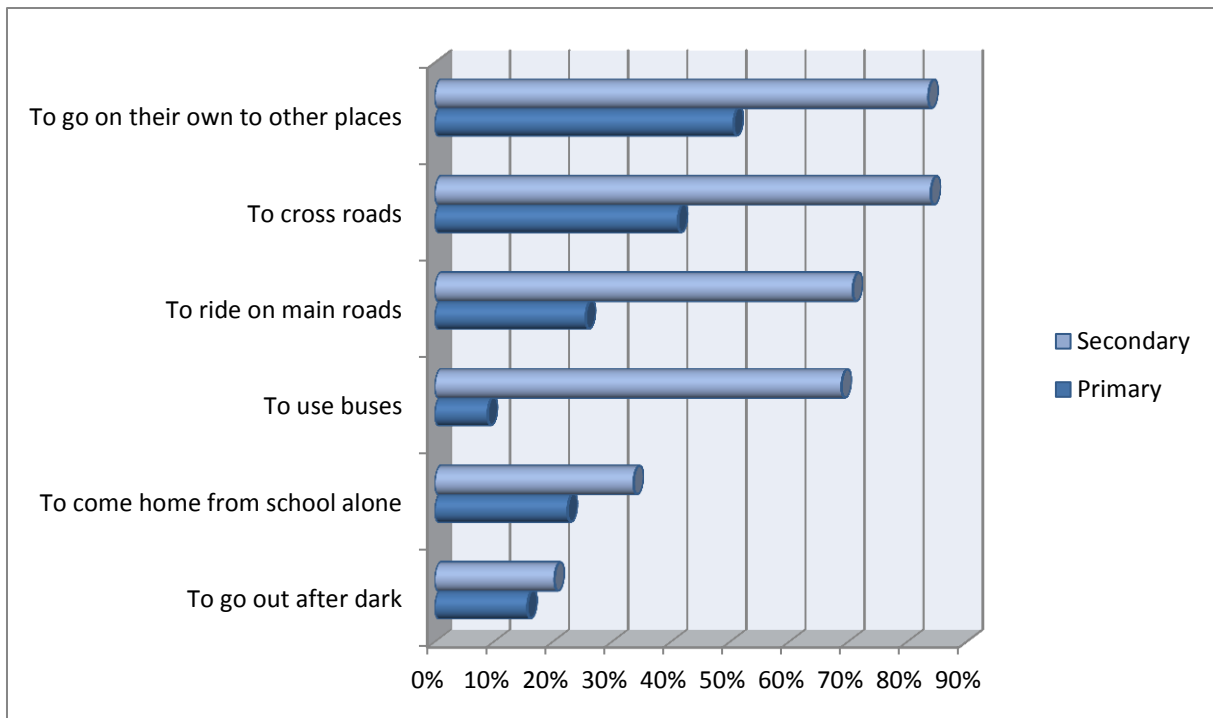


**Figure 2** Progression of the Six Licences from Primary to Secondary School: The Parents' Point of View

Figure 2 compares the licences granted by parents to **Psc** to those granted to **Ssc**. The chart shows that the hierarchy of the six licences is almost the same in the two types of schools. However, for each of the six licences a marked difference can be observed between the two groups. It denotes important changes in the parental attitude towards these licences within the considered age range.

The licence to cross main roads is the most frequently granted in the two groups. Almost all the secondary school youth are allowed to cross main roads on their own whereas only one third of the **Psc** are allowed to do so. Similarly, the bulk of young people can travel from home to school or go to other places on their own, whereas less than one fourth of **Psc** is allowed to do so. The results for these three licences indicate that these aspects of independent mobility are already granted in secondary school. It will be examined whether these permissions develop regularly between 7 and 10 or if they show a sudden increase when the children move from primary to secondary school (see 2.i.: The impact of age).

The next two licences—i.e., to use the bus and to ride on main roads—are granted to approximately half of the young people. This signifies that they are progressively granted while the children are in secondary school. We can see that these two licences are exceptionally granted to **Psc**. Finally, we observe that both primary and **Ssc** groups are not allowed to go out after dark.



**Figure 3** *Progression of the Six Licences from Primary to Secondary School: The Children’s Point of View*

The Figure 3 displays the progression of the six licences from the children’s point of view. One can observe that the gap between primary and **Ssc** is less marked than in the parents’ perspective. The second striking difference is that the children’s hierarchical order of the six licences tangibly differs from the parents’.

One can also observe that the hierarchy of the six licences shows some divergences when comparing primary to secondary school. This is particularly the case for the licence to use bus. It is the least frequent for **Psc** whereas for **Ssc** it comes in fourth rank--a high proportion of them declaring to use buses independently. The ability to use public transports is clearly acquired when the children are at secondary school. The other remarkable difference is related to the liberty to ride on main roads, which shows a substantial increase from primary to secondary school. Finally, it is noteworthy that the licence to go on their own to places other than school is the most frequently claimed by **Psc**.

## ii. The journey to and from school

### Mode of transport

**Primary School.** Two modes of transport prevail in the journeys to and from French primary schools—i.e., nearly 90% of the children travel by car (one half) or walk (one third). Interestingly, the chart shows that 6% of the children getting to school in a car go back home walking. This is probably due to the fact that it is difficult for some parents to be available at 4:30 p.m. when primary school ordinarily finishes. The other modes of transport are clearly a minority, the most important one (school bus) representing less than 5% of the modes of transport.

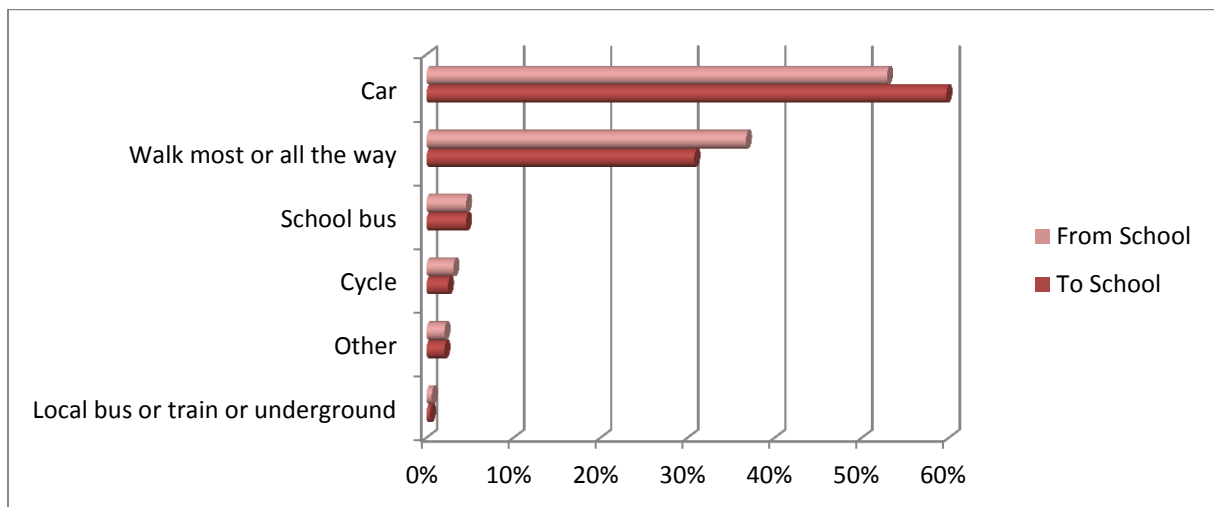


Figure 4 Children’s Modes of Transport to and from Primary School

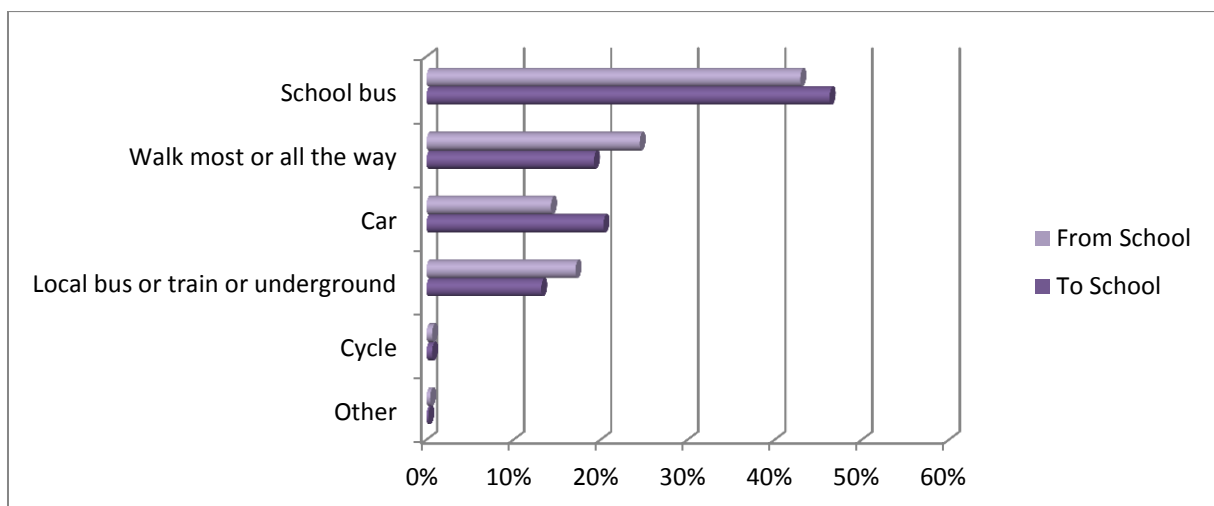


Figure 5 Children’s Modes of Transport to and from Secondary School

**Secondary School.** The mode of transport prevailing among **Ssc** is the school bus, which is used to go to and back from school by over 40% of those children. Nevertheless, three other modes of transport are also largely used by **Ssc**; altogether they represent approximately

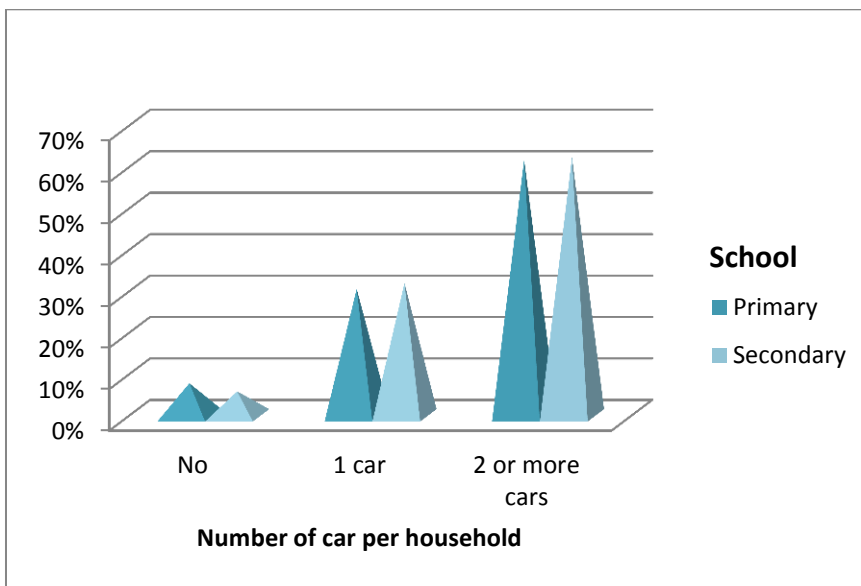
55% of the juniors' travels. Walking appears as the most important mode, it precedes travelling by car or by public transport (mainly local bus, underground applying only to some children in the city of Rennes).

We also observe some changes in the mode of transport used to get to school as compared to those used to go back home. School buses and especially cars are used more frequently to get to school, but their use decreases to go back home to the benefit of walking (+5%) and local buses (+ 4%). As for **Psc**, similar reasons may be considered regarding the decrease in the use of car to go back home, yet the varying schedule of courses from one weekday to another in secondary schools may also account for these changes. For instance, when the class ends early, it might save time to go back home walking or using local buses than to wait for a school bus or parents to pick you up.

**Household access to cars and children's modes of transport from schools**

There is no observable difference in the number of cars per household depending on whether the respondents were parents of primary or **Ssc**. In the French sample, 62% of the households have access to two or more cars, 31% have access to one car and 7% have no regular access to a car.

Chart x.fr *Household regular access to cars*



We examined whether the number of cars per household was related to the children's mode of transport to school (specifically we considered the mode of transport for the travel back from school, which may be less constrained by a strict schedule). In order to test potential significant associations between each mode of transport and the number of cars available in the household, we used a statistical procedure relying on Bayesian inference models (Bernard, 2003). Specifically, we ran a computer program designed to analyze the association rates in contingency tables (BAYYACT: Bernard, 2000). It permits to assess whether the number of responses appearing in each cell of the table is over- or under-

represented as to the total distribution of the responses (e.g., is walking to school under-represented among children belonging to households with two cars or more). Hereafter, we will only consider the association that are inductively attested with a level of guarantee equal or superior to 95%.

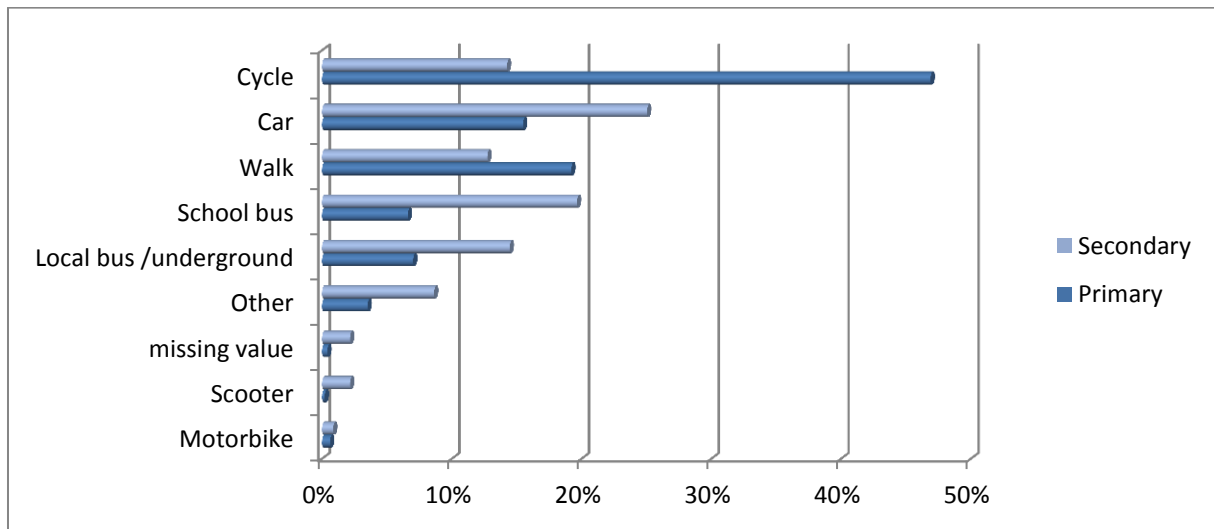
Firstly we examined potential relations for **Psc**. Not surprisingly, among the children belonging to a household with no car we found that walking back from school was a mode of transport over represented and that travelling back in a car was highly under-represented. More surprisingly, a similar pattern of results was observed among those belonging to a household with only one car; however the association rates were moderate. Finally, a reverse picture emerged among the children belonging to households with two or more cars. We observed both an under representation of children walking and an over representation of those travelling by car.

Regarding secondary school: children belonging to households with 2 or more cars were found to show an under representation for walking and an over representation for travelling by car, but the association rates were moderate. In children belonging to households with one car, we observed a reversed pattern: over representation of those walking and notable under representation of those going back by car. We did not find any attested association for **Ssc** belonging to households with no car. No association emerged either for any of the other modes of transport (school bus or local bus). On the whole, the association rates between the number of cars per household and the children's modes of transport were weaker in secondary schools than in primary schools.

#### **Preferred mode of transport to school**

Nearly half of the **Psc** asked chose the bicycle as the preferred mode of transport to school. Walking and travelling by car represent second and third choice respectively. However, the percentages of primary children choosing these last two modes are notably lower than those who chose cycling. Concerning **Ssc**, the choice is more largely dispersed over five main modes of transport. Nevertheless, the car emerged as the most preferred mode among these young people (25%), the school bus appearing as second best.

Chart xx Preferred modes of travel in primary and secondary school children



**Actual and preferred mode.** Only one fourth of **Psc** have the opportunity to travel to school by their preferred mode. This percentage is higher for **Ssc** (38.4%). To explain this result we examined further the concordances and discordances between preferred and actual travelling mode.

Chart xx Proportion of children travelling by preferred mode

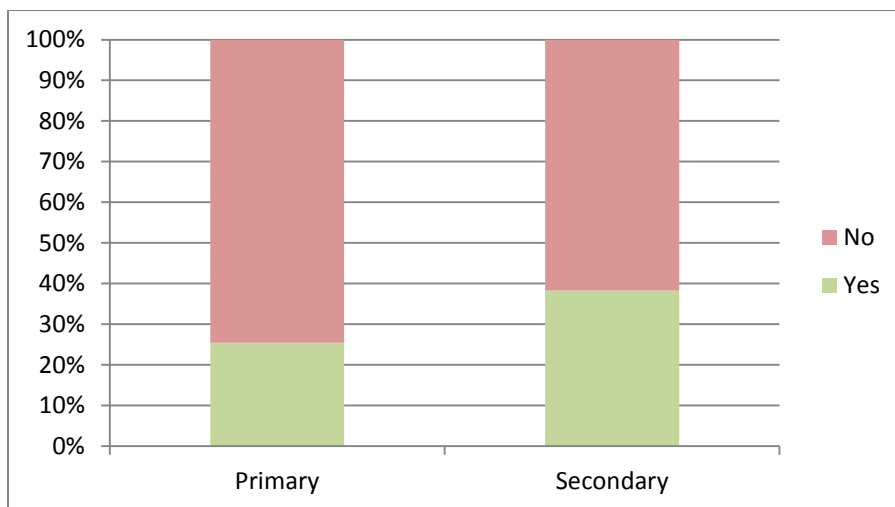


Chart xx shows the concordances between the preferred and the actual travelling modes of transport. Regarding **Psc**, the highest percentage of concordance between the expressed preference and the actual travelling mode is observed for walking, while going to school by car comes second best. It is noteworthy that cycling represents a very small percentage of the concordance between preferred and actual travelling mode. Regarding **Ssc** the highest percentage of concordance between the expressed preference and the actual travelling mode is observed for the school bus; probably because it provides an occasion for peer encounters. Here too, going to school by car comes in second rank, while walking and local transport represent each nearly 20% of the concordances.

Chart xx *Concordance between preferred and actual travelling mode*

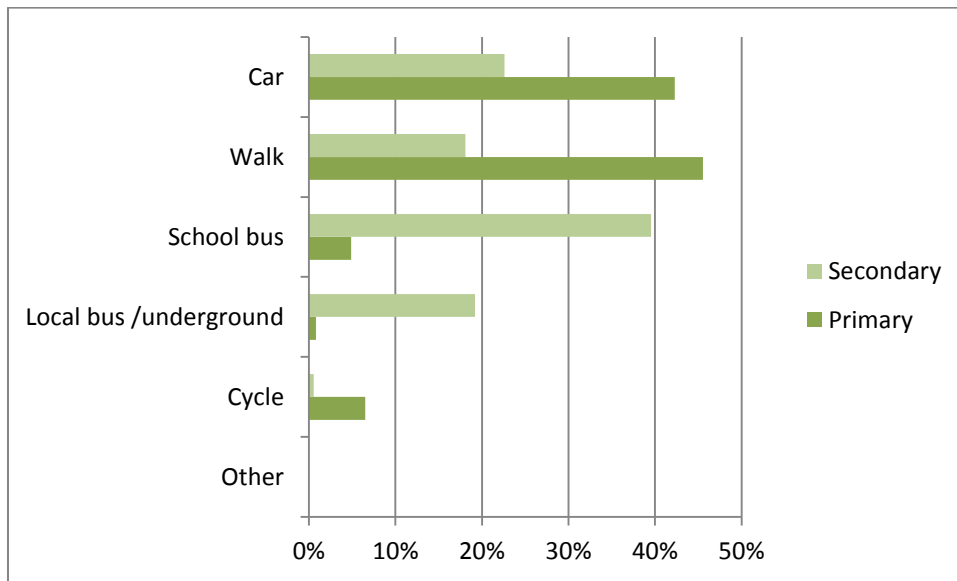
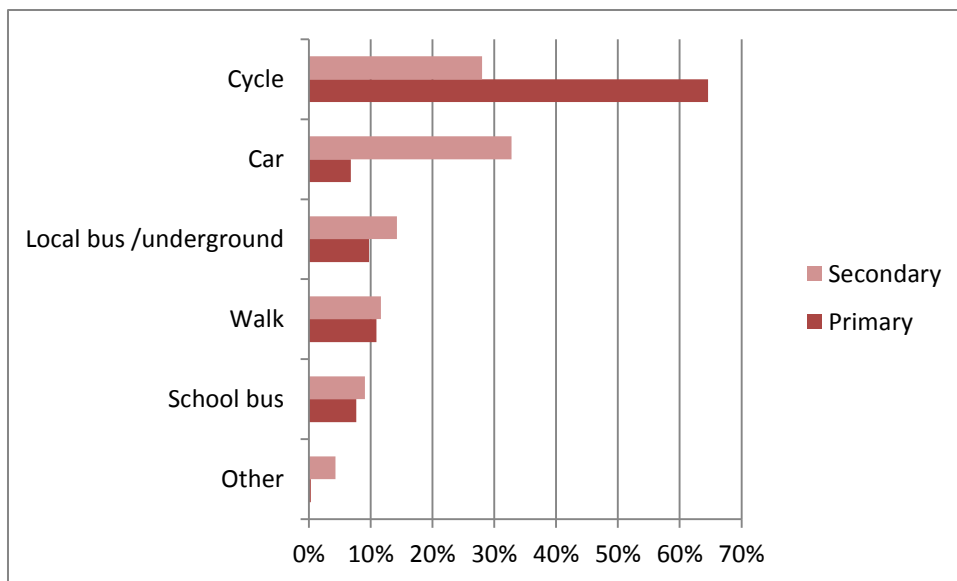


Chart xx *Discordance between preferred and actual travelling mode*



Conversely, table xx shows the discordances between the preferred and the actual travelling modes of transport. For **Psc**, two thirds of the discordances are related to cycle. We have seen that for these children, cycling is the very first expressed preference for travelling to school; yet, it rarely corresponds to the actual travelling mode. This discrepancy may explain why in primary school a higher percentage of children not travelling by their preferred mode of transport can be observed. Regarding **Ssc**, the highest percentage of discordance is related to children who wished to go to school by car but who did not travel by car. Divergence about cycling to school only appears in the second rank.

### Accompaniment to school

**Primary school.** About two thirds of **Psc** are accompanied by their parents when they go to or come back from school. These travels to or from school with parents often include several other younger or older children, most likely siblings. Accompaniment by other adults does not concern more than 10% of the children. One can observe a change in the accompaniment between going to and coming back from school. Parental accompaniment decreases in the afternoon as compared to the morning; while in the morning it is easy for working parents to accompany their children to school, school finishes too early (4:30 p.m.) for them to pick up their children. If many children stay at school –i.e. after school club--until parents can pick them up, for some others an alternative solution is chosen. Accompaniment by another adult as well as travelling alone partially compensates for the decrease in parental accompaniment.

Table xx Independent travel to and from school

	Independent Travel	
	Yes	No
<b>Primary</b>		
<b>To school</b>	14,0%	86,0%
<b>Back home</b>	18,8%	81,2%
<b>Secondary</b>		
<b>To school</b>	25,9%	74,1%
<b>Back home</b>	30,7%	69,3%

This accompaniment change affects children independent mobility. As a matter of fact, if we consider together travelling alone and travelling with peers or younger children—i.e., to the exclusion of any accompaniment by parents, another adult or older children—we can see that a larger percentage of **Psc** travel independently when coming back home from school than when going to school (see table xx).

Chart xx *Accompaniment to Primary school*

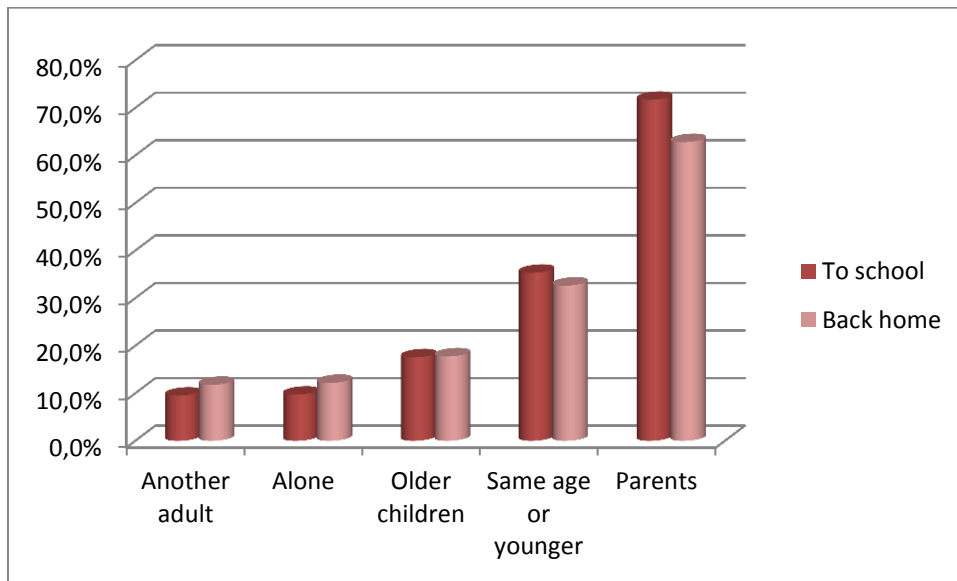
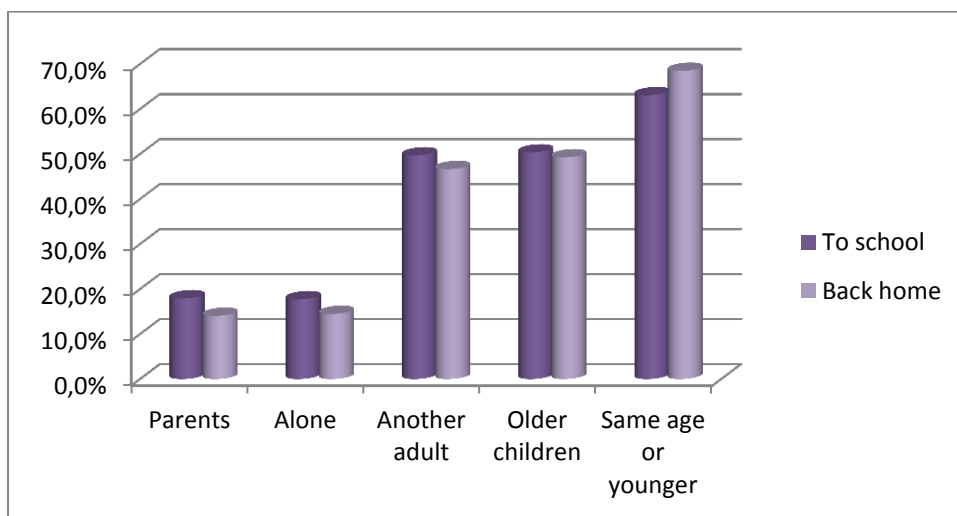


Chart xx *Accompaniment to secondary school*



**Secondary school.** In secondary schools, the accompaniment pattern is quite different from the one observed in primary schools. Only a minority of children is accompanied by their parents, while travelling in school bus induces an accompaniment with another adult (bus driver) as well as other older, same-aged or younger children. The higher percentage observed for the category “same age or younger children”, is likely associated with peer accompaniment when taking a local bus or walking to or from school. Chart xx also shows that these young people infrequently travelled alone.

Finally, alike what is observed for **Psc**, in the afternoon parental accompaniment decreases whereas independent travel increases (see Table xx).

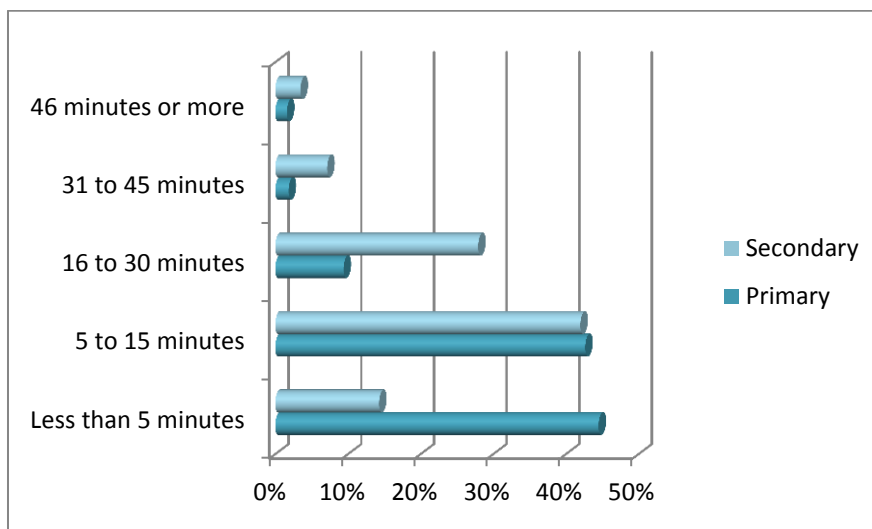
### Duration of journey to school

The duration of the journey to school is markedly shorter for **Psc** than for **Ssc** (Contingency coefficient = .35; exact test:  $p < .001$ ).

For **Psc** the journey lasts less than 5 minutes for nearly half of them, and it does not exceed 15 minutes for 87% of them. However, for some young children (3.4%) this duration exceeds 30 minutes! This can be explained by the fact that most of them (13/15) live in a rural area.

Regarding **Ssc**, the duration of the journey is less than 5 minutes for only 14% of them. Whereas it exceeds 15 minutes for nearly 40% of them and even 30 minutes for 10% of them.

Chart xx *Duration of journey to school: children’s estimation*



These results rely on children’s estimations, thus they must be considered with caution particularly when they come from **Psc**. It is noteworthy that whereas 10.1% of the **Psc** were unable to estimate the duration of the journey, only one of the **Ssc** (0.2%) was unable to do so. The correlation between distances estimated by parents and the duration of the journey effectively estimated by children is lower for primary than for **Ssc**:  $r_s = .36$  ( $n = 251, p < .01$ ) and  $r_s = .50$  ( $n = 258, p < .01$ )

Table xx *Distances from home to school estimated by parents (percentage of responders)*

Distance	Under 0.5 km	0.5 to 1km	1 to 2 km	Over 2 km
Primary	25.8%	23.7%	15.0%	35.5%
Secondary	8.9%	13.1%	11.6%	66.4%
<b>Total</b>	<b>17.8%</b>	<b>28.7%</b>	<b>13.4%</b>	<b>50.2%</b>

Percentages are based on the number of responding parents (18.4% of the parents did not respond to this question).

Thus, in order to accurately analyse how distances estimated by parents and the duration of the journey estimated by **Psc** relate, we ran a Bayesian statistical analysis designed for tables of contingency.

When the distance estimated by parents is shorter than 500m, we observe that a smaller number of **Psc** were unable to estimate the duration of the journey. In this case the response “less than 5 minutes” was notably over-represented whereas the other types of response were under represented (results attested inductively with a guarantee > 95%). On the opposite, when the distance estimated by parents exceeds 2km the number of children unable to estimate the duration of the journey is over-represented. However, for the children that answered the question, responses of the type “less than 5 minutes” were logically under-represented whereas those indicating durations superior to 15 minutes were over-represented. No over- or under-representation emerged in children’s types of responses when the distance estimated by parents fell between 0.5 km and 2 km. In the latter case the children’s responses appear randomly distributed; this result suggests that it seems more difficult for **Psc** to accurately estimate the durations of journeys for intermediary distances (0.5 to 2km) than for shorter or longer ones.

**Choice of the school: Distance and other reasons.**

Most children attend the nearest school: respectively 80% and 84% for primary and **Ssc** (see Chart xx). Less than one fifth of the children do not attend the nearest school, and the reasons given by their parents are quite diverse.

Chart xx *Proportion of primary and secondary school children attending the nearest school*

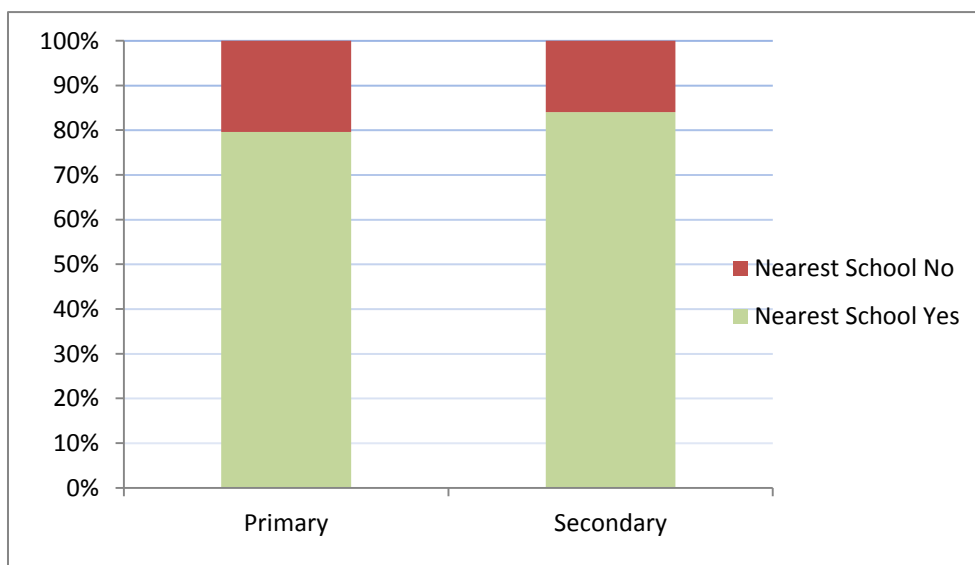
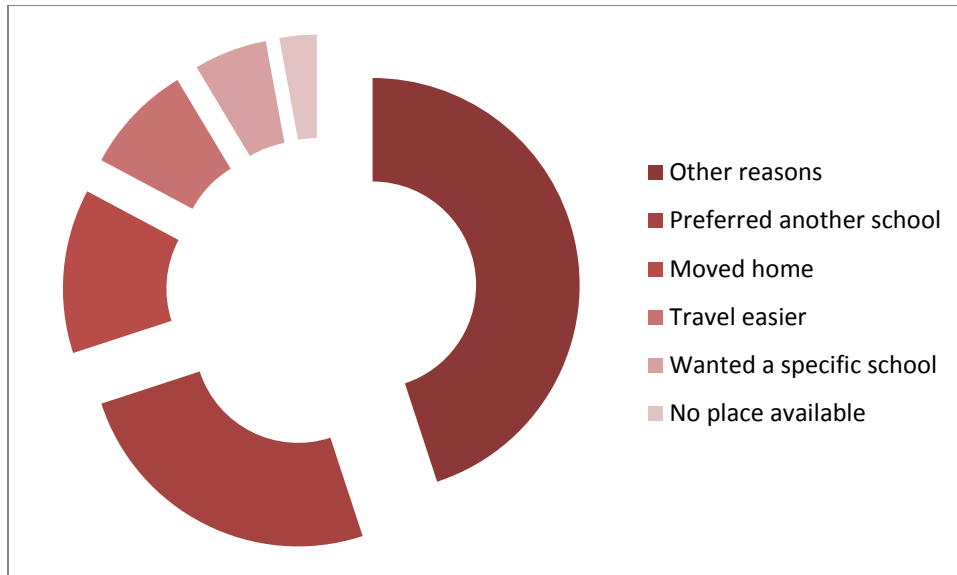


Chart xx shows that among the proposed reasons the one that was most frequently given by parents was that they did not want to send the child to the local school and preferred a specific school elsewhere. This reason is followed by: “moved home after the child started

school” and “travel easier”. The last two reasons – “wanted a specific type of school (faith school, performing arts, etc)” and “no place available at the local school” – do not represent an important part of the reasons given to explain why the child does not attend the nearest school.

Chart xx *Reasons given for not attending the nearest school*



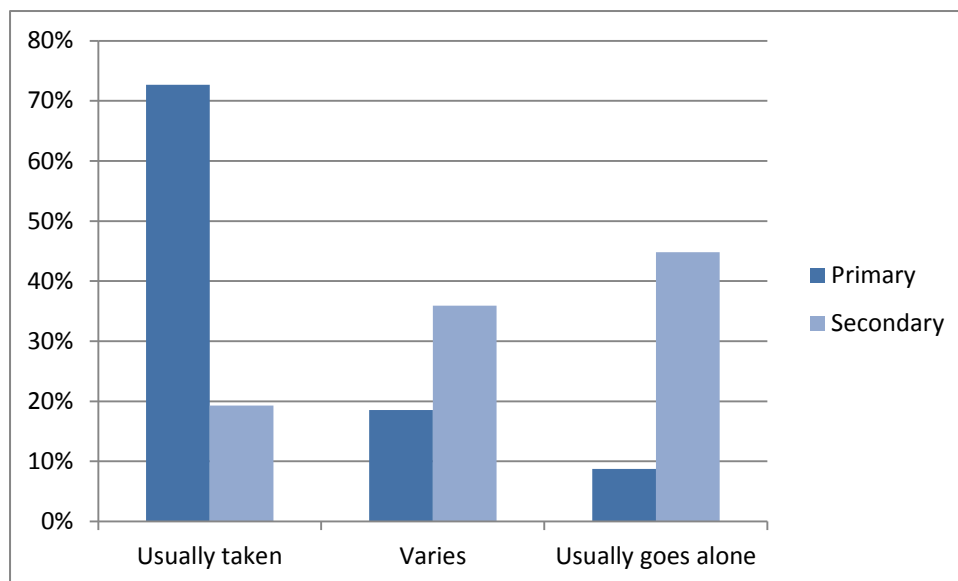
However, the chart also shows that the majority of the parents (63/123) ticked “other reasons”. A close examination of the responses permitted to identify 6 main themes. The first one (n = 15) is related to the wish to explain what sort of specific school they were looking for; among which: a state school because the nearest one was a faith school, facilities adapted to disabled children, type of foreign languages taught in the school, small-sized school and good reputation of the school. The second type of reasons mentioned is related to particular administrative constraints (n = 12). In France, the choice for state schools is largely determined as a function of the geographical area in which your home is located. In some cases, a school depending from another administrative district could be the nearest to your home. This reason was mainly mentioned by parents of **Ssc**. The third theme is related to parents’ working-places (n = 10): either in the school itself or in the immediate vicinity of the chosen school. The fourth one put forward was alternating custody (n = 7), which resulted in an agreement between separated parents who lived in different places. Interestingly the fifth theme corresponds to parents concerned with preserving continuity in the child’s experience of school (n = 6). These parents moved but they let their children attend the school they are used to and in which they have friends. Finally, the fifth theme emerging is related to the vicinity of the school, pre-school or day care centre of the child’s siblings (n = 5).

### iii. Non school travel and activities

#### Parental attitudes regarding non school travels

The examination of the parents' responses regarding their children's non school travels reveals a notable difference between primary [Psc] and secondary school children [Ssc]. Chart xx shows that nearly three-fourths of Psc's parents responded that their child is usually taken to places other than school that are within walking distance. This type of response falls to less than one-fifth for Ssc. Besides, 45% of the parents of Ssc responded that their child usually goes on their own; this was the response of only 9% of Psc's parents. Likewise, fewer Psc's parents than Ssc's parents responded that their child is sometimes allowed to go to non school activities alone, even if these are within walking distance. Additionally, the approximate number of round trips made each week to accompany the child elsewhere than school is markedly higher for Psc ( $m = 3.16$ ,  $std = 0.18$ ) than for Ssc ( $m = 1.76$ ,  $std = 0.16$ ); the test is significant : ( $t(665.1) = 5.90$ ,  $p < .001$ ).

Chart xx *Parental accompaniment to other places than school: primary vs. secondary school children*

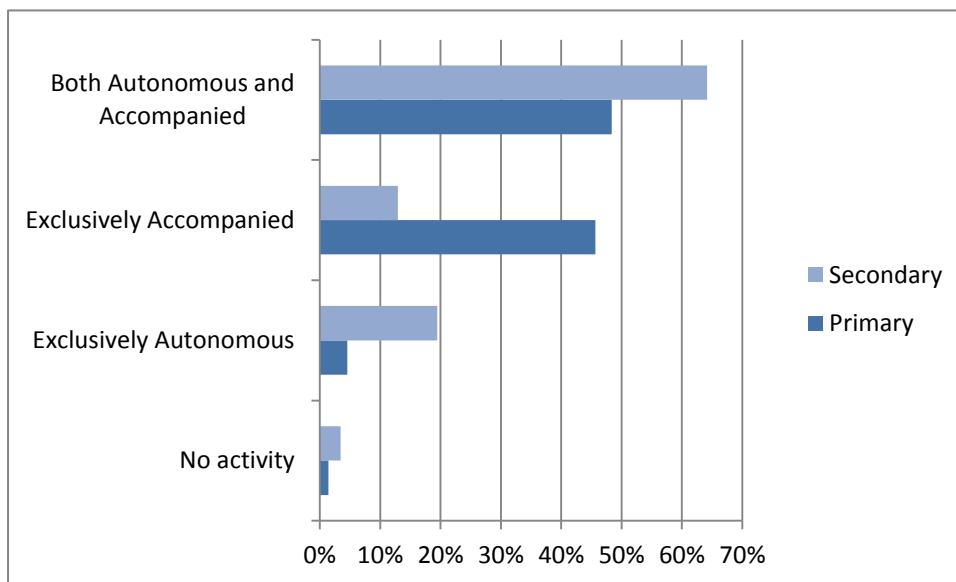


On the whole, these results highlight a clear differentiation in parental attitudes toward children's non school travels depending whether children attend primary or secondary schools. Parents' responses suggest that they have a very tight control on the travels of children under 11. We observe a substantial change in the parental attitude towards non school travels of older children who benefit of a larger autonomy.

Children’s activities and associated travel modes

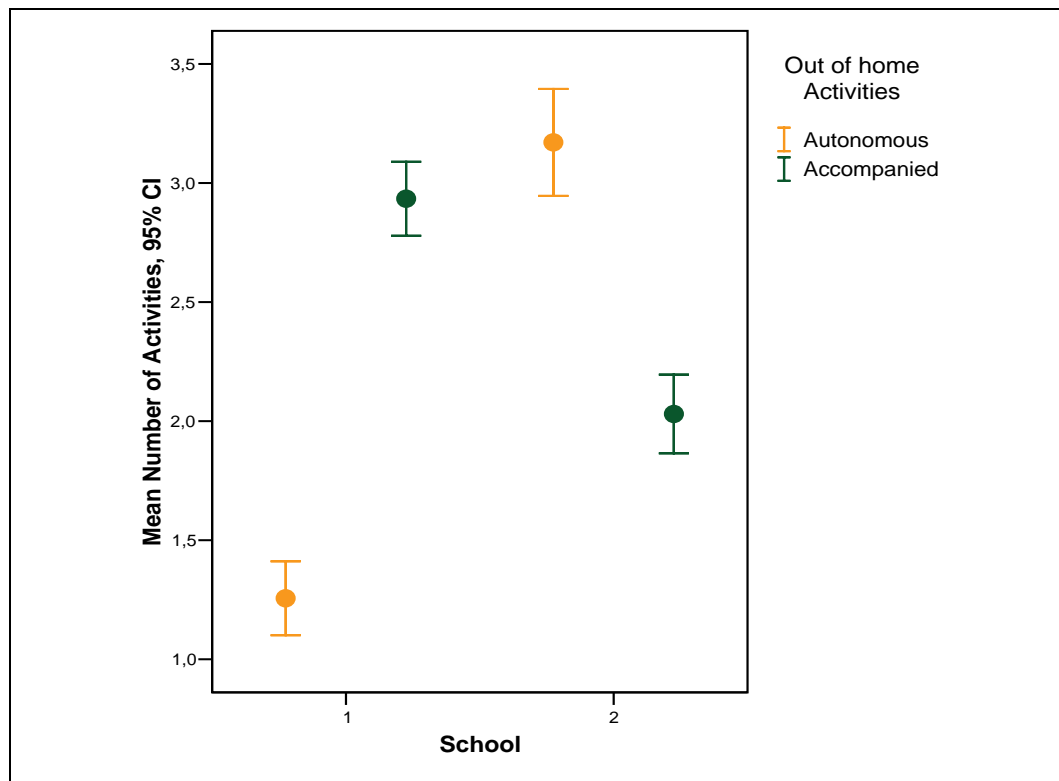
In France, Wednesdays are an out of school day—whole day for primary school, afternoon for secondary school—therefore many regular out of school activities take place on mid-week, either on Tuesday evening or on Wednesday. This is why we asked the children about their out of home activities in the week preceding the survey. Chart XX shows that very few children did not go out for any activity in the week preceding the survey. Most of the children go out for activities both on their own and accompanied by adults. A large percentage of Psc goes out exclusively accompanied by adults, whereas few of them go out exclusively on their own or with peers. Although less marked, the pattern is reversed for young people: the percentage of them declaring to go out for activities exclusively on their own is higher than those declaring to go out exclusively accompanied.

Chart xx *Out of home activities: Percentage of children going out for these activities exclusively on their own, exclusively accompanied or on both modes*



Accordingly to these reversed patterns, the mean number of activities where the children went on their own or with peers is notably greater for secondary than for Psc ( $t(828.3) = 13.78, p < .001$ ), whereas the number of accompanied activities is smaller for Ssc ( $t(945) = 7.83, p < .001$ ). The chart xx also shows that Psc declared a markedly larger number of accompanied activities than autonomous activities ( $t(483) = 37.13, p < .001$ ). Conversely, for young people, the number of autonomous activities is significantly higher than the number of accompanied activities ( $t(462) = 24.35, p < .001$ ). These differences incite to further examine the variety of out of home activities and their associated types—autonomous vs. accompanied—separately for primary and Ssc.

Chart xx *Comparison of the number of autonomous and accompanied activities in primary and secondary school children.*

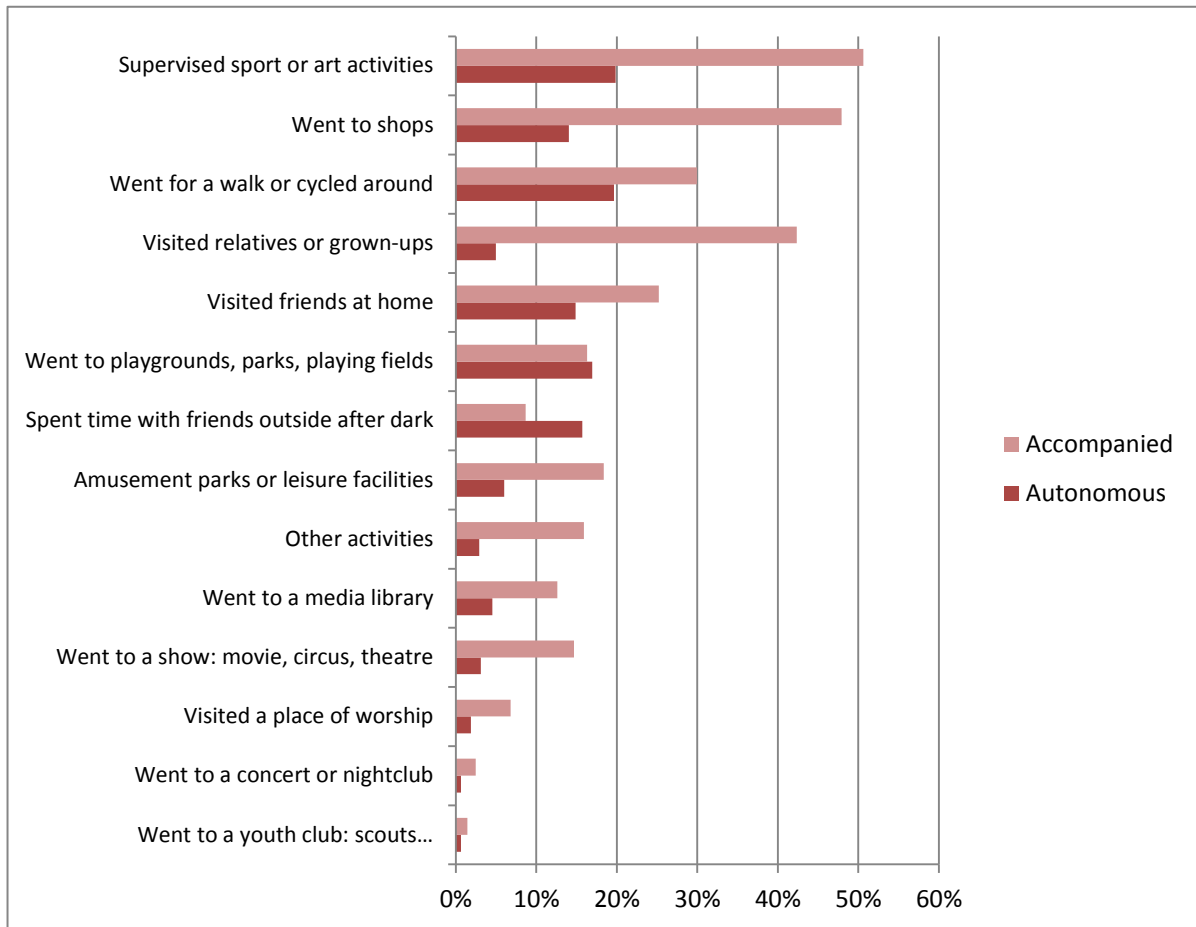


### Primary school children's activities.

The mean number of different types of activity that Psc reported for the week preceding the survey is 3.98 ( $SD = 2.25$ ), and the mode is 4. Chart xx shows the various types of activities ordered as function of the percentage of Psc that practised the activity whatever the travel accompanying mode was<sup>3</sup>. It emerges that 64.3% of these children are practising a supervised sport or art activity in a club outside the school. This is in accordance with the literature that stresses that children of western countries are involved in weekly agendas structured by a successions of activities practised under the supervision of adults (Karsten and van Vliet, 2006). Five other types of activity are reported by more than one fourth of the children: a) Went to shops (58.3%), b) Went for a walk or cycled around (48.1%), c) Visited relatives or grown-ups (46.3%), d) Visited friends at home (37.8%) and e) Went to playgrounds, parks, playing fields (32.4%).

<sup>3</sup> For a given activity this percentage cannot simply be calculated by summing accompanied and autonomous travel because an important number of children went to the activity both accompanied and autonomously. Thus, for each type of activity we computed a new variable satisfying the logic condition activity reported in the column "On your own or with other young people" **OR** in the column "With parents or other adults".

Chart xx *Percentage of accompanied or autonomous travel to the various activities reported by primary school children*

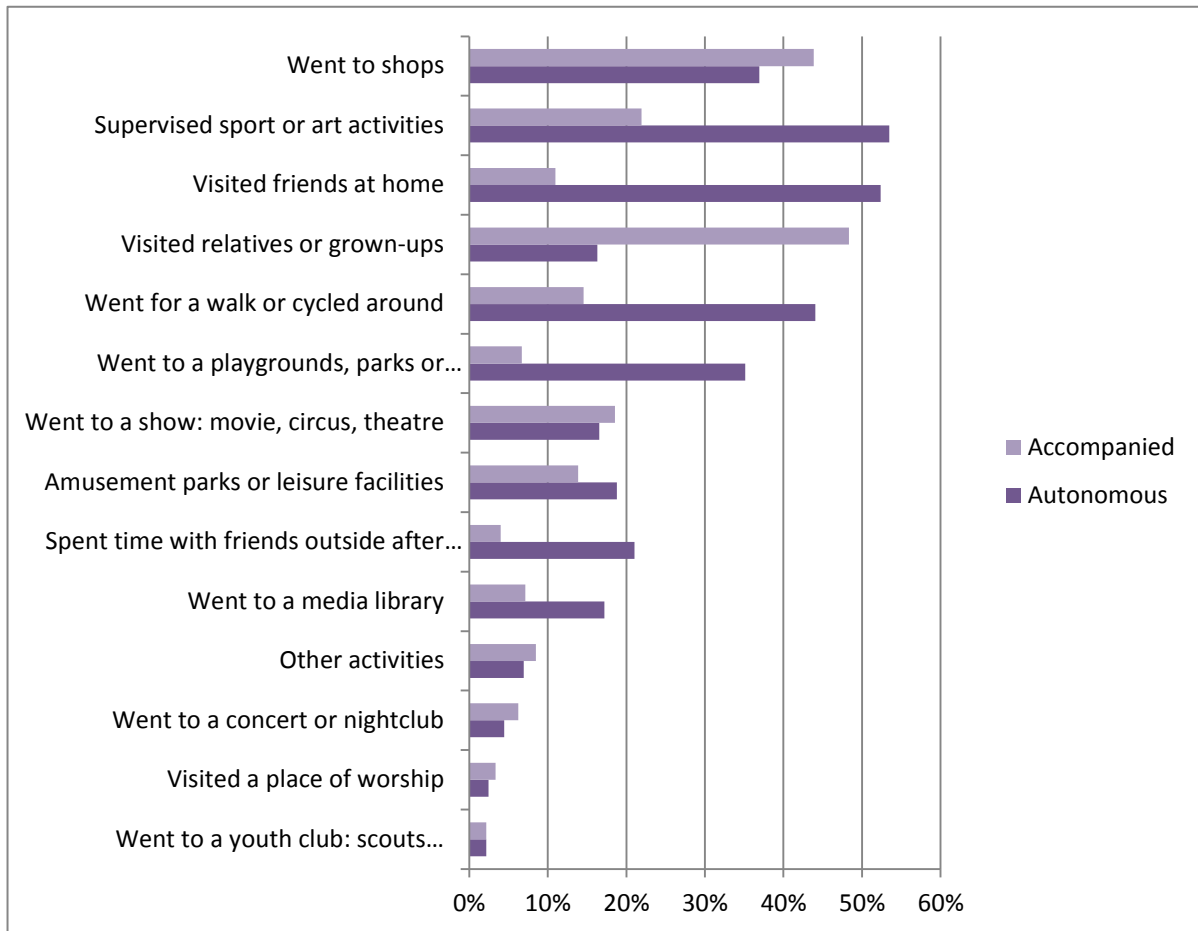


The chart xx also permits to examine the respective proportion of Psc that went accompanied or not to these activities. For most types of activities, the percentage of children who went to the activity accompanied was higher than those who went on their own. There are two exceptions however: “Spent time with friends outside after dark” and “Went to playgrounds, parks, and playing fields”. This may be explained by the fact that these types of activities are likely to imply the use of outdoor spaces which are in the vicinity of the children’s homes. This might particularly be the case for being outdoors after dark: children playing with next door friends in front of their houses or block of flats. It is noteworthy that we carried out the survey in November, February and March when it is dark quite early. Thus, if the children play outside near their home, it is not particularly surprising that as many as 15.7% declared that they spent time with friends outside after dark.

**Secondary school children’s activities.**

The mean number of different types of activity reported by Ssc is 4.76 (*SD* = 2.62), and the mode is 4. On average, Ssc reported a higher number of activities than Psc, the test is significant ( $t(910.6) = 4.93, p < .001$ ).

Chart xx *Percentage of accompanied or autonomous travel to the various activities reported by secondary school children*



The first eight activities appearing on Chart xx are reported by more than one-fourth of the young people asked. One can observe that the first six are the same as for Psc, yet not exactly in the same order. For instance, shopping (68.5%) appears in first rank before supervised sport and art activities (64.8%). Moreover, 35% of these Ssc went to shops on their own. This underlines the growing social importance for young people of places such as shopping malls, which had already been reported in previous studies (Vanderbeck & Johnson, 2000). The activities reported by the French young people also stress the growing importance for peer encounters of activities such as going to the cinema or the theatre (30.7%) or going to amusement parks or leisure facilities (28.3%), where they go to a large extent on their own or with other young persons. Furthermore, as compared with Psc, we observe an inversion between “Visited relatives or grown-ups” (58.1%) and “Visited friends at home” (58.5%) that might be associated with a growing independence from the family activities to the benefit of peer encounters. Finally the chart xx shows that young people go to most types of activities mainly on their own or with peers. As one could expect, the major exception is for visiting relatives, and secondarily for shopping.

#### iv. Perception of safety in the neighbourhood

##### Parents' perception of safety in the neighbourhood

A majority of parents of both primary [Psc] and secondary school children [Ssc] have a positive evaluation of the role of the adults in their neighbourhood, most of them agree with the idea that those adults look out for other people's children (see chart xx). Less than 15% of the parents disagree with this statement. Although the perception of the parents of Ssc tends to be slightly more positive, positive neutral and negative judgements are similarly distributed in the two groups of parents. Regarding the attitude of adults in the neighbourhood towards children there is no noticeable link between the parental perception and the fact that their children is in a primary or a secondary school— $\Phi = .099, ns$ .

Chart xx *Most **adults** who live in the neighbourhood look out for other people's children in the area*

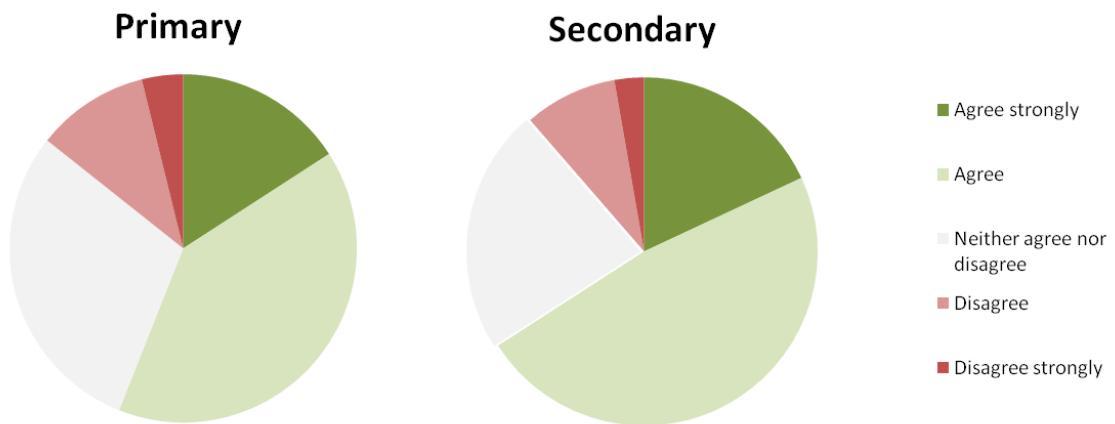
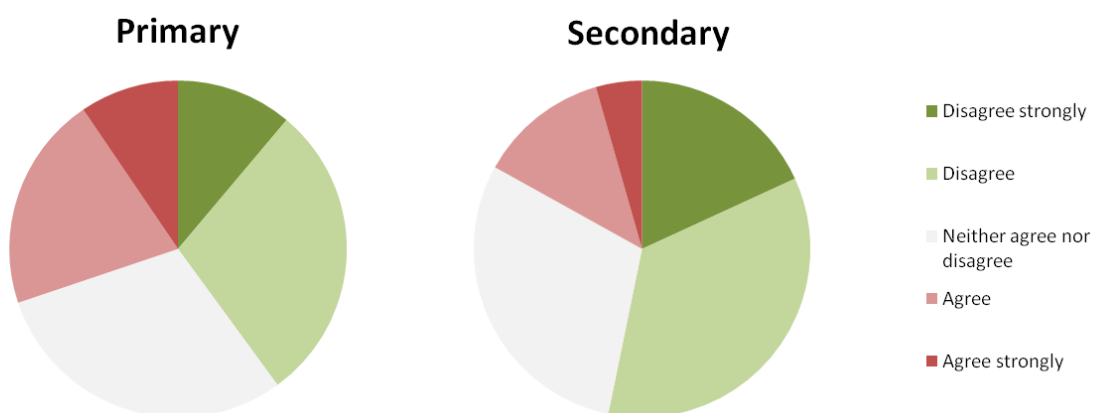


Chart xx *Some young people and adults in the area make you afraid to let your children play outdoors*



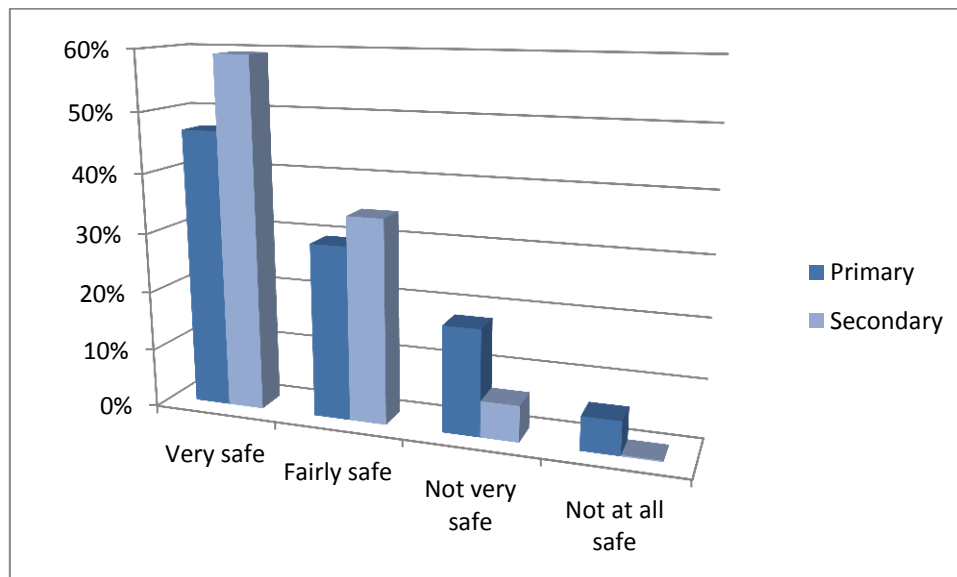
Parents seem a slightly bit more worried about the presence in the area of some young people or adults who might represent a threat for their children. This trend is more

perceptible in the responses of parents of Psc than in those of Ssc. In this case, the parents' perception and the children's attendance to primary or secondary school seem related, although moderately:  $\Phi = .170$ ,  $p < .001$ . However, it has to be underlined that even if 30% for the parents of Psc perceive a social threat for their children, a higher percentage of them (40%) do not perceive it. Moreover, a majority of the parents of Ssc do not seem particularly worried about some young people or adults in the area.

### Children's perception of safety in the neighbourhood

When asked about their global perception of safety in their neighbourhood 20.2% of Psc responded they were not allowed to go out on their own against 4.3% for Ssc. A few children did not answer the question, respectively 0.4% and 0.6% in primary and secondary schools.

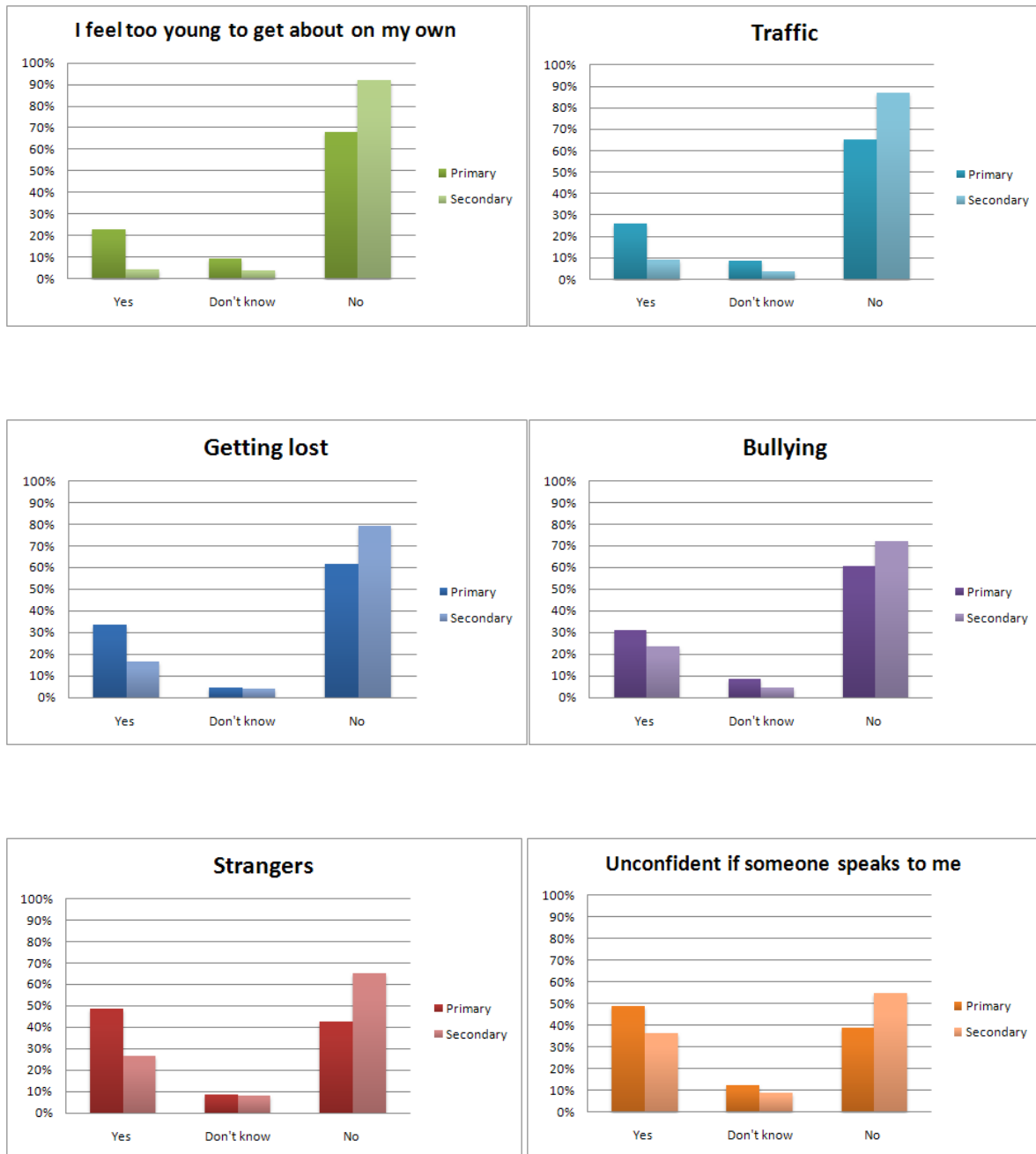
Graph xx *How safe do you feel on your own in your local neighbourhood?*



Examining the responses of the children ( $n = 823$ ) who specified their perception of safety, it comes out that most of these children declared they feel quite safe—either very safe or fairly safe—in their local neighbourhood: respectively 76.3% and 93.6% for Psc and Ssc.

The graph xx shows that Ssc tend to feel safer than Psc. For instance, only one Ssc admitted not being safe at all in the local neighbourhood, versus 22 Psc (5.7%). As a matter of fact, the level of perceived safety is moderately but significantly depending on the school type (primary vs. secondary): *coefficient of uncertainty* for safety dependent = .034,  $p < .001$ .

Graph xx Outside on your own or with friends are you worried by any of the following?



**Note.** The graphs are ordered from the less worrying item (top right) to the most worrying item (bottom left). To order the items we subtract the number of children worried from the number of children not worried. For instance, it resulted that the difference was 611 for “I feel too young to get about on my own”, whereas it only was 38 for “Unconfident if someone speaks to me”.

### Sources of worry when children are outside on their own

The examination of the elements that are perceived by children as potential sources of worrying when they are outside on their own confirms the difference between Psc and Ssc (see graph xx). Namely, whatever item of worrying considered, the younger children appear more worried than the older ones.

Another interesting finding emerging from this detailed examination of different sources of worry is that children's responses convey a more mitigate picture of their perception of safety that when they were asked about their global feeling of safety in the local area. This is particularly obvious for the three items related to social encounters outside.

How to deal with someone who wants to speak to the children or ask them something comes out as the most worrying. This is disquieting even for Ssc: only half of them seem confident with what to do, whereas they were more than 93% to claim they feel very safe or fairly safe outside. When children are on their own or with friends outside, the presence of strangers is the second most worrying item, particularly for younger ones. Nearly 50% of Psc are worried by strangers outside. Only 42.8% declare that they are not worried although they are more 75% to claim they feel very safe or fairly safe outside. To a lesser extent the third source of worrying outside is bullying. One third of Psc and one-fourth of Ssc are afraid of being bullied. This is a problem the authorities have to deal with, even if the majority of the children declare that they are not worried by bullying.

The other three items seem less worrying, especially for Ssc. From an adult point of view it may seem surprising that getting lost represents a greater fear than the traffic. Yet we have to keep in mind that a complete mastering of the Euclidian space is acquired around 11 years of age (Piaget, 1937), and that a good geographical representation of routes requires learning and experiences (Spencer, Blades, & Morsley, 1989). Furthermore, in case children get lost, we have seen that it will be difficult for many them to ask someone for help, particularly if they are strangers. Nevertheless, regarding the prevention of accidents, we can deplore that children are not more concerned about traffic dangers. Finally, it comes out that only 20% of the Psc consider that they are too young to go about by their own, and quasi none of the Ssc do so.

**Other worries and fears.** Regarding the additional commentaries, 25.6% children indicated that something else worried them when they were outside on their own. This was the case for 32.6% of Psc and 18.2% of Ssc.

Many of the children's additional commentaries were in relation to their preceding responses detailing the sources of worrying—e.g., about strangers or unknown people speaking to them. However, some other commentaries put forward new themes of worry. A careful examination of these commentaries permitted to extract 24 themes, that in a second stage were aggregated in six broads themes (see table xx).

Table xx *Broad themes appearing in the children's commentaries on worries and fears when they are outside on their own*

Themes of worries and fears	All Children	Primary	Secondary
Strange or disquieting people	14,5%	16,9%	11,9%
Dogs and other animals	8,0%	12,8%	3,0%
Feared events	5,8%	3,7%	5,4%
Disturbing contexts	4,1%	4,5%	3,7%
Traffic annoyances	1,4%	1,0%	1,7%
Miscellaneous	2,2%	2,5%	1,9%

**Note.** Percentages are respectively based on the total number of surveyed children (N=946), Psc (n= 484) or Ssc (n= 462).

**Strange or disquieting people.** The first broad theme related to strange or disquieting people makes up an important part of the additional commentaries of both Psc and Ssc, although it represents the major part of the remarks of the latter (see figure xx). A wide range of different people seems disquieting for children. Drunken or stoned people are the most often mentioned (n=18), followed by unknown people that ask or propose something to the children (n=16). Also mentioned are thieves (n=11), dangerous people, paedophiles, exhibitionists and bizarre people (n=23). Children are also afraid of encounters with socially stigmatized categories such as mentally or physically disabled people, homeless people or gypsies (n=12). Worthwhile to mention is that older adolescents are sometimes perceived as a danger (n=8) and that people smoking in the street are perceived as a nuisance (n=3). The Psc living in the countryside also fear the hunters (n=4). Finally 5 children named particular neighbours. Some categories of people are clearly related to children's previous experiences (drunk people, neighbours), other are related to negative social representations (disabled, homeless), and some are related to TV news or movies.

**Dogs and other animals.** The second theme emerging from the children's commentaries highlights the fear to encounter dogs outside particularly big ones not on leash. Many other species such as cats or horses are also mentioned, as well as wild animals—snakes, boars, foxes, buzzards...—or insects. Nevertheless, worries about dogs largely prevail. The presence of dogs and other animals outside represent a minor worry among Ssc; on the other hand it is a real problem for more than one Pcs out of ten. As grown ups, we may tend to disregard this question that seems critical for many young children (see Fig xx for an illustration).

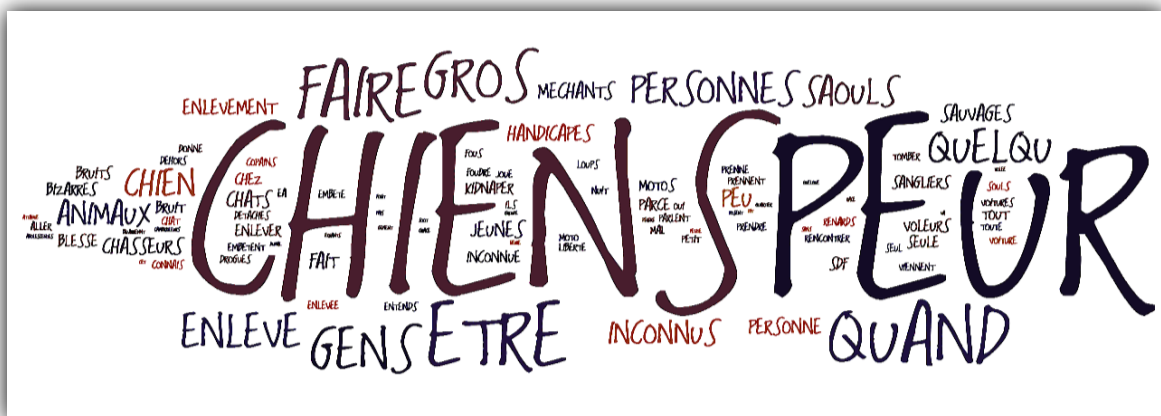
**Feared Events.** This theme aggregates all the children's expressed fears about harmful events that may happen to them while they are outside on their own. They might be involved in a fight (n=3), they might be bullied (n=5), they might get injured (n=7) or worst they might be attacked, raped or even killed (n=11), but above all they might be kidnapped (n=41)! This theme also encompasses worries about being watched, being approached and especially being followed (n= 13). These kinds of fears are equally shared by Pcs and Ssc.

Fig xx Word cloud plot<sup>4</sup> of secondary school children’s commentaries on fears and worries



**Disturbing contexts.** This theme encompasses both alarming elements of the environment such as darkness (n=10) or noises (n=9)—particularly unidentified ones—and disturbing situations (n=17). The latter refers to situations in which the children are lost, separated from their friends and more generally alone. Being alone seems stressful for some children.

Fig xx Word cloud plot of primary school children’s commentaries on fears and worries



**Traffic annoyances.** Some children wanted to specify what is worrying about traffic. For instance, they explained their fears about car drivers that may not pay attention to them when they are crossing or protested about cars going too fast in residential areas not taking care of the children who are playing (n=8). Others complained about motorbikes perceived as dangerous and noisy (n=6).

**Miscellaneous.** Some of the commentaries regrouped here are slightly out of scope, but others point to interesting features (n=21). For example, the fact that young people are worried by the possibility to encounter their parents or even receive a phone call from them when they are outside with peers; they feel ashamed! A girl explained that she is anxious to

<sup>4</sup> We used <http://www.wordle.net/> to generate word cloud plots

be seen by somebody who knows her in a place where she should not be, and another one to be outside in her own street (social control?). Several expressed worries about the weather conditions particularly they fear to be struck by lightning. A boy complained about the difficulty to avoid pedestrians when he is biking!

#### Relationships between parents' and children's safety perception in the local area.

Finally, we thought interesting to explore potential relationships between the parents' perception of safety and their children's perception of safety and threats in the local area. Is there any tangible relationship? If so, does it vary from primary to secondary school?

To address these questions we computed secure-unsecure scores respectively for parents and children.

The parental secure-unsecure score corresponds to the sum of the score issued from the question about child-friendly attitude of adults in the neighbourhood—i.e., strongly agree =+2, agree =+1, neither agree nor disagree =0, disagree =-1 and strongly disagree =-2—added to the inverted score issued from the question about dangerous young people or adults in the local area. The score also takes into account the parents' responses related to anxiety about the risk for their child of being injured in a traffic accident when crossing a road—very worried =-2, quite worried =-1, don't know, not sure =0, not very worried =+1 and not worried at all =+2.

The children's secure-unsecure score was computed in summing scores from: a) the question on safety feeling the neighbourhood—very safe = +2, fairly safe =+1, not very safe =-1 and not safe at all=-2; b) the questions about the six potential items of threat when children are outside on their own—yes =-1, don't know= 0 and no =+1; c) the question on another source of worries—yes =-1, no other worries mentioned = +1.

The correlation between the parental and the children's perception of security-insecurity in the local area was positive but very small:  $r_s = .10$  ( $n = 669$ ,  $p = .001$ ). A similar correlation is found with Psc:  $r_s = .11$  ( $n = 407$ ,  $p = .03$ ), but for Ssc the correlation was quasi null:  $r_s = .04$  ( $n = 262$ , ns). We tested whether the Psc's secure-unsecure scores varied depending on their parents' perception of security-insecurity in the local area categorized into three groups: parents with the less secure perception (lower quartile scores), parents with an average secure perception (scores falling in the interquartile) and parents with the more secure perception (upper quartile scores). No significant differences emerged from the test ( $ANOVA F(2) = 1.11$ , ns).

No tangible relation between parents' and children's perception of safety in the local area could be established. The responses of the children and of their parents to the questions about worries, fears and perceived risks appeared largely independent. This suggests that children's responses may depend on other factors such as gender and also on personal traits and experiences.

# 1 The influence of different factors on independent mobility

## 1. Cluster analysis of the six licences of independent mobility

### Method

In order to examine the potential impact of different factors on the children's independent mobility, we carried out a Hierarchical Cluster Analysis [**HCA**].

Since a preliminary examination of the bivariate correlations among the six licences displayed a complex array of significant positive and negative correlations (see annexe xx), it seemed useful to check whether it was possible to distinguish several clusters of children defined by different combination of licences. Subsequently, the first stage of the **HCA** was designed to determine how the six licences combine together to shape distinct profiles of children's independent mobility. This was achieved by entering the six licences as the active nominal variables in the **HCA**<sup>5</sup>.

The second stage of the **HCA** was designed to find out which factors were associated with particular profiles of independent mobility. This objective was achieved by entering in the **HCA** a set of illustrative nominal and scale variables related to individual and environmental factors. Specifically, regarding individual factors, gender, age and types of school attended were added in the analysis, as well as variables providing information on the children's perception of safety (secure-insecure score), the number of activities undertaken in the week, and the range of activities to where they went on their own or with friends. Regarding the environmental factors we added as illustrative variables: the type of area (mostly urban to mostly rural), the type of housing (flat vs. house), the absence of suitable outside spaces where the child could play, the presence of a garden, of a quiet residential road, of shared communal spaces and of parks reachable either with or without crossing a main road. Were also added as illustrative variables some variables related to attributes of the household: number of cars per household, number of people in the household, mono or bi-parental family and the number of working parents (0, 1, 2).

### *The licence arrangements emerging from the children's declarations*

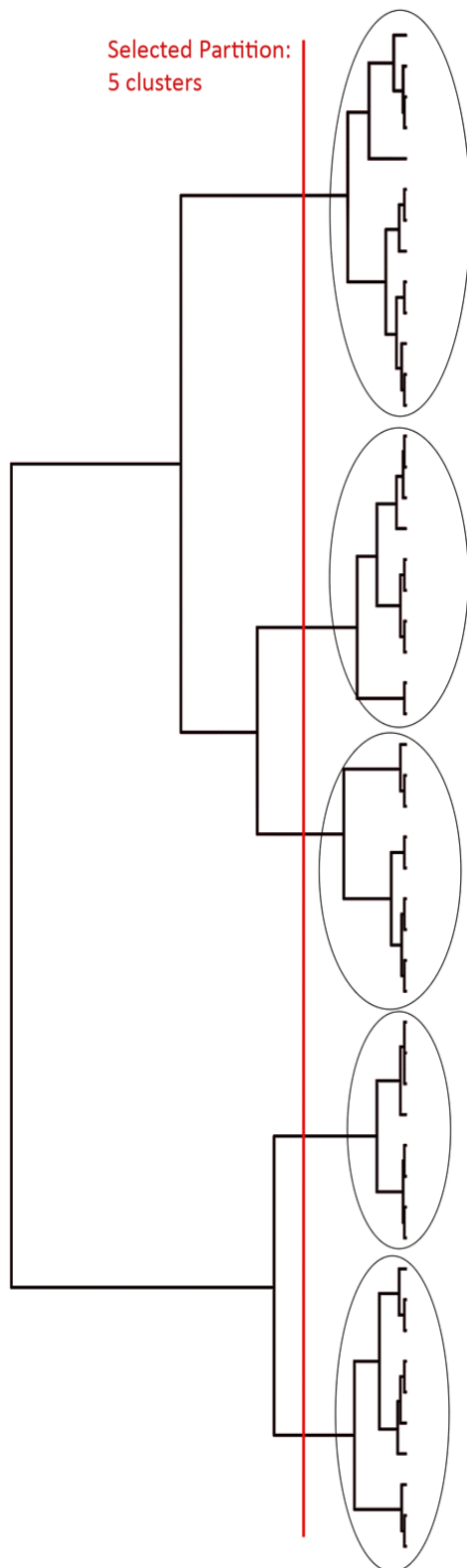
#### **The five clusters describing the independent mobility: Children's declarations**

Five clusters emerged from the **HCA**. The inter-cluster inertia account for 66.8% of the total inertia: inter-cluster inertia = 0.775, total inertia = 1.160. The intra-cluster inertia ranges between 0.045 and 0.094. This means that these five clusters present a good internal cohesion while the partition itself accounts for a large part of the inter-individual differences regarding the six licences. Figure xx displays the cluster tree with a summary of the main characteristics of each of the five clusters.

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<sup>5</sup> The **HCA** procedure is based on Ward's method of aggregation. The procedure relies on the first 5 factors of the initial factorial analysis that together account for 89.8% of the inertia (total variance). Software Spad N<sup>®</sup>.

Figure xx Cluster tree and partition issued from children’s declarations on their licences



**Cluster #C1: Highest dependent mobility.**

n= 163 (17.2%). No **licence** for “other places than school” and “cross main roads”. Low or lowest percentages for the other licences.

**Age:** younger children (9.8) mostly primary school / **Number of activities:** the lowest / **Safety feeling:** low. **Area:** under-represented in major city, over-represented in rural market town / few outside facilities available in the neighbourhood.

**Cluster #C2: High dependent mobility with a slight local autonomy.**

n= 188 (19.8%). No **licence** for “cross main roads” and cycle on main roads. Low percentages for the other licences except for “going to other places than school” (36%).

**Age:** youngest children (8.5) quasi exclusively primary school / **Number of activities:** low / **Safety feeling:** lowest for children and parents.

**Cluster #C3: Emerging independent mobility with a large local autonomy**

n= 268 (28.3%). No **licence** for “going to school alone” and “outside after dark”. High percentages for the other licences, very high for “going to other places than school” (96%).

**Age:** mostly secondary school / **Area:** under-represented in major city, over-represented in new town, small town and rural market town.

**Cluster #C4: Large independent mobility restricted to daylight hours**

n= 175 (18.5%). **Licence:** all children “going to school alone”, none of them “outside after dark”, High percentages for the other licences.

**Age:** Oldest children (11.9). **Area:** over-represented in major city, under-represented in rural areas (market town, village) / Home near school (<0.5Km) / higher % of **household with 1 car** and **mono-parental families**.

**Cluster #C5: Largest independent mobility including going outside after dark**

n= 175 (18.5%). **Licence:** all children “going outside after dark”, Highest percentages for the other licences.

**Age:** Older children (11.8) mostly secondary school. **Gender** in majority boys/ **Number of activities:** the highest / **Safety feeling:** the highest. **Area:** over-represented in the major city.

### Cluster #C1: Highest dependent mobility.

This cluster regroups 163 children (17.2%). The intra-cluster inertia (0.045) is the lowest of the five clusters. This signifies that Cluster #C1 is the most homogeneous, the licence profiles of the children in the cluster being quite uniform. The distance to the origin<sup>6</sup> is intermediate (0.070), this means that this cluster is neither typical nor particularly atypical.

The main distinguishing attribute of the children making up Cluster #C1 is that none of them declared that they went to other places than school with friends or on their own. Similarly, none of them declared having the licence to cross main roads. Interestingly, a large percentage of these children responded that they “don’t know if they have the licence to cross main roads” (40.5% vs. 13.8% for the whole sample of children<sup>7</sup>). Moreover, Cluster #C1 is characterized by the lowest percentages of children granted the licences to use buses (2.5% vs. 31.4%), to go out after dark (3.1% vs. 18%), and to go to school on their own (9.8% vs. 28%). The only exception is for cycling on main roads, the percentage of children who declared to have the licence is not the lowest, (16.6% vs. 45.4%). The latter result does not seem to be fully congruent with the rest of the children’s profile in Cluster #C1. The important percentage of these children who responded that “they don’t know if they have the licence to cross main roads” suggests that they may have some difficulties to differentiate main roads from secondary roads. It may also be that they were accompanied by an older sibling they forgot to take into account when responding.

Children of Cluster #C1 are principally attending primary school (72% vs. 51.1%), and their mean age (9.8 years) is lower than the mean of the whole sample (10.8). However, age may not be the only factor accounting for their particularly high dependent mobility. It emerges that these children are over-represented in the rural market town—*Combours*: 32.5 vs. 21.2%—whereas they are under-represented in the major city—*Rennes*: 6.7% vs. 20.4%. They are particularly under-represented among the secondary school children [Ssc] of *Rennes* but also among the Ssc of the suburban new town—*Le Rheu*. One can also note that a large percentage of the children of cluster #C1 lives in a house (65.6% vs. 53.4%) with a garden (65% vs. 54.3%). On the other hand, the local areas in which they live seem to provide fewer parks or playgrounds reachable without crossing a main road (58.9% vs. 49.5%), and a larger percentage of these children’s parents consider that there is no suitable outside space where children can play. Children of Cluster #C1 practised fewer activities (2.79) than the other children (4.36). This supports the view that the areas in which they live

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<sup>6</sup> Distance to the origin refers to the distance to the centre of the factorial space defined by the cloud of the individual licence profiles of all the children participating in the French survey.

<sup>7</sup> Here after in this section the first percentage will account for the considered cluster and compared to the percentage observed for the whole sample of children involved in the survey (exceptions will be explicitly signalled).

The tests for the differences are significant for all the comparisons commented in the text.

provide them with few opportunities to practise outside activities in parks and playgrounds, and also as to go to cinemas, leisure facilities or attractive shopping centres.

It is worthwhile noting that the families of children in Cluster #C1 are mostly bi-parental families characterized by a higher rate of two working parents. Finally, children of this cluster appeared somewhat less secure than the average (secure-unsecure score 2.67 vs. 3.77).

#### Cluster #C2: High dependent mobility with a slight local autonomy.

This cluster is made up of 188 children (19.8%). The intra-cluster inertia is average (0.089). The distance to the origin (1.13) is one of the highest indicating that this group tends to be slightly apart from the rest of the sample.

The percentages of children of Cluster #C2 who declare to have the licences to use buses (2.7% vs. 31.4%), go out after dark (6.4% vs. 18%), and go to school on their own (9.4% vs. 28%) are quite low. In this respect, their profile is similar to that of children in Cluster #C1, but three distinctive traits can be noted. None of the children of Cluster #C2 is allowed to cross main roads and the percentage of them allowed to cycle on main roads is the lowest of our sample (6.4% vs. 31.4%). On the reverse, contrarily to the children of Cluster #C1 more than one third of them declared that they went to other places than school with friends or on their own (36.2% vs. 66.7%). Thus, children of cluster #C2 are warned to cross or cycle on main roads but enjoy of some independence to move in their local neighbourhood.

Children in Cluster #C2 massively attend primary school (91%), and on an average they are the youngest children of our sample (mean age 8.5 vs. 10.8). These younger children fell the most insecure in their local area (secure-unsecure score 1.56 vs. 3.77). They mentioned fewer activities than the average (3.46 vs. 4.36), but more than children of cluster #C1.

No specific area is associated to Cluster #C2, but the area amenities are presented in negative terms by the parents of children of Cluster #C2. Higher percentages of them mentioned that there is: -a) no park reachable without crossing a main road (62.8% vs. 42.5%), -b) no shared communal space (53.7% vs. 40.6%) and -c) no quiet residential road (58.5% vs. 48.3%). On the other hand, these children live more frequently in a house (62.2% vs. 53.4%) with a garden (63.8% vs. 54.3%). It is noteworthy that the parents of children of Cluster #C2 grant few licences and appear to be the most anxious ones about the children's safety in the local area (parental secure-unsecure score -0.37 vs. 0.0).

#### Cluster #C3: Emerging independent mobility with a large local autonomy.

This cluster is the largest with 268 children (28.3%); due to its large size it is also the less homogenous (intra-cluster inertia = 0.094). The distance to the origin is the shortest (0.30), this means that Cluster #C3 is most central and the nearest of the average profile of the whole set of children participating in the French survey.

None of the children of Cluster #C3 are going to school on their own, similarly none of them are going outside after dark. On the opposite, as compared to the whole sample, markedly higher percentages of these children have the licences to cross main roads (81.3% vs. 62.2%), cycle on main roads (60.8% vs. 45.4%), and use buses (40.7% vs. 31.4%). Furthermore nearly all these children have the licence to go to other places than school on their own or with friends (95.9% vs. 66.7%). A detailed examination of the types of activities where these children went on their own suggests that the activities are likely to take place in the neighbourhood: walked or cycled around, went to sport or art club, visited friends and went to playground. On the other hand, it appears that the distance from home to school is longer than the average: 46.3% of their parents estimate that the school is more than 2 Km. away, against 28.9% for the whole population. This may explain why the children of Cluster #C3 present a large independent mobility in the local neighbourhood while none of them goes to school independently.

Most of these children attend secondary school (70.9% vs. 48.9%); their mean age (11.7) is higher than the general mean age for the whole sample (10.8). No significant differences can be detected regarding their gender, their number of activities or their feeling of safety, but some differences emerge regarding the areas. A lower percentage of the children of Cluster #C3 lives in the major city—*Rennes* 13.1% vs. 20.4%, and higher percentages of them are found in the secondary schools of: -a) the suburban new town, -b) the small town and -c) the market town. Interestingly, both the children and parents seem to perceive their local area as relatively safe: secure-insecure scores 4.6 vs. 3.8 for children, and 0.3 vs. 0.0 for their parents.

#### Cluster #C4: Large independent mobility restricted to daylight hours

This cluster regroupes 175 children (18.5%). The intra-cluster inertia (0.072) and the distance to the origin (0.072) are average.

As compared to the whole survey sample, larger percentages of children in Cluster #C4 declare to have the licences to go to other places than school (88% vs. 66.7%), cross main roads (84% vs. 62.2%), use buses (50.9% vs. 31.4%), and cycle on main roads (61.1% vs. 45.4%). Nevertheless, the main characteristic of Cluster #C4 is that all the children went to school on their own. In contrast, none of them declared going out after dark.

These children are mostly but not exclusively attending secondary school (66.3% vs. 48.9%). Their mean age (11.9) is significantly higher than that of the whole sample (10.8). Lower percentages of children in Cluster #C4 are found in the rural market town—*Combourg*—or the rural area—*Pleine Fougères*, whereas a higher percentage of them live in the major city—*Rennes* 41.7% vs. 20.4%. Moreover, it came out that **Ssc** of the major city but also of the small city—*Fougères*—are over-represented in this cluster. It also emerges from the parents' questionnaire that a higher proportion of children in Cluster #C4 live not far from the schools, i.e. less than 0.5 Km (36.1% vs. 20%). On the contrary, proportionally fewer of them live more than 2 Km away from school. One can also note that a larger percentage of

the children's households in Cluster #C4 have only one car (33.1% vs. 21.5%), and a lower percentage have 2 or more cars (24.6% vs. 43.2%). These contextual factors may explain why the main characteristic of this cluster is that all the children go to school on their own.

Moreover, if we keep in mind that the secondary school catchment areas can be quite extended—this is the case in Rennes and particularly in Fougères—the short distances from home to school indicate that children of Cluster #C4 are more likely to live in the city centres themselves rather than on their fringes. This also transpires when we examine the activities where these children go alone or with friends. As for Cluster #C3, children in Cluster #C4 declared numerous activities likely to take place in the neighbourhood (e.g. visited friends' homes or went to playground), but others suppose an easy access to local shopping malls, city centre or leisure facilities likely to be found in the bigger cities (went to shops, amusement parks or leisure facilities). The urban status of children of Cluster #C4 is further supported by the fact that they are proportionally more numerous than in the whole sample to live in a flat (28.6% vs. 15.1%), and conversely less numerous to live in a house (35.4% vs. 53.4%). Finally, the families of these children are more frequently mono-parental families (13.7% vs. 8.1%).

#### Cluster #C5: Largest independent mobility including going outside after dark.

Cluster #C5 is the smallest; it is made up of 153 children (16.2%). The intra-cluster inertia (0.085) suggests a slight heterogeneity among the children's profiles, but the specificity of the cluster is that the distance to the origin is the largest one (1.29). This indicates that in Cluster #C3 the children exhibit in some way atypical licence profiles.

Children of Cluster #C5 show the highest degree of independent mobility. All of them declared going out after dark, which is the most discriminative specificity of this cluster. All of them also go to places other than school on their own or with friends. In Cluster #C5, higher percentages of children than in the whole population went on their own to a very wide range of activities, including: friends' homes, shops, playgrounds, walking or cycling around, leisure facilities, concert, sport or art clubs, cinema, relatives, place of worship and library—by decreasing order of differentiation. Moreover, Cluster #C5 presents the highest percentages of children who are granted the licences to cycle on main roads, use buses and cross road. The only licence for which they are not first ranked is going to school on their own; but this licence is contingent to the distance from home to school, particularly **Ssc**.

These children are mostly attending secondary school, and their mean age is higher: 11.8 vs. 10.8. Nevertheless, Cluster #C5 is also made up of **Psc**, 38% of the cluster—i.e., 59 children! It must be emphasized that Cluster #C5 is the only cluster for which gender significantly intervenes in the group constitution: boys in a majority make up Cluster #C5, 61.4% vs. 50.8%. This is even more obvious if we consider separately the **Psc**, the percentage of boys is up to 67.8% against 32.2% of girls. Other noticeable attributes of the children making up Cluster #C5 are that they markedly practice a greater number of activities and feel more

secure than children of the whole sample, respectively mean number of activities = 6.71 vs. 4.36, and mean secure-insecure score = 5.6 vs. 3.8.

As regard to the area, the children of the major city—*Rennes*—are over-represented in Cluster #C5: 28.1% vs. 20.4%. One can also note a lower percentage of households with 2 or more cars. This maybe related either to the fact that a higher proportion of Cluster #C5 families live in a big town or to the fact that a lower percentage of these families are bi-parental families, 45.7% vs. 56.3%.

### *The licence arrangements emerging from the parents' responses*

#### **Six clusters describing the independent mobility: Parental statements**

A Hierarchical Cluster Analysis [**HCA**] was also carried out with licences that parents granted or did not grant to their children. Thus, the six licences as defined by the parents are the active variables of this **HCA**. Nominal and scale variables are also added as illustrative variables. As for the children **HCA**, these illustrative variables encompass areal, environmental and familial factors, as well as individual factors related to personal attributes (e.g. age) or perceptions (e.g. safety feeling) of both children and parents. In addition to personal attributes of the responding parents (e.g. education level), this analysis includes more variables qualifying the family context (e.g. siblings' age) than in the **HCA** conducted with the children's responses.

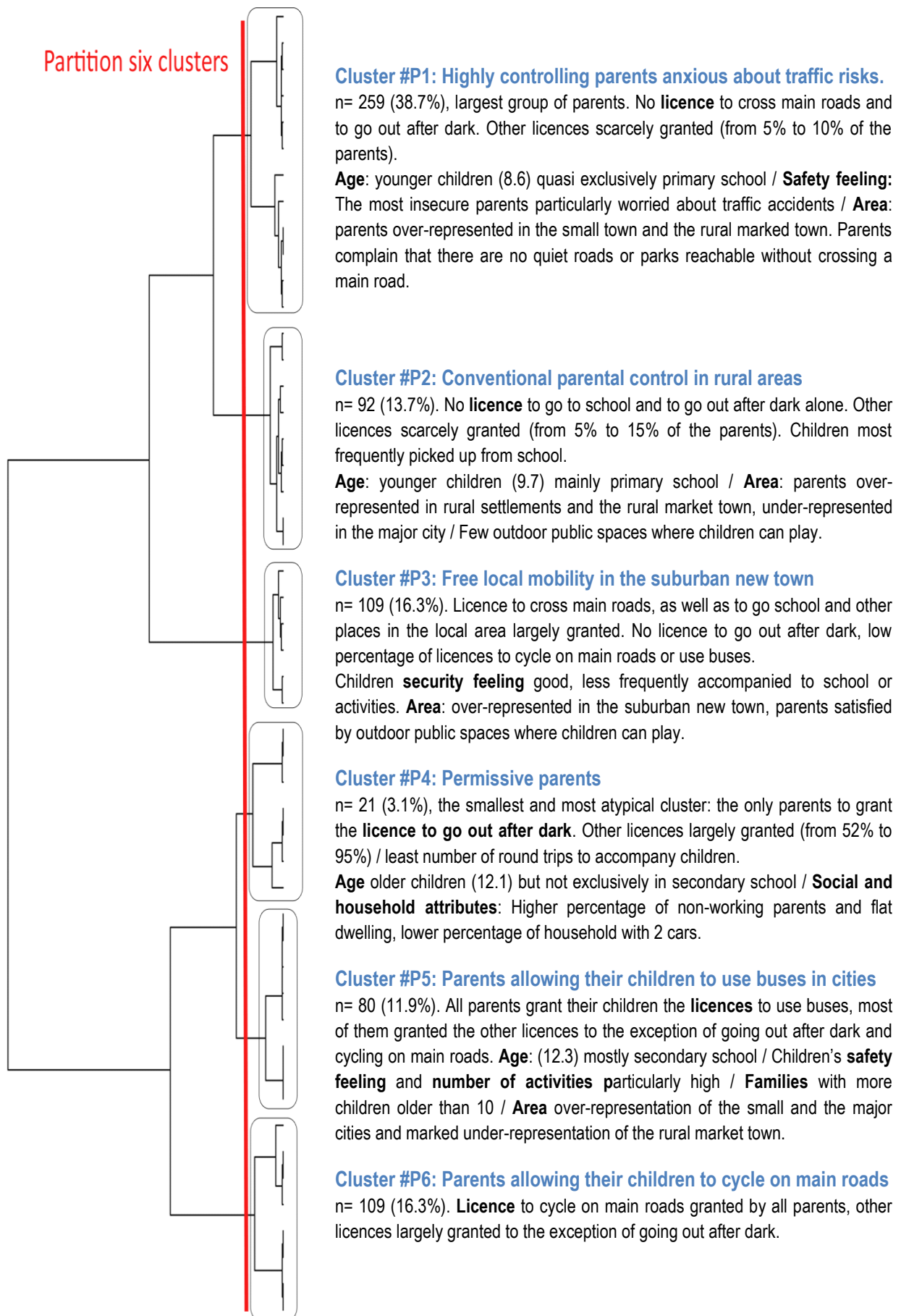
The best partition emerging from the **HCA** highlights six clusters. The inter-cluster inertia accounts for 78% of the total inertia: inter-cluster inertia = 0.867, total inertia = 1.112. The intra-cluster inertia ranges between 0.024 and 0.066. Thus, each of the six clusters presents a strong internal cohesion while the partition itself accounts for a very large part of the inter-individual differences. Figure xx displays the cluster tree with a summary of the main characteristics of each of the six clusters.

#### **Cluster #P1: Highly controlling parents anxious about traffic risks.**

Cluster #P1 is the largest cluster regrouping 259 parents (38.7%). In spite of its large size, it is homogeneous (intra-cluster inertia = 0.057). The distance to the origin is intermediate (0.58).

The parents making up Cluster #P1 massively exert a high control on their children's mobility. Not surprisingly, none of them allows their child to go out after dark, but also none of them allows their child to cross main roads, which is specific to this cluster. The percentage of parents forbidding their children to go to school (90% vs. 53.1%) or to other places than school on their own (89.6% vs. 50.7%) are higher than in the whole parental population. Similarly the percentage of them forbidding to cycle on main roads (93.8% vs. 70.1%) or use buses (95.7% vs. 70.7%) are also higher.

Figure xx Cluster tree and partition issued from parents' statements on children's licences



**Age:** the oldest children (12.3) quasi exclusively secondary school / Parents with the highest **secure feelings** not worried about social and particularly traffic dangers / older sibling families / lower Parental level of education.

They are the parents of the youngest children (8.6 vs. 10.3) who quasi exclusively attend primary school (93.8%vs. 60.9%). Parents of Cluster #P1 also reveal to be the most insecure parents with the most insecure children (secure-unsecure score respectively -0.47 vs 0.0 and 1.80 vs 3.31). These parents more frequently than the others responded that “they are very worried” about the risk that their child be injured in a traffic accident (62.6% vs. 52.2%). Moreover, when asked about the main reasons for accompanying the child to school, they more frequently responded “concern about traffic dangers”. They also more frequently indicated that the child was “unreliable or too young”.

These parents are under-represented in the small town—*Fougères*: 16.2% vs. 21.5%—and overrepresented in the rural market town—*Combours*: 27.4% vs. 21.6%. A larger percentage of them complain, where they live, that there are neither quiet roads nor parks accessible without crossing a main road. Finally, they are proportionally less numerous to indicate the presence of shared communal spaces in the local area.

#### Cluster #P2: Conventional parental control in rural areas

Cluster #P2 is made up of 92 parents (13.7%). This homogeneous cluster (intra-cluster inertia = 0.031) is the most central, that is the closest to the average set of responses regarding the six licences (Distance to the origin = 0.38).

None of the children of Cluster #P2 go to school alone, and most of the parents forbid them to use buses (89.1% vs. 70.7%) or cycle on main roads (84.8% vs. 70.1%). However, there is no tangible difference with the responses of the whole population of parents regarding going out after dark and going to other places than school. Furthermore, most parents of Cluster #P2 granted their children the licence to cross main roads (96.7% vs. 57.9%).

Children in Cluster #P2 are slightly younger than the average (9.7 vs. 10.3) and are predominantly attending primary school (80.4%vs. 60.9%). It appears that families of Cluster #P2 are over-represented in rural areas, either rural settlement—*Pleine-Fougères*: 21.7% vs. 12.5%)—or rural market town—*Combours*: 27.4% vs. 21.6%. Correlatively, they are under-represented in the major city—*Rennes*: 5.4% vs. 17.1%, and they are fewer to live in a flat (10.9 vs. 21.3%). In most cases there is no park reachable without crossing a main road (91.3%vs. 81.2%), moreover parks reachable by crossing a main road are fewer (7.6% vs.17.2%) The rural environment probably accounts for the fact that households tend to have more frequently 2 cars (73.9% vs. 61.4%), and that parents are more frequently picking up their children from school (3.82 vs. 2.63 days per week).

#### Cluster #P3: Free local mobility in the suburban new town

Cluster #P3 is made up of 109 parents (16.3%). The intra-cluster inertia is 0.037 and its distance to the origin is 0.44.

All parents of Cluster #P3 regularly or occasionally allow their children to go to school on their own. Most of them grant their children the licences to cross main roads (87.2% vs. 57.9%) and to go to other places than school (74.3% vs. 47.5%). Regarding this last licence, they often responded “it varies” (39.4% vs. 24.9%) or “usually goes alone” (34.9% vs. 22.5%). However, many of them do not allow their children to use buses (88.1% vs. 70.7%) or cycle on main roads (84.4% vs. 70.1%). All of them forbid their children to go out after dark.

Cluster #P3 is made up in majority of parents of **Ssc** (52.3% vs. 39.1%) whose mean age (10.9) is slightly superior to the general mean age (10.3). Interestingly, these children feel safer than their peers (mean secure-unsecure score 4.26 vs. 3.31). Parents of Cluster #P3 less frequently pick up their children from school (1.33 vs. 2.63 days per week) and accompany them to out of school activities (mean round trips 2.09 vs. 2.96).

Results show that families of Cluster #P3 are over-represented in the suburban new town—*Le Rheu*: 39.4% vs. 27.3%. They are particularly over-represented in the secondary school of this new town (22.9% vs. 10.4%). On the other hand they are under-represented in the rural market town—*Combours*: 11.0% vs. 21.6%. The parents of Cluster #P3 are proportionally more numerous to signal a park reachable without crossing a main road (41.3% vs. 28.4%), and quiet roads in their local area (40.4% vs. 30.1%). Moreover, the time to go to school on foot is shorter than the average time (8.26 vs. 15.1 minutes). It has to be underlined that in the new town of *Le Rheu* there are many pathways and public green spaces. These environmental attributes certainly contribute to the tolerant profile regarding licences to go to school and other places in the local area reported for this cluster. It is worthwhile noting that such a free local mobility does not only benefit to the **Ssc** but also to the **Psc** who made up nearly the half (47.7%) of this cluster.

#### Cluster #P4: Permissive parents

Cluster #P4 is the smallest one; it only regroups 21 parents (3.1%). The intra-cluster inertia is low (0.024), while the distance to the origin is particularly large (6.45). This points out the atypical licence profile of this small and homogenous groups of parents.

The atypical characteristic of this group of parents is that they all allow their children to go out after dark. As a matter of fact, they are the only parents to grant this licence to their children in the whole population. Most of them also grant the licences: to cross main roads (95.2% vs. 57.9%), use buses (60.9% vs. 24.3%), go to school on their own (60.9% vs. 46.1%) and go to other places than school (80.9% vs. 47.5%). Regarding the last licence, most of these parents responded “usually goes alone” (76.2% vs. 22.5%). Only the licence to ride on main road can be found less widely granted, although more frequently than in the average (52.4% vs. 18.5%).

These parents rarely accompany their children to out of school activities (mean round trips 0.47 vs. 2.96). Similarly, they pick up their children from school less frequently (1.0 vs. 2.63)

days per week), and when they do so they more frequently say that it is because “it is on their way to work”.

The mean age of the children of Cluster #P4 (12.1) partly accounts for this atypical licence profile. However, the percentage of **Psc** is not significantly lower than in the whole population. Thus, age is not the only explanation. One can note that the families of Cluster #P4 live mostly in a flat (52.4% vs. 21.3%) and have less frequently 2 cars (33.3% vs. 61.0%). Moreover, the percentage of households in which none of the parents works is markedly superior to the average rate (28.8% vs. 7.8%) and on the other hand the households in which 2 parents are working is notably lower than the average rate (33.3% vs. 63.3%). Also relevant is the percentage of missing responses to the question about the mono- or bi-parental status of the family (33.3% vs. 8.8%). These results suggest that some of the families making up Cluster #P4 encounter social difficulties.

#### Cluster #P5: Parents allowing their children to use buses in cities

Cluster #P5 is made up of 80 parents (11.9%), whom licence profiles are fairly homogeneous (intra cluster inertia = 0.029). Distance to the origin equals 0.937.

All the parents of Cluster #P5 granted their children the licence to use buses; this is the most distinctive trait of this cluster. Most of them also granted their children the licences: to cross main roads (96.3% vs. 57.9%), go to school (87.5% vs. 46.1%) as well as to other places than school on their own (78.7% vs. 47.6%). None of the parents allows their children to go out after dark—which is the norm—but more surprisingly none of them allows their children to cycle on main roads. Regarding the licence to cycle on main roads, it is noteworthy that the percentage of parents who avoided responding the question is higher than usual (35% vs. 11.3%), as if they did not know how to respond.

The children of Cluster #P5 are massively attending secondary schools (87.5% vs. 39.1%) and on average are older (12.3 vs. 10.3). They report more activities (5.01 vs. 4.28) and also appear to feel markedly safer than most of the children (mean secure-unsecure score: 5.11 vs. 3.31). Parents of these older children pick them up from school less frequently than other parents (1.0 vs. 2.63 day per week) and also accompany them less often to out of school activities (1.97 vs. 2.63 time per week). These results indicate that parents of Cluster #P5 give their children a large autonomy for both activities and mobility. It is noteworthy that these parents seem not particularly worried about traffic danger, 63.5% of them against 47.7% in the whole population did not select “concern about traffic” when asked for the reason to accompany their children to school. It can also be noted that most often than in average, families of Cluster #P5 tend to comprise more children aged between 11 and 15 years (1.21 vs. 0.82) and fewer children aged 10 or less (1.10 vs. 1.43).

Finally, it appears that these families are strikingly under-represented in the rural market town—*Combourg*: 2.5% vs. 21.6%). Conversely, they are over-represented in the small city—*Fougères*: 36.2% vs. 21.5—and particularly in the major city—*Rennes*: 37.5% vs. 17.5%). In

majority they indicated that the school was more than 2 Km away from their homes (56.3% vs. 40.9%). They also less frequently indicated that there are 2 cars in the household (47.5% vs. 61.0%). Having less than 2 cars, living far from the school, but above all dwelling in cities that provide people with good bus services may account for the particular licence profile of Cluster #P5 characterized by the licence to use buses.

#### Cluster #P6: Parents allowing their children to cycle on main roads

Cluster #P6 is made up of 109 parents (16.3%) It is the least homogeneous cluster (intra cluster inertia = 0.066). Distance to the origin is relatively high (1.279) showing that this group is slightly apart from the rest of the population without being atypical as is Cluster #4.

As all parents—to the exception of those of Cluster #P4—the parents of Cluster #P6 do not allow their children to go out after dark. On the other hand, most of them allow their children to cross main roads (98.2% vs. 57.9%), go to school (81.6% vs. 46.1%) and to other places than school on their own (92.7% vs. 47.6%). However, if the percentage of parents of Cluster #P6 allowing their children to use buses is higher than in the whole parent population (58.7% vs. 24.0%), this percentage is far beyond what is observed for Cluster #P5. On the reverse, all of them grant their children the licence to cycle on main roads, whereas none of the parents of Cluster #P5 does so. The contrasted parental attitude regarding these two licences is what distinguishes these two clusters.

The children of Cluster #P6 have similar age characteristics to those of Cluster #P5: they are older (12.3) and mainly attend secondary school (80.7% vs. 39.1%). Although they feel safer than most of the children (mean secure-unsecure score 4.74 vs. 3.31), they do not feel as safe as children of Cluster #P5. In contrast, the parents of Cluster #P6 show the highest positive secure-unsecure scores (0.78 vs. 0.0). They responded that they were “not very worried” about the risk for their child of being injured in traffic (36.7% vs. 21.3%), and in majority they did not respond that “concern about traffic dangers” was the main reason for them to accompany their children to school when they were younger. They also most frequently responded that they “agree” with the statements that “most adults in the neighbourhood look out for other people’s children” (52.3% vs. 41.64%). The parents of Cluster #P6 appear less anxious than the other parents regarding social risks and particularly regarding traffic risks. This probably explains why they grant their children the licences to cycle on main roads.

To complete the picture of this parental profile, it can also be pointed out that these parents are less frequently picking up their children from school (1.28 vs. 2.63 day per week), and they are less frequently making round trips to accompany their children to activities (1.70 vs. 2.96). The families have more children aged between 11 and 15 years (1.30 vs. 0.82) and fewer children 10 or less (0.90 vs. 1.43). Finally, it comes out that the parents’ education level in Cluster #P6 is characterized by an over-representation of lower level technical diplomas (35.8% vs. 26.0%).

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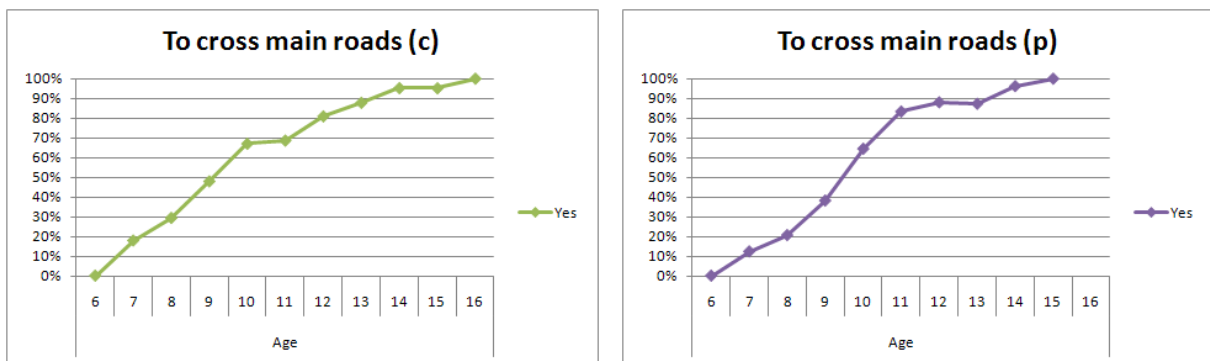
These exploratory cluster analyses put forward the role of different factors on children’s independent mobility, which respective influences need to be further discussed (see hereafter “Discussion and Conclusion”). Nevertheless, it already appears that **Age** is a major factor that impinges on the acquisition of the licences, both as regard to the children’s declarations and their parents’ statements. Thus, the evolution of each of the six licences as a function of age will be accurately examined.

## 2. The impact of age on each of the six licences

### Influence of age on licence to cross main roads

The licence to cross main roads evolves similarly with age through the parents’ and children’s declarations (see Chart xx). The only noticeable difference can be observed between 10 and 11: on the children’s curve (c) there is a plateau whereas on the parents’ curve (p) the slope is important. As a matter of fact the parents mainly grant their children the licence to cross roads between 8 and 11 years. From the children’s point of view the evolution is more regularly spread between 6 and 16.

Chart xx Evolution of licence to cross main roads in children’s (c) and parents’ (p) responses



Nevertheless age is a better predictor of the acquisition of the licence to cross main roads in the parents’ statements than in the children’s declarations: *Uncertainty Coefficient*<sup>8</sup>  $UC = 0.32$  and  $UC = 0.20$  for parents and children respectively, both measures are significant *Monte Carlo Estimate*<sup>9</sup>  $p < .001$ .

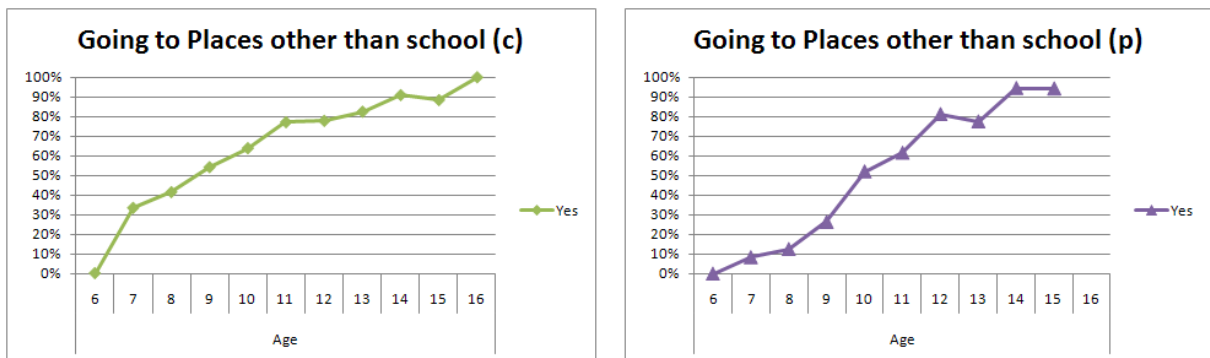
<sup>8</sup> Uncertainty coefficient. A measure of association that indicates the proportional reduction in error when values of one variable are used to predict values of the other variable. For example, a value of 0.32 indicates that knowledge of one variable (e.g. Age) reduces error in predicting values of the other variable (e.g. licence to cross main roads) by 32%.

<sup>9</sup> Monte Carlo Estimate. An unbiased estimate of the exact significance level, calculated by repeatedly sampling from a reference set of tables with the same dimensions and row and column margins as the observed table. The Monte Carlo method allows an estimation of the exact significance without relying on the assumptions required for the asymptotic method. This method is most useful when the data set is too large to compute exact significance, but the data do not meet the assumptions of the asymptotic method.

**Influence of age on licence to go to other places than school**

Regarding the licence to go to other places than school, there are noticeable differences in the responses of the children aged between 6 and 9 and the responses of the parents of these children. According to the children, this licence increases rapidly over this period, half of them declaring to go to other places than school on their own or with friends when they are 9. Before the end of primary school, 64% of the children declare they are moving around independently in the local area. According to the parents it evolves slowly until 9, it is only at 10 that they grant their children this licence.

Chart xx Evolution of licence to go to other places than school in children’s (c) and parents’ (p) responses

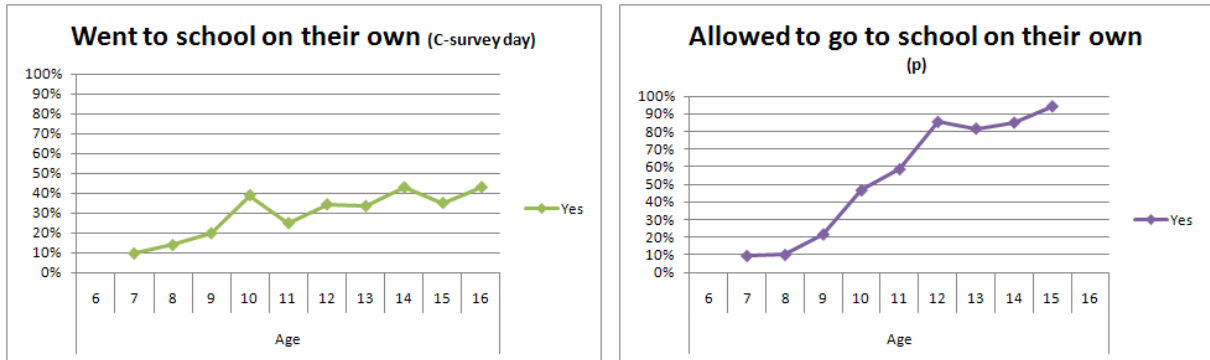


Again, age is a better predictor of the acquisition of the licence to go to other places than school in the parents’ statements than in the children’s declarations:  $UC = 0.20$  and  $UC = 0.14$  for parents and children respectively, both measures are significant *Monte Carlo Estimate*  $p < .001$ . Although significant, the effect of age on this licence is small for the children’s declarations.

**Influence of age on licence to go to school independently**

The parents’ and children’s responses regarding the licence to go to school independently have to be considered separately.

Chart xx Evolution of licence to go to school independently in children’s (c) and parents’ (p) responses



For the children, the question was restricted to how on the survey day the child actually travelled to and from school. On the other hand, the parents were asked if the child has already been allowed to travel to school on their own, whatever happens regularly or exceptionally and whether it has already happened in the past or still happens at present. This is particularly consequential for **Ssc**, whose school is often farther from home than the primary school was.

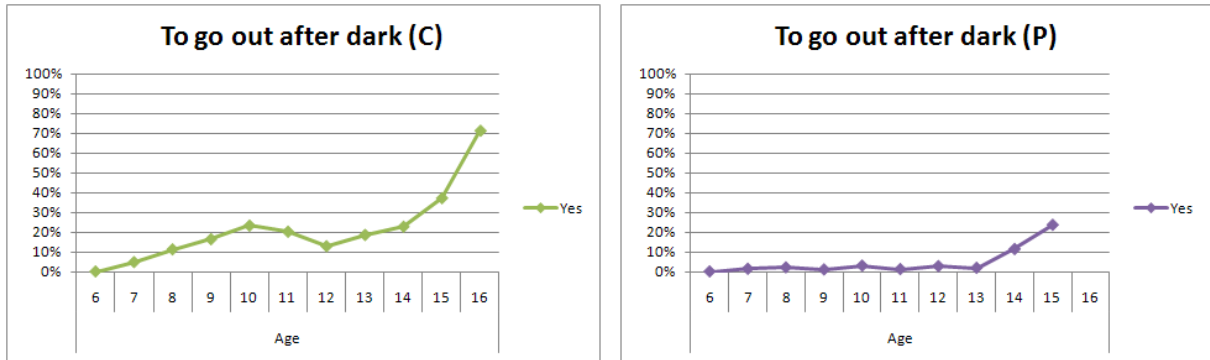
Considering the children’s curve, this explains the decrease that can be observed between 10 and 11, when children change from closer primary schools to farther secondary schools. Chart xx shows that going to school independently evolves very slowly with age; while significant the effect of age is small:  $UC = 0.05$ , *Monte Carlo Estimate*  $p < .001$ .

On the opposite, from the parental point of view, the licence to go to school independently clearly evolves with age:  $UC = 0.30$ , *Monte Carlo Estimate*  $p < .001$ . Parents begin to grant their children this licence at the age of 8, and the quasi totality of the children has the licence at 16.

**Influence of age on licence to go out after dark**

The examination of the children’s responses regarding the licence to go out after dark brings to light two successive evolutions separated by a period of decrease between 10 and 12 years of age (see Chart xx C). This result suggests that the meaning of the question is not the same for **Psc** and **Ssc**.

Chart xx Evolution of the licence to go out after dark in children’s (c) and parents’ (p) responses



It seems that the **Psc** understood the question as: “Are you sometimes playing outside when it is already dark?” that does not mean necessarily late or away from home. It is important to stress that in France, the evening meal is a family event that generally takes place around 8 p.m., which represents a psychological and social frontier separating late afternoon from night. Thus, the curve of the **Psc** can be interpreted as the evolution of the licence to play outside in the late afternoon, even if it is dark<sup>10</sup>. This interpretation is comforted by the younger children’s commentaries while they were responding to the questionnaire<sup>11</sup>. The **Ssc** probably understood the question as “Do you spend time with friends outside at night<sup>12</sup>”, namely after dinner. Chart xx shows that this second type of licence begins to emerge in children’s responses at 12, and markedly increases between 14 and 16. The effect of age on this (these) licence(s) is small: *UC* = 0.05, *Monte Carlo Estimate* *p*<.001.

The parents clearly understood the question in its second meaning. They exceptionally granted this licence before 14. We have seen that those who do so make up an atypical group (here above Cluster #4P). Even after 14 this licence is scarcely granted and the effect of age on the granting of this licence by the parents is quite small: *UC* = 0.12, *Monte Carlo Estimate* *p*<.001.

**Influence of age on licence to cycle on main roads**

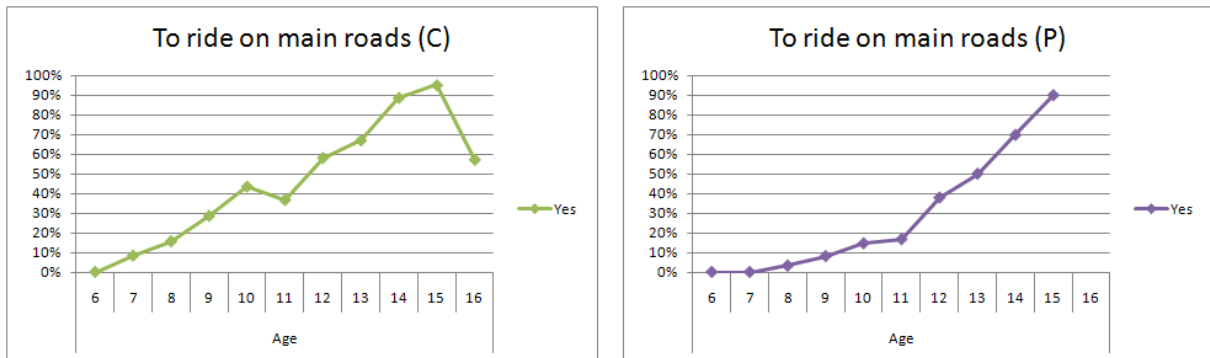
The number of children who declare to have the licence to cycle on main roads steadily increases with age for both **Psc** and **Ssc**: *UC* = 0.22, *Monte Carlo Estimate* *p*<.001. However, one can observe that surprisingly a lower percentage of children aged 11 declare to cycle on main roads at than those aged 10 . This might be due to the change of school. The decrease at aged 16 is not significant because the sample is quite small (7).

<sup>10</sup> The French survey was mainly carried out in November and February, when it can be dark before dinner.

<sup>11</sup> With children under 9, the questionnaire was carried out in small groups as a directive interview.

<sup>12</sup> It was impossible to literally translate the expression “after dark” in French. We used the expression “*quand il fait nuit*”, that does not mean “at night”, but could be more ambiguous for a clear distinction between “after dark” and “at night”.

Chart xx Evolution of the licence to cycle on main roads in children's (c) and parents' (p) responses

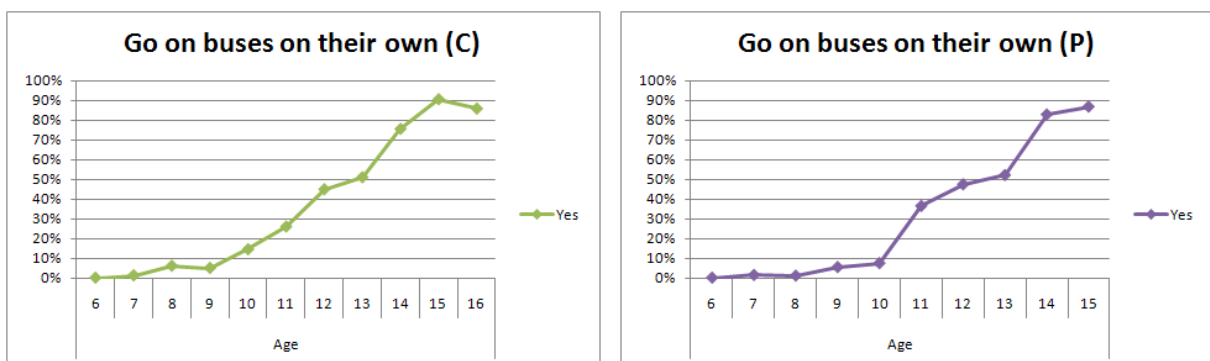


In the parental responses the licence to cycle on main roads slowly increases until 11, then it increases rapidly; the chart xx (p) shows a sharp slope between 11 and 15. Age is an important factor in the parents' decision to grant their children the licence to cycle on main roads:  $UC = 0.29$ , Monte Carlo Estimate  $p < .001$ .

**Influence of age on licence to use buses**

Quite a few children declared using buses on their own before they are 10, then the use of buses increases regularly and steadily. When they are 13, half of the children say they use buses alone. The influence of age on this licence is significant:  $UC = 0.26$ , Monte Carlo Estimate  $p < .001$ .

Chart xx Evolution of the licence to use buses in children's (c) and parents' (p) responses use buses on their own



The development of the licence to use buses independently is quite similar in the parental responses. In primary school, this licence is rarely granted. The percentage of children who are granted the licence rapidly evolves through the secondary school years with two marked accelerations: the first one when entering the secondary school, the second one between 13 and 14. The parental licence to use buses is substantially depending on age:  $UC = 0.38$ , Monte Carlo Estimate  $p < .001$ .

## Discussion

The comparison in the licence holding of six form of independent movements of primary and secondary school children put forward that independent mobility develop markedly after 11 years when children are in secondary school. Specifically, four of the six licences are held by a large majority of the secondary school children: to go to other places than school on their own, to cross main roads, to use public transport, and to cycle on main roads. However, only one third of these older children declared to go to and from school on their own. This result is probably due to the size of the secondary school catchment areas which were particularly large in four of the five survey areas. Therefore, the distances from the children's homes to secondary school constrained the children to use the school bus or to be driven by their parents.

The less granted licence to both secondary and primary school children is the licence to go out after dark. The percentages of the French children allowed doing so either in primary or in secondary school were lower than those observed in England and Germany (see Shaw et al., 2013). It was impossible to literally translate the expression "after dark" in French. We used the expression "*quand il fait nuit*", that does not mean "at night", but could be more ambiguous for a clear distinction between "after dark" and "at night". Thus, many children may have understood the question "*do you spend time with friends outside after dark*" as "*Do you spend time with friends outside at night*", which means after 8:30 p.m. In France, the evening meal is a family event that generally takes place around 8 p.m. and that represents a psychological and social frontier separating late afternoon from night. These linguistic and cultural elements may partly account for the lower score observed in France regarding the licence to go out after dark.

The first set of results puts forward that primary school children's independent mobility is particularly restricted; four of the six licences examined were held by less than one third of these children. The licence to go to other places than school is the most frequently mentioned by the 7-to-11-year olds. As a matter of fact, going on their own to other places of the surrounding signifies the opportunity to go to play areas, parks, sport clubs or shops without depending on parental accompaniment, besides it also means the possibility to freely visit friends in the neighbourhood without adult supervision. But one can note that only half of primary school children can benefit from such a basic and critical licence that can be seen as a prerequisite to the development of activities independently from adults in the dwelling area. For the other half of the primary school children, this result supports the idea that out of school activities are likely to take place in adult-controlled settings such as sport or art clubs, activity centres, adventure parks etc., where children must be accompanied by their parents (Bachiri, Després and Vachon, 2008; Witlox and Tindemans, 2006).

On the whole, these results make clear substantial changes in children's independent mobility from primary to secondary school. However additional analyses must be carried out to accurately establish how these licenses evolve depending on age. Such analyses will help

to disentangle the effects related to the child development from those related to the shift from primary to secondary school.

The second set of analyses permitted to isolate five contrasted types of independent mobility defined by various combinations of licences. These five profiles of independent mobility are mainly depending on the number of licences gained—i.e., they appear ordered from a first profile with quasi no licences gained to a fifth profile with all licences gained. The fact that the licences profiles seem mainly defined by the number of licences gained and that age appears positively associated to an increasing number of licences can speak in favor of a unique pattern of development organised in a predictable succession of stages.

However, if the age emerges as the principal factor significantly associated with each of the five profiles, an accurate examination reveals that the link between age and a given profile nonetheless presents some flexibility—i.e., the age range of the children making up a cluster is relatively extended. Moreover, the profiles are not only determined by the number of licences gained but also by the type of the licences gained. For instance, children making up cluster #C1 have the same or a slightly lower number of licences gained than children making up cluster #C2, but what distinguishes them is that none of the former gained the licences to cross main roads and to go to other places than school, whereas more than one third of the latter declared to go to other places than school on their own. Furthermore, one can note that children in cluster #C1 are on average older than children in cluster #C2. Similarly, for the groups of children making up clusters #C4 and #C5, we observe that their mean number of licences is alike and that their mean age is the same, but the difference between the two groups relies on the fact that none of the children in cluster #C4 is going out after dark without an adult supervision, whereas children in cluster #C5 pretend to do so.

Therefore, these results suggest that the development of independent mobility is to a large extent—but not exclusively—defined by an increased number of licences gained depending on age. This means that there is not a unique pattern of development but several pathways leading from a full dependent mobility to a large independent mobility. Such a conclusion draws our attention to the factors likely to modulate the development of independent mobility through various combinations of licences.

The cluster analysis permitted to identify several factors associated to the different types of independent mobility. Among them, the type of area stands as an important one associated significantly to the definition of four clusters. For instance, children making up the cluster #C4 defined by a large independent mobility restricted to daylight hours are over-represented in the major city and under-represented in the rural area. Conversely, children from the major city are under-represented in the cluster of the children showing an emerging independent mobility with a large local autonomy, whereas those living in the

suburban new town offering a lot of pathways, parks and play areas are over-represented in that cluster (see Annex 1). Such findings strengthen the idea that environmental attributes such as city-size, density and outdoor urban facilities can either hinder or support the development of particular aspects of children's independent mobility.

Finally, it seems worthwhile mentioning that children's safety feeling in the neighbourhood emerges from the cluster analysis as a factor tangibly associated to the nature and degree of independent mobility. On the other hand, gender is only associated to one cluster—i.e., boys are overrepresented in the cluster of children declaring the largest independent mobility, that includes the license to go out after dark.

Overall, this empirical study supports the view that a complex array of factors—including environmental attributes of the living area—intervenes in the development of children independent mobility.

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