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Understanding retailing-based mobility for the 5-16 years old segment: findings and lessons from Lyon's Household Trip Survey

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Extended Abstract

1. Introduction

Shopping mobility is an essential component of urban trip system, for both personal and goods flows. Although several works exist on general trips, mainly related to work-based trip chains or professional deliveries, the literature on kids and young mobility in terms of shopping trip behaviour is scarce. Moreover, this segment of population presents the particularity that systematic trips are not directly related to shopping and the presence of non-shopping trips related to retailing (mainly when the trip is done for leisure or meeting friends in retailing areas, without necessarily a purchase or a shopping action) is higher than that of adults. Furthermore, the 5-16 years old segment is public-transport dependent, and has a modal report which is strongly different than that of adults. Moreover, some studies show that kids retailing mobility has increased, but few of them go inside the in-depth characteristics and classifications of this segment, in term of users and habits.

This paper aims, via a statistical analysis of the Household Trip Survey for the urban area of Lyon (France), to understand retailing-related mobility of the 5-17 segment of population. First, the analysis of different time horizons trends is proposed (1985, 1999 and 2006). Then, focusing on 2006, a classification of the different categories of kids in terms of retailing mobility is made. This classification will lead us to better define the different behavioural patterns in terms of shopping mobility, relating it to variables such as the household location, the studying place location, the socio-professional category of the kid's parents, the retailing area accessibility and the type of retailing zone, among others. As a conclusion, a first modelling and simulation proposal is made and further developments are enounced.

2. Urban shopping trips and kid retailing

Knowing the household supply structure of a city often offers key advantages to both planners and managers. In public sector, mainly when involving transport and urban planners, the main city's strategies in terms of land-use, retailing urban planning and commercial development of the various city areas are extremely related to the fact people will travel to those zones for shopping (Cubukcu, 2001; Kubis and Hartman, 2007; Routhier et al., 2009). For private companies, mainly when dealing with strategic management and marketing, knowing the shopping structure in terms of trips and types of consumers offers a competitive advantage in managing resources, offers, services and advertisement campaigns.

Although different works exist in literature dealing with this subject, they are often dealing with a city’s viewpoint (Vickerman and Barmby, 1985; Cubucku, 2001; Kubis and Hartman, 2007; Gonzalez-Feliu et al., 2010, 2012), and use datasets where kids mobility is often underanalysed because of its weak weight with respect to adult mobility. Moreover, even in cases where households are considered, the role and place of children is conditioned to that of parents. However, we think important to underline the place of kids mobility in terms of shopping trips, mainly related to two facts. First is that in the last years, with an explosion of urban commercial poles, the young public has increased traveling to such places for a double purchasing and leisure. The second it that the new forms of family, the flexibility trends in parents’ working hours and the cities’ variable timetabling strategies for schools and other public services has led to an increase of kids and teenagers occupancy of retailing-based areas, either commercial centres or a retailing-based neighborhoods. As shown in some works, investigating on kids with direct questionnaires is difficult, since samples are difficult to implement and maintain, and child are often reticent to answer. Moreover, specific data collection actions are expensive and difficult to implement. For that reason, we think important to first investigate the subject of kids and teenagers shopping mobility on standard data. In France, a standard survey exists since more than 50 years, the Household Trip Survey (CERTU, 2008). That survey aims to understand the overall urban mobility, but includes information to retrieve a general view of the mobility of people aged of 5 years old or more. This specificity of French Surveys gives an opportunity of studying kids mobility related to retailers and stores, and motivates the present research.

3. Methodology

This communication constitutes a first exploratory analysis of the Household Trip Survey and aims to investigate if an in-depth understanding of kids’ mobility related to purchasing can be made with standard data. For this reason, the main analyses belong to the descriptive statistics field.

First, an extraction of trips made by people aged of 17 years old and less allowed us to identify the main dataset and its quality. Note that we used to this purpose the Household Trip Survey of Lyon in year 2006 (Sytral, 2006). The number of surveyed trips (all purposes, ages and modes) is also retrieved in order to see which quantity of data is available for shopping trips (see Table 1). The number of records concerning kids shopping mobility (from 1 to 17 years old) is small (about 500 records) and represent 3% of the overall kids trips, which is much less than the average of shopping trip records for the overall survey (11%). So such records will not allow us to make a spatial analysis but are still enough to carry out an analysis by category of ages, type of destination and nature of trip (accompanied or unaccompanied).

Table 1. Number of records for shopping trips and overall trips in the Household Trip Survey of Lyon 2006

	Kids	Adults	Total
Shopping-related trips	543	10074	10617
Total number of trips	17098	79152	96250
% of shopping trips	3%	13%	11%

After identifying the dataset, we analyse it following three criteria: the age, the shopping destination and the nature of trip. First, mono-variable analyses are carried out to make a first class distinction. Since two of the three variables are binary¹, the classification is made only on the age criterion. An analysis of the 543 records by age and an aggregative nested classification method have led to a classification containing X classes:

Table 2. Number of records for each age and choice of age classes

Age	Number of records	Class
5	53	5-7
6	52	5-7
7	37	5-7
8	38	8-11
9	30	8-11
10	45	8-11
11	42	8-11
12	39	12-15
13	47	12-15
14	37	12-15
15	41	12-15
16	37	16-17
17	45	16-17
Total	543	4 classes

After that, mono and multivariable analyses have been carried out to identify the main characteristics of kids shopping mobility. Moreover, for accompanied trips, the accompanying adult trips have also been analysed.

4. First findings

In this section, we present the first preliminary findings of the descriptive statistics analysis. We observe that overall shopping trips represent about 11% of weekly personal trips in Lyon. From them, we isolate kids shopping trips, making a bivariate analysis first. Indeed, on the following table we observe the average daily number of shopping trips (on the entire urban area of Lyon) for kids, by age class (lines) and type of shop (columns), following the categories defined in the methodology. To this number, the part of overall shopping trips (ST) is also indicated, in percentage. As shown in Table 3, kids shopping trips represent about 5% of overall shopping trips, which is, although small, not negligible. Moreover, we observe that shopping mobility of 16-17 years old is smaller than the rest, and there is a preference for stores and commercial centres. Moreover, we start to see the first car users as drivers (), since

¹ Nature of transport is a binary variable, not initially contained in the survey and defined by combined request formulation for the aims of the presented research. Type of shopping destination is not binary in the survey but responds to four classes: multi-purpose trip at a commercial center, superstore or assimilated, proximity retailer and marketplace. Since the first purpose is negligible and the second assimilated to a proximity retailer in shopping trip motivation, both have been assimilated respectively to superstore and proximity retailer classes.

in France it is authorised to drive at 16 if an adult with more than 3 years of driving licence is accompanying the young driver in the same car.

Table 3. Number of shopping trips for each kids age class and type of shop

Age class	Proximity retailer	Part of ST	Store	Part of ST	Total	Part of ST
5-7	5 503	1,16%	3 517	1,17%	9 019	1,16%
8-11	5 378	1,14%	4 637	1,54%	10 015	1,29%
12-15	6 444	1,36%	4 750	1,57%	11 194	1,45%
16-17	2 404	0,51%	2 409	0,80%	4 813	0,62%
Total	19 728	4,18%	15 313	5,07%	35 041	4,53%

If we re-order such results by transport mode, we observe the diversity of the modal report with respect of the type of store. Indeed, commercial centres and stores are accessed with a wider variety of modes; this can be explained by the distance, which is higher, but not only. Indeed, no bicycle trips are made to proximity retailers, but this mode is used by some kids of the 8-15 age classes. After 15, we observe a small usage of motorbike and car (in France, driving is authorised from 16 years old if driver is accompanied by an adult with driving licence) but are preferred to bike, and under 8, most kids are accompanied, and it seems that the usage of bike is not encouraged by parents for the youngest category.

Table 4. Number of shopping trips for each kids age class, type of shop and transport mode

	Age class	Motorbike	Other	On foot	Public transport	Bicycle	Car driver	Car passenger	Car pax. public tpt	Total
Proximity retailers	5-7	-	-	349	99	-	-	-	3 068	3 517
	8-11	-	-	250	538	-	-	-	3 849	4 637
	12-15	-	-	517	724	-	-	-	3 509	4 750
	16-17	56	-	310	752	-	-	28	1 264	2 409
	Total	56	-	1 426	2 113	-	-	28	11 690	15 313
Commercial centres/ stores	5-7	-	-	1 960	107	-	-	3 436	-	5 503
	8-11	-	-	1 965	135	88	-	3 190	-	5 378
	12-15	173	254	2 724	400	313	-	2 403	176	6 444
	16-17	197	-	1 047	354	-	47	759	-	2 404
	Total	370	254	7 696	996	401	47	9 788	176	19 729
Overall trips		426	254	9 122	3 109	401	47	9 816	11 866	35 042

5. Conclusion

In this paper we overviewed the main trends of kids and teenagers shopping mobility. More precisely, from the Lyon's household trip survey, we established a first classification of individuals then extracted the main characteristics of shopping trips for the different categories. Then, we explored the results and tried to define each category in terms of kids and teenagers shopping mobility. The next step is then modelling. Although it is soon to make a complete choice model, due to lack of data, a first choice model can be made, for each

category. To do it, it should be interesting to combine data from different cities, for example, from Lyon, Bordeaux and Lille, three conurbations of similar size which have available data at similar horizons. From them, it is envisaged to affine the analysis and produce a set of choice models to orient planners and managers in their retailing and leisure choices.

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UNDERSTANDING RETAILING- BASED MOBILITY FOR THE 5-16 YEARS OLD SEGMENT: FINDINGS AND LESSONS FROM LYON'S HOUSEHOLD TRIP SURVEY

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Agenda

- Introduction
- Motivation
- Methodology
- Results
- Conclusion

Introduction

- Shopping mobility is an essential component of urban trip system
- New trends → increase of purchases by kids
- Moreover, leisure activity at retailing areas increases, mainly for the 11-18 segment
- Aim of this paper: understand the main mobility trends of kids in terms of purchasing-related activities from standard data

Motivation

- Retailing quantitative data:
 - scarce and/or confidential
 - mainly related to adults
 - few opportunities to study kids behaviour
- Mobility is extremely related to shopping behaviour
- Standard data is available for urban mobility

So, why not to use such data?

Methodology

- Main issues
 - To identify kids direct mobility related to shopping (easy)
 - To identify accompanied and unaccompanied trips (medium)
 - To identify indirect mobility related to shopping (hard)
- Data: Household trip survey of Lyon (about 100 000 surveyed trips on about 27500 individuals)

Methodology

- First, dataset has been extracted (direct child mobility)
- Second, adult mobility has been related to kids mobility (by a matching procedure)
- Third, a typology of ages has been defined using an Agglomerative Nesting algorithm

Methodology

	Kids	Adults	Total
Shopping-related trips	543	10074	10617
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Table 1. Number of records in the dataset

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15	41	12-15
16	37	16-17
17	45	16-17
Total	543	4 classes

Table 2. Number of records for each age and choice of age classes

Results

Age class	Store			Proximity retailer			Overall
	Accompanied	Unaccompanied	Total	Accompanied	Unaccompanied	Total	
5-7	3517	0	3517	5503	0	5503	18040
8-11	4111	526	4637	4833	546	5379	20032
12-15	3445	1306	4751	3556	2888	6444	22390
16-17	1944	466	2410	2136	268	2404	9628
Overall	13017	2298	15315	16028	3702	19730	70090

Tables 3a and 3b. Total daily number of shopping trips by activity and age class

Age class	Store	Proximity retailer	Overall
5-7	0%	0%	19%
8-11	11%	10%	8%
12-15	27%	45%	0%
16-17	19%	11%	5%
Overall	15%	19%	9%

Results

	Age class	Moto	Other	On foot	Public transport	Bike	Car driver	Car pax.	Car pax. public tpt	Total
Proximity retailers	5-7	-	-	349	99	-	-	-	3 068	3 517
	8-11	-	-	250	538	-	-	-	3 849	4 637
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	Total	370	254	7 696	996	401	47	9 788	176	19 729
Overall trips	426	254	9 122	3 109	401	47	9 816	11 866	35 042	

Table 4. Number of shopping trips for each kids age class, type of shop and transport mode

Unaccompanied mobility to CCs

In both cases, good public transport or foot accessibility



Zone	N.	Trips	%
P.Dieu	2	925	2%
P. Alpes	12	284	1%

Conclusions

- Shopping mobility in 5-18 years old in increasing and merits to be studied
- The first results on standard data shown interesting trends and merit to be pursuit in-depth
- Data sample is too small to make in-depth spatial analyses on one city
- Further work
 - Overall descriptive analysis (including leissure trips) on a set of cities
 - Discret choice models

Thank you very much for your attention

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