THE ATTITUDES AND BEHAVIOUR OF EUROPEAN PEDESTRIANS

ELEONORA PAPADIMITRIOU, NTUA (nopapadi@central.ntua.gr)
ATHANASIOS THEOFILATOS, NTUA (atheofil@central.ntua.gr)
GEORGE YANNIS, NTUA (geyannis@central.ntua.gr)
GERALD FURIAN, KFV (gerald.furian@kfv.at),
CHRISTIAN BRANDSTÄTTER, KFV (christian.brandstaetter@kfv.at),
VIRPI BRITSCHGI, VTT (virpi.britschgi@vtt.fi),
EMIL DRÁPELA, CDV (emil.drapela@cdv.cz)
RICHARD FREEMAN, University of London (r.freeman@ioe.ac.uk)

Introduction

Pedestrians are the most vulnerable users of transport networks due to various reasons such as lack of protection as well as particular characteristics and behaviour affecting the nature of their interaction with motorized traffic (OECD, 2001&2011; ERSO, 2008; Yannis et al., 2007a). As a consequence, the knowledge of pedestrian attitudes, perceptions and behaviour may assist policy makers in the better understanding of pedestrian behaviour issues and safety needs and to improve pedestrian safety (Yannis et al., 2007b).

Several existing researches provide results on pedestrian attitudes, perceptions and behaviour. For example, Yagil (2000) examined the self-reported road-crossing behaviour of young student pedestrians. Another study (Granié, 2009) explored the effects of sex-stereotype conformity, perception of danger and risky behaviour of adolescent pedestrians, whereas Bernhoft & Carstensen (2008), analyzed preferences and behaviour of older pedestrians and cyclists. Zhou et al. (2009) attempted to measure pedestrians' social conformity and to test the theory of planned behaviour. Diaz (2002) examined pedestrians' attitudes towards traffic violations and self-ratings of violations, errors and lapses, whereas Sisiopiku & Akin (2003) analyzed perceptions towards various pedestrian facilities such as crosswalks, physical barriers and pedestrian warning signs.

The results presented in this paper are based on SARTRE 4 project (Social Attitudes to Road Traffic Risk in Europe). The project has received funding from the European Union Commission, and from the 19 participating countries.

Research methods

The data was collected by face-to-face interviews, and the she sample consisted of 21 280 respondents. The selection of pedestrians was carried out according to the following criterion: pedestrians were selected as those respondents who reported that their most frequent transport mode in the last 12 months was neither passenger car nor motorcycle and who reported non-zero daily walking distance travelled.

The analysis consisted of 2 parts: descriptive analysis and in-depth analysis.

2. In-depth analysis: statistical analysis and modeling of pedestrians' travel habits, road safety attitudes and behaviour by means of factor and cluster analysis.

Descriptive analysis

The frequencies, percentages and country comparisons on pedestrians' road safety attitudes and behavior are described in the following chapter. The results include also analyses per age, gender, town size and area type.

Pedestrians' concerns about road safety

92% of the pedestrians reported that they travelled daily or several times a week by walking. In Netherlands, the majority of pedestrians travelled frequently also by bicycle. In most countries the percentage of people that used public transport regularly was higher than 50%.

The percentage of pedestrians who consider the roads to be very or fairly safe varied from 24% (Greece) to 92% (Finland). Pedestrians in Northern and Western European countries were more satisfied with roads compared to Central and Southern European countries. Greece, Cyprus and Poland showed the highest percentages of pedestrians that did not find roads safe at all. Similarly, the percentage of pedestrians who believe that the government does care (very much or fairly) about road safety, varied from only 15% (Greece) to nearly 81% (Finland). The percentage of pedestrians who believe that the roads have become very or fairly safer over the past 10 years ranges from 22% (Greece) to 79% (Finland).

The majority of respondents were very much or fairly much in favour of using speed limit devices in cars (percentage higher than 70% apart from Netherlands and Sweden), black boxes (percentage about 80%), fatigue detection devices (around 85%), and alcolocks in cars (percentage higher than 60%). The majority of pedestrians were also very much or fairly much in favour of using cameras for red light surveillance (more than 80%), surveillance of speeding at a single point (more than 80%), or between two distant points (more than 70%). Interestingly, the percentage of pedestrians who strongly support more '30 km/h' zones was low compared to the other measures, although this is a measure explicitly aiming to improve pedestrian safety. On the other hand, the majority of pedestrians are very much or fairly much in favour of more car and motorcycle free zones.

The results are possibly affected by the degree to which the risk-taking or distracted driver behaviour is spread in each country. Most pedestrians did not consider walking to be dangerous (average percentage was about 60%). On the other hand, pedestrians considered cycling to be fairly or very dangerous (65% on average).

Almost half of all pedestrians were very much of fairly much satisfied with pavements. There was a great variation between the countries: this percentage ranges from very small such as 2-4% (Estonia, Hungary, Czech Republic and Greece) to 30-42% (Austria, Finland, Israel, France and Sweden). In general, almost half of pedestrians were satisfied with the separation of pedestrians and cyclists.

The maximum percentage of pedestrians that are very or fairly satisfied with safety can be found in Finland (85%). Most of the countries had a percentage higher than 50%. The maximum percentages of pedestrians that are not much or not at all satisfied with safety were found in Greece (83%) and Cyprus (80%).

The majority of European pedestrians get annoyed with car drivers (more than 60%) at least sometimes. Almost 25% reported this to happen often. Similarly, 25% of pedestrians get often annoyed with motorcyclists: this was most common in Greece, Czech Republic, Estonia, Austria, Germany, Poland, Italy, Slovenia and Serbia. Most of pedestrians are never or rarely annoyed with bicyclists apart from Netherlands, Austria, Estonia and Germany (almost 30%).

The influence of age on pedestrians' behaviour

Some statistically significant differences were observed between the age categories. In general, the youngest and the oldest age groups responded more often that they are very satisfied with pavements, separation of pedestrians and cyclists, and safety. The older age groups were less satisfied with the speed and volume of the traffic than other groups. The older respondents avoided dangerous streets or intersections more often than other age groups.

Older respondents reported to be less annoyed about car drivers than other age groups. For getting annoyed with motorcycles, the situation was quite the opposite: young groups reported more often than older groups that they were annoyed with motorcyclists. For getting annoyed with cyclists, the differences between the age groups were very small.

The influence of gender on pedestrians' behaviour

Over 10% of pedestrians reported that they often or even always make or answer a phone call was done most often both by female and male respondents while walking. There was no difference between genders. Using a music device and wearing reflective clothing were the things that over 50 % never did. The majority of the respondents answered that they never crossed the street on red light for pedestrians. Men answered that they cross streets on red light or wrong places more often than women, and women reported that they avoid dangerous streets or intersections more often than men.

In general, male respondents were more satisfied with pedestrian infrastructure than the female ones. The difference between male and female respondents was clearest in being satisfied with pavements (20 % of male 'very satisfied' vs. 13 % of females). Female pedestrians reported to get annoyed about other road users more often than male pedestrians.

The influence of town size on pedestrians' behaviour

Regarding town size, answers of participants varied significantly. Inhabitants of big and middle size towns cross the road when it is red light for pedestrians more frequently, they use music devices during their walk more often, they use more their mobile phones while walking and they cross streets at places other than the pedestrian crossing more often. On the contrary, big cities residents wear less reflective clothing and are less afraid of dangerous streets and intersections.

Differences in the size of cities in relation to the satisfaction of their inhabitants for pedestrian infrastructure were also significant. In most cases, satisfaction was highest in big cities and gradually decreased with the decrease in town size.

Pedestrians' annoyance by motorcyclists increases with town size, while their annoyance with bicyclists decreases with town size. Annoyance by car drivers does not appear to vary by town size.

The influence of residential area on pedestrians' behaviour

Differences between urban, suburban and rural areas were mostly visible in red light crossing, mobile phone use and listening to music while walking, which were much less common in rural areas and small towns. On the other hand, wearing reflective clothing and avoiding some streets or intersections were less frequent in urban areas.

Respondents living in urban areas showed higher satisfaction with pedestrian infrastructure, although these differences were not always striking. A quite different distribution of results was obtained as regards the area description. The highest annoyance by car drivers' behaviour was found suburban areas and the highest annoyance by motorcyclists' behaviour was observed in small towns.

In-depth analysis

In order to obtain sub-groups of pedestrians based on their travel behavior, a cluster analysis was performed. The variables "Use of transport means" and "Walking frequency" were used for the setup of the analysis. Various transformations of these variables were performed and resulted in the dependent variables for the cluster analysis. These variables are:

- Total Travel Distance
- Percentages of distance in km per means of transport (The analysis was performed through TWOSTEP CLUSTER (PASW® Statistics 18 Command Syntax Reference), which groups observations into clusters based on a nearness criterion (Log-Likelihood in this analysis).

Analysis was performed on the European level and not separately for the individual countries as it makes sense to produce a manageable number of pedestrian types in order to compare the different countries; and not to have optimized typologies for each country which would not be comparable among each other.

Grouping pedestrians on the basis of their travel habits

The analysis resulted in four types of pedestrians (see also Table 1):

- Type 1: 'Average distance traveller, short distance pedestrian and user of public transport'.
    - Medium daily travel distance, daily walking but below average distance (mean: 2,83km), high percentage of usage of public means of transport or high

percentage travelling as car passenger; very low percentage of travelling by bicycle. 44.5% of pedestrians fall into this category.

- Type 2: 'Long distance traveller and pedestrian'.
    - Very similar to type 1 but characterized by a much higher daily travel distance (mean: 79,93km = highest travel distance of all four types) and a much higher walking distance (mean: 8,63km). This is the smallest group: 9.9% of all pedestrians fall into this category.
- Type 3: 'Short distance traveller - mostly walking and cycling'.
    - the "typical" pedestrian: two thirds (67%) of the daily travel distance is done by walking, another fourth (24%) is done by cycling; low daily total distance (mean 9,5km) as usage of public means of transport and travel as car passenger is very low. 24,1% of cases fall into this category.
- Type 4: 'Average distance traveller, short distance pedestrian and frequent cycling'.
    - Similar to type 1, but with the following differences: higher percentage of daily travel distance by walking (23%) and cycling (14%), minor use of public means of transport (31%) or travelling as car passenger (28%). 21,5% of pedestrians fall into this category.

Table 1. Clustering of European pedestrians: daily travel distance and percentage of kilometres by travel mode.

	Average distance traveller, public transport user (45%)	Short distance traveller (24%)	Average distance traveller, frequent cycling (22%)	Long distance traveller (10%)
% of walking kms	17 %	**67 %**	23 %	19 %
Daily travel distance	22 km	9 km	21 km	**80 km**
Daily walking distance	**3 km**	4 km	2 km	9 km
% of public transport kms	**44 %**	4 %	31 %	**46 %**
% of car passenger kms	31 %	5 %	28 %	27 %
% of cycling kms	6 %	**24 %**	**14 %**	6 %

Pedestrians' attitudes and behaviour

The next step of the in-depth analysis was to try to identify groups of variables reflecting pedestrians' attitudes, behaviour and perceptions. For that reason, an exploratory factor analysis (a principal component analysis) took place. This technique is good in understanding the structure of a large set of variables and in reducing the dataset to a more manageable size. As a next step, a cluster analysis was carried out aiming to group pedestrians in meaningful sub-groups or clusters based on their attitudes and behavior.

The cluster analysis resulted in 3 clusters of pedestrians. 44,4% of pedestrians are in the 1st cluster, 30,7% are in the 2nd cluster and 24,9% are in the 3rd cluster:

CLUSTER 1: "Positive attitudes, positive behaviour"

- Satisfied with road environment
- Agree with and penalties
- Agree with devices
- Agree with speed limitations and surveillance
- Average risk-taking and distraction
- Accept pedestrian measures

CLUSTER 2: "Negative attitudes, negative behaviour"

- Not satisfied with road environment
- Disagree with measures and penalties
- Disagree with devices
- Disagree with speed limitations and surveillance
- High risk-taking and distraction
- High changing behaviour

CLUSTER 3: "Mixed attitudes, positive behaviour".

- Average satisfaction with road environment
- Agree with penalties
- Average agree with devices
- Average agree with speed limitations and surveillance
- Low risk-taking and distraction
- Disagree with pedestrian measures
- Not annoyed by other road users
- Not changing behaviour

37% of male pedestrians are in Cluster 1, which suggests that they have positive attitudes and positive behaviour, while 38% has negative attitudes and negative behaviour. Only 25% has mixed attitudes. Almost half of females (48%) have positive attitudes and positive behaviour while 25% and 27% are assigned to the other two clusters.

Although overall most pedestrians belong to Cluster 1 (positive attitudes and positive behaviour) and the lowest percentage belongs to Cluster 2 (negative attitudes and negative behaviour), this trend is reversed for pedestrians younger than 34 years old, who have negative attitudes and behaviour. Those age groups (17-24 and 25-34) have the lower percentage of mixed attitudes (Cluster 3).

The percentage of pedestrians having "positive attitudes and positive behaviour" is higher than 40% in almost all the countries, apart from Austria, Netherlands, Spain and Germany. In those 4 countries pedestrians were equally distributed across the 3 clusters. The highest percentages of "negative attitudes and negative behaviour" can be found in Italy (48,2%), Cyprus (46,5%), Sweden (39,3%) and Greece (38,9%). The most dispersed cluster is "mixed attitudes, positive behaviour", which has some notably low percentages such as 5,6% (Greece), 6,9% (Cyprus) 8,1% (Estonia), while at the same time has some high percentages such as Hungary (40,5%), Finland (39,2%) and Spain (38,7%).

Conclusions

Aside from walking, pedestrians travel frequently as car passengers and as public transport passengers, and less as motorcycle passengers. Pedestrians seem to be very concerned about several socioeconomic issues, including pollution, unemployment and health care. Only in a few countries pedestrians are worried about congestion. The responses are clearly affected by the degree to which these issues are present in the different countries.

Crossing at non-designated locations and during red signal display were typical examples of risky behaviour. Risky behaviour was more frequent in urban areas than in rural areas. It was more typical for men than for women. Women and the elderly people avoided dangerous streets or intersections more often than men or younger people.

Three profiles of pedestrians in terms of motivations and travelling style were found in the data:

- Positive attitudes + positive behaviour
- Negative attitudes + negative behaviour
- Mixed attitudes + positive behaviour

Male pedestrians reported negative attitudes and behaviour to a larger extent than female pedestrians, and young respondents were over-represented in the cluster of pedestrians with negative attitudes and behaviour.

Satisfaction for pedestrian infrastructure (pavements, separation of pedestrians and cyclists, crossing points, street lights etc.) was higher in urban areas. Male pedestrians were more satisfied with the infrastructure than women. Pedestrians in northern and western Europe believe that road safety is an important concern of their national government. Pedestrians show strong support for a variety of safety measures and dissatisfaction with the speed of traffic, but not the establishment of more 30 km/h zones.

Road users use a variety of modes, sometimes even in one journey, so policy should support multiple modes. Targeting messages on environmental benefits to younger people and

health concerns to older people is most likely to increase each group's walking. The focus should be on designing better road layouts rather than trying to enforce speed limits with penalties.Pedestrians are active agents in the urban environment. They should be managed by design and not expected to follow rules.

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