

SAFETY GUIDELINES FOR CARPOOLING

ADAMOS, Giannis, MSc, Research Associate, University of Thessaly, Department of Civil Engineering, Pedion Areos, 38334, Volos, Greece, Telephone: +302421074158, Fax: +302421074131, E-mail: giadamos@civ.uth.gr

NATHANAIL, Eftihia, PhD, Assistant Professor, University of Thessaly, Department of Civil Engineering, Pedion Areos, 38334, Volos, Greece, Telephone: +30 2421074164, Fax: +302421074131, E-mail: enath@uth.gr

ABSTRACT

In an era of increased demand for alternative transport means, as a consequence of environmental awareness and economic crisis, carpooling started to form viable solutions for the daily commute. Though, challenges related to safety concerns, flexibility, or ride partner matching still need to be faced.

The objective of this paper is to focus on the transportation of children who ride with their friends' parents to and from school and other activities in Greece, and develop policy guidelines that will safeguard their safety.

The methodology includes the review and assessment of the safety implications of carpooling, both for children and driver responsibility, evaluation of the perceived safety levels through the existing statistics worldwide and literature review.

Results showed that parents keen to relax expectations on safety measures, when carpooling. Although they use safety seat when driving their own children, they do not require that their children use a safety seat when travelling with friends. They would sit a child in the front seat, or have two children sharing a seat and/or seatbelt, and one in another's lap.

Keywords: carpooling, safety, guidelines, children, schools, education.

INTRODUCTION

Based on the latest statistics and the revised urban-rural typology, 68% of the European Union (EU) population live in urban areas (<http://ec.europa.eu>), and the 40% live in large urban areas of over 200.000 inhabitants. The same infrastructure is used by private vehicles, public transport, cyclists and pedestrians, while an average European citizen makes 1000 trips per year, with half of them ranging less than 5 kilometres long (PROUD, 2012).

Increased congestion, increase of the carbon dioxide CO₂ emissions (40% caused by urban mobility) and decrease of the safety level (one out of three road fatalities occurs in cities) are some of the most serious consequences caused by the increased urban mobility. There is no doubt that private car is still the dominant urban transportation mode, contributing about 75%

of kilometres travelled in EU conurbations, and causing mobility problems in most large European cities (PROUD, 2012).

Urban transport policy is of high importance for the European Commission. More specifically, the White Paper “European transport policy for 2010: Time to decide”, was the first comprehensive framework for the achievement of a sound European transport policy, through which the EU aimed at striking the balance between the economic development and the quality and safety demands of societies (EC, 2001). In 2006, the Mid-term review of the 2001 White Paper and the Communication “A sustainable future for transport: Towards an integrated, technology led and user friendly system”, argued for a comprehensive and holistic approach to transport policy, taking into consideration that mutually complementary action is needed at all levels of governance. The Communication set the main actions that should be undertaken over the next years, such as the integration of investment needs, regulations, technological innovation and international regimes in order to identify European added value to solve mobility problems (COM(2006) 314 final).

Urban implications of mobility have also been of concern for the Communitarian Bodies that resulted in the Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions “Action Plan on Urban Mobility” (COM (2009) 490 final). In the context of this Communication, urbanisation and its impact on transport was identified as one of the key challenges in providing a more sustainable transportation system, through short and medium-term actions (from 2009 to 2012) that integrate urban mobility and promote partnerships at a local, regional and national level and enhance the involvement of EU stakeholders, citizens and industry (COM (2009) 490 final). Lastly, the recently published by the European Commission White Paper “Roadmap to a Single European Transport Area – Towards a competitive and resource efficient transport system”, includes objectives and actions for the development of a more competitive and sustainable transport system till 2050 and proposes the widest possible use of public transport, walking and cycling for the elimination of congestion and noise exposure and the improvement of air quality. A higher share of travel by collective transport in combination with service obligations, the facilitation of walking and cycling, and the integration of demand management and land-use planning, are also, considered of high importance of the improvement of urban transport and commuting (COM (2011) 144 final).

Taking into consideration that transportation is directly associated to the every-day activities of humans and that there is a significant urban transportation demand causing congestion, negative environmental impact and increase of road accidents, the paper addresses the issue of carpooling as a sustainable alternative solution. Also, as an important amount of trips during the day, are those made by parents or guardians for carrying students to and from school, concentrated in the morning and evening hours, before and after work, respectively, children carpooling issues are investigated in this paper, aiming at promoting its implementation. A state-of-the-art review is attempted in the next paragraphs, identifying carpooling characteristics, and implications, especially in terms of safety, presented in the second section of the paper. Children transportation safety and components affecting it are presented in the third section. A synthesis of recommendations for promoting safe carpooling for schools follows in the fourth section. Finally, some conclusions and discussion on the next steps are formulated in the fifth and last section of the paper.

CARPOOLING AS AN URBAN SUSTAINABLE SOLUTION

During the last decades, social and economic opportunities have been underpinned by mobility growth resulting in serious increase of congestion in urban areas and environmental deterioration. Transport started to pose a threat for the modern societies, while satisfying the demand for mobility becomes a key determinant for citizens' quality of life. Transport and mobility are two notions different but strongly interrelated; transport, including both infrastructure and services is the mean to achieve the requisite level of mobility, while mobility is the behavioural outcome of people's need to travel, in order to participate in various activities or to consume products, goods and service.

Sustainability may be the solution to secure the balance between the transport provided and the level of mobility achieved. In an era of transformation like the current, both citizen and decision makers need to address contradictory situations generated by the unbalance between the technological advances and instruments for the improvement of daily lives, and the economic crisis restricting the use of these instruments. Strategies or initiatives developed promote "cheap" ways of transport sustainability through less fuel consumption, such as walking, cycling, public transport, car sharing, and carpooling.

Especially focusing on carpooling, one single definition does not exist in literature, and it seems that the terms "carpooling", "car-sharing" and "ridesharing" may not be used alternatively. For the needs of the present paper, the term "carpooling" will be used, since it emphasizes the formation of a pool ("joint venture"), while, the term of "car-sharing" for example, refers mostly to the booking of a car by people in order to cover occasional mobility needs (Vanoutrive et al., 2012).

Carpooling was firstly promoted during the World War II due to the oil and rubber shortages and during the 1970's oil crisis, while, in the latest years, a large promotion of carpooling occurred during the Olympic Games in Beijing in 2008 for the confrontation of the driving restrictions (Gilbert & Perl, 2008; Wang, 2011). Carpooling is considered as an interesting Transport Demand Management tool applying mostly to employment centres where people have their companies in common (Correia & Viegas, 2011), as well as to household transportation (Morency, 2007).

The distinguishing into household-based (or internal) and non-household based (or external) carpools is mostly met in literature (Correia & Viegas, 2011; Morency, 2007; Teal, 1997), and is relevant both to the route characteristics, but also to the "feelings" of the people that carpool. For example, the members of the same household have common trip-origin and the level of trust between them is higher than the case that the relation between the people that carpool is friendship, work-related or even unrelated at all (Vanoutrive et al., 2012).

A second classification of trips conducted by carpooling addresses the basis of the type of matching between origins and destinations (Morency, 1999). The simplest type is when the driver and the riders have common origin and destination location, while, in any other case, the system of carpooling becomes complex, and requires the identification of flexible solutions for the travellers, e.g. to define a meeting point at an intermediate place, such as a carpool parking (Vanoutrive et al., 2012).

Apart from the case that travellers may have different origin and destination locations causing increase of the complexity of carpooling, socio-demographic characteristics and psychological barriers, attitudes and perceptions seem to affect the success of a carpooling

system. The review of relevant studies showed that there is not a strong correlation between socio-demographic parameters with the tendency to carpool, even though it was observed that lower income classes, due to the lower percentage of vehicle ownership or car availability carpool more often than the higher income classes. Also, findings showed that higher educated people, probably associated with higher income, and females with young children carpool less (Vanoutrive et al., 2012; Morency, 2007).

Travel costs and time attributes, as part of the transport system characteristics (Hunt & McMillan, 1997) constitute significant parameters that affect the carpooling propensity and resilience, and define the final modal choice. Especially travel time is distinguished by researchers into in-vehicle time and extra in-vehicle time (Hunt & McMillan, 1997; Brownstone & Golob, 1992), in order to assess the impact of the total time needed when carpooling, including, for example, the time for picking up carpoolers, the parking time, the walking time to reach a carpool intermediate location, etc. Travel costs, on the other hand, include fuel, toll, parking costs, etc. and also affect the choice of a traveller to carpool or use its own vehicle alone (Hunt & McMillan, 1997).

The availability of potential carpooling partners has also been indicated as an important parameter influencing the choice of people to carpool or not (Kurth & Hood, 1977; Levin, 1982). The most usual concept to encounter the missing of available partners to carpool is the establishment of “carpooling clubs”, which aim at grouping people who want to share a trip with other people (Correia & Viegas, 2011). These clubs are often met at university campuses, e.g. in the Università Statale and Politecnico di Milano universities in Italy (Bruglieri et al., 2011), or in the National Technical University of Athens (www.carpooling.ntua.gr).

Focusing on the psychology of people and the potential issues that may affect their decision to carpool or travel alone, literature shows that privacy and fear to ride with strangers significantly limit the potential of carpooling (Gardner & Abraham, 2007; Canning et al., 2010).

Summarizing the literature review findings, the following issues can be highlighted:

- Carpooling can be considered as a sustainable solution in urban areas, since the continuous rising of the car use and the increase of single occupant vehicle trips, cause congestion, road accidents and negative environmental impact.
- Carpooling can be considered as a realistic alternative for:
 - Lower economic classes of population
 - People with age that do not have their own private vehicle
 - People that do not have the resources to use their car often during the week
 - People that find difficulties in parking
 - University students
- Carpooling is not attractive for:
 - Higher economic classes of population
 - Higher educated people
 - Females with young children
- Carpooling:
 - Increases travel time
 - Decreases travel costs
 - Is associated with parking availability (easy parking, less need for carpooling)

- Carpooling main barriers:
 - Psychological, e.g. fear about own safety or insecurity to ride with “strangers”
 - Driving stress, e.g. the responsibility of the carpooler driver for the safety of the people he/she is transporting
 - Limited flexibility, e.g. adults with different working hours

CHILDREN TRAFFIC SAFETY

Children belong to vulnerable road users, and statistics corroborate this categorisation. Each year more than 1100 children under the age of 15 are killed on European roads and 100.000 are injured (<http://ec.europa.eu>).

Based on the relevant statistics, the situation regarding the safety of children is rather worrying. The main statistical data, associated with children (aged<15), are highlighted below (<http://ec.europa.eu>):

- The average number of fatalities for years 2000-2009 is 1377 children – EU19 (approximately 3% of total fatalities).
- The 45% of fatal accidents occurred in an urban road type environment (year 2009).
- The 41% of fatal accidents occurred when the mode of transport was car or taxi (for the year 2009).
- The 13% of fatalities for the year 2009 occurred between 8:00-11:59, the 27% between 12:00-15:59 and the 33% between 16:00-19:59, respectively.

The main characteristics or parameters that may explain the reasons that children are prone to road accidents or injuries are summarised to the following:

- Defective knowledge of parents for the safe transport of their children.
- Children do not have developed risk comprehension. For example, they do not consider correctly speed or distance.
- Due to their fragile body type, their injuries are usually serious.
- They are not aware of the traffic rules.
- They tend to mimic adult’s behaviour, even when it is not appropriate.

SAFETY GUIDELINES FOR CARPOOLING

In the effort to develop safety guidelines for carpooling focusing on children who ride with their friends’ parents to and from school and other activities, one has to consider a) how could the attractiveness and promotion of carpooling be increased taking into consideration the safety of children, b) how do parents feel when other parents drive their children to and from school or other activities, c) what would make parents feel comfortable and trust the riding of their children through a carpooling system?

Taking into account the various categories of the involved target groups, three main guideline categories are formulated: guidelines for parents, guidelines for schools and guidelines for state/decision makers.

Safety guidelines for parents

- Start thinking which groups of parents have similar transport needs as yours (e.g. same direction).
- Contact those parents that match better with the transport needs and meet with them.
- Consider whether the ride will include only the transporting to and from school or other activities (e.g. sports) too.
- Agree with other parents that you ride their children on issues such as:
 - Money – share costs
 - Standard waiting time (define late rules)
 - The route
 - The car
 - The picking up points
- Check that the carpooler driver has a valid driving licence.
- Make a trial ride with the carpooler driver to check his/her driving capabilities.
- Hobnob with other parents that will to carpool your child and check for any psychological issues that you may consider prohibited for your child's safety (e.g. driving stress or expended ride children of other families).
- Ensure that your child and the children you ride wear an appropriate and properly adjusted child restraint, booster or seatbelt on every car trip and consider:
 - That the car seat fits well in the vehicle.
 - That the car seat is the appropriate for the age and size of each child.
 - The person responsible for transporting children (driver) is aware of how to install and use the car seat correctly.
- Set basic safe riding rules, such as:
 - The "operation" of the restraints/boosters. For example, questions that may arise in this case are: "Will each parent provide the carpooler driver with its child restraint/booster in a daily basis? "If a family has an extra restraint/booster will this be placed "permanently" or stored in the trunk of the vehicle of carpooling?" "In the case of not "permanent" display, who will be responsible for adjusting it?"
 - The number of the children riding on the carpooling vehicle. Attention should be given to the age restrictions concerning the seating of children in the front seat.
- Make in cooperation with the other parents the weekly transporting plan addressing strict timing and routing schedules.
- Talk to your child about how to behave when carpooling.
- Develop an "emergency" alternative plan for cases that the carpooling driver is unable to perform the route (e.g. sickness) and consider issues such as:

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- The availability of restraints/boosters for each child. For example, what if a restraint/booster is displayed in the vehicle of the driver that cannot perform the transporting.
- Extra time that may be needed for the adjustment of the restraints/boosters.

Safety guidelines for schools

- Introduce the benefits of the establishment of “carpooling clubs”.
- Organise activities at schools aiming at the acquaintance of parents and the further increase of the “trust” level.
- Organise synergies of road safety and mobility education, promoting among other issues, safe carpooling.
- Provide education and road safety concept to the students, regarding carpooling.
- Provide “carpool meeting points” at safe parking areas.
- Provide the appropriate signage for the “carpool meeting points”.
- Occupy appropriately trained personnel for the accompaniment of children to the “carpool meeting points” and the supervision of them till their boarding to cars and their correct adjustment to seats.

Safety guidelines for state/decision makers

- Introduce legal framework clarifying carpooling.
- Design and implement raising-awareness strategies (e.g. campaigns) addressing safe carpooling and the benefits of carpooling (environment’s protection, less congestion, etc.).
- Investigate the establishment of high-occupation-vehicle lines.
- Investigate the establishment of high-occupancy and toll lanes.
- Investigate toll differentiation for carpooling.

CONCLUSIONS - DISCUSSION

In an era of increased demand for alternative transport means, environmental pollution and energy limitation, various strategies or initiatives are being developed to promote “cheap” ways of transport sustainability. Carpooling is considered as an interesting Transport Demand Management tool applying mostly to people with common mobility needs, such as schools. However, children safety has always been one of the main concerns in road transportation and parents concern for their children safety, when driven by other drivers and stress when driving other children to school owing to their responsibility on the passenger safety, underpin its implementation.

The lack of specific car-pool restrictions is evident and policy guidelines that will safeguard children safety are necessary. These guidelines have been formulated for three target groups, parents, schools and decision-makers, addressing the particular needs of each one of them and indicating measures for increasing carpooling safety.

For advancing the topic, next step that should be accomplished is the guidelines validation, through a pilot survey. For this reason, a methodology should be developed to be used for identifying the necessity of the guidelines and prioritizing them. This methodology should include a questionnaire survey to parents addressing their perception on carpooling and their practices related to the provision of seat restraint systems, usage of seat belt and seating of children, an awareness-raising activity for the increase of knowledge of parents on issues regarding road safety in general and safe carpooling specifically, an educational program for teachers and children, and a before-after evaluation for identifying the attitude changes towards carpooling. The impact on traffic may be also estimated, with the use of the results of the evaluation and the simulation of the travel preferences changes in a transportation forecasting model.

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