

Perception of Road Safety in Children's Environment

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Abstract Recent evidence has shown that children constitute a key population group regarding traffic accidents, being consequences of crashes involving children a major factor affecting their physical and mental integrity and welfare. Furthermore, it has been also stated that if children perceive existing risks on their environment in an accurate manner, probably their safety outcomes will be better than those registered in the long term by children who does not recognize some potential hazards. For this reason, it becomes relevant the task to study the perceptions related to road safety in the children's environment, both for them as from their parents, who are their primary caregivers and companions on their daily trips. The central objective of this study was to describe the factors related to the perception of road safety in the children's environment and how different environmental factors affect it, from the perspective of children and their parents. As results, it was found that almost 70% of children feel safe when they circulate by their city as pedestrians; on the other hand, but 13% of them perceives this scenario as quite unsafe. The main reasons for perceiving road environment as unsafe were the amount of traffic (40%), disrespect for traffic rules (31%), and road insecurity in general (20%). On the other hand, small-size of cities (33%), good status of road safety (28%) and little traffic (20%) are associated to a safe perception of cities or towns. It has been also observed that children usually perceive safety in their environment when favorable measures for pedestrian are implemented, such as the case of pedestrian crossings, semaphores and broader sidewalks. In many cases, children perceive environments as safe spaces, but there are many environmental elements and factors related to road traffic that must be addressed by public agencies to improve both the safety perception as objective road safety for children.

Keywords: road safety, children, parents, perception of road safety, children's environment, traffic accidents

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1. Introduction

Road Safety Education (also known as *Traffic Safety Education*) is, regarding the mid and long term, one of the best potential improvements for future road safety outcomes. Furthermore, the Road Safety Education (RSE) constitutes one of the current major concerns of the countries regarding the educational processes that may enhance better results in the field of public health [1,2]. This statement acquires special relevance taking into account that, between several factors, the high rates of accident in the childhood and adolescence [3,4,5], have been becoming in one of the first causes of mortality over the recent decades [6,7,8,9]. In other words, RSE results as undoubtable need of the actual society [10], with the aim to create, train, strengthen and promote positive attitudes towards road safety and safe behaviors on the roads [11], decreasing, at the same time, potential injuries and deaths registered on the road [12].

However, recent negative records road safety becomes in a social, occupational, economic and public health problem, that can be managed through the articulation and

systematic action of social institutions and stakeholders [13], promoting a lifelong culture of road safety for all the life of the individuals [14].

Recent research evidence on the field of traffic and road safety shows that formative processes related to road safety should be carried out from an interdisciplinary and holistic perspective, with the aim of improving awareness and safety levels in different road situations, i.e., when the individual acts as pedestrian, passenger or driver of any vehicle [15,16]. In the other hand, other empirical developments have stated that the lack of RSE among the population, if there are not effective interventions in this regard, will become a very serious public health problem along the next years [17,18], reason for which, nowadays, it is necessary to build programs and measures to enhance RSE specially for most vulnerable groups of road users (as children) and all other actors involved in mobility, especially from the educational system [19].

One of the most relevant aspects of Road Safety Education applied to the childhood is to realize a proper analysis of the environments in which they normally circulate, and to determine how they identify potential hazardous and protective factors as road users, and how do they perceive road safety in these specific environments.

For this reason, this study aims to describe the perception of road safety in children's environment from a scientific and interdisciplinary approach, supported by previous studies developed by the University Research Institute on Traffic and Road Safety (INTRAS) of the University of Valencia (Spain), and the existing empirical evidence, acquired through different studies conducted in various countries, with different population samples and methodological approaches [20-28].

The Road Safety Education and its impact on children's safety

Road Safety Education have shown positive outcomes in terms of road user' safety, according to recent studies that aimed to identify protective factors towards risky behaviors on the road [19,29]. It also wants to prepare all road users to perceive dangerous situations potentially found in daily transportation. In the specific case of vulnerable population groups, it attempts to make the individuals not only acquiring accurate perception of the implications of their behaviors on the road, but to develop strategies to avoid such risks and achieve higher levels of road safety in the mid and long term [30,31,32].

According to the recent evidence and several accident databases, children should be highlighted as a vulnerable group to accidents and its negative consequences on subjects' physical and mental integrity and welfare. It makes sense if we take into account that childhood is an early stage of development, fact that explains a lower risk perception and knowledge of best practices to circulate, that, compared to other age groups, could be observed in behaviors proceeded by imprudence, ignorance of norms, as well as perceptual, sensory and cognitive deficits [33]. In later stages of life, such as adolescence and adulthood, essentially during the learning and experience acquisition for complex tasks as driving [19] some risk behaviors performed by other road users (as their parents) may serve as a negative influence for children's learning of RSE [34,35].

The role of perception of road safety in the learning of RSE

We all agree with the fact that, if children perceive existing risks on their environment in an accurate manner, probably their safety outcomes will be better than those registered in the long term by children who does not recognize some potential hazards, such as (e.g.) lack of signaling, misbehaviors of drivers and adverse conditions to circulate. However, some other factors, such as perception of children's safety of their children are considered to influence positively or negatively the road safety level of the children and, at the same time, their subjective perception of the risk present on the environment [36,37,38]. Numerous studies have shown that there are significant associations in this regard [39,40,41,42].

It is interesting to observe that some studies relate objective security of traffic environments to the perception of safety reported by different kind of road users [43,44], emphasizing the importance of positive effects of perceiving security in the environment for having better behavioral outputs. However, and specifically in the case of children, traffic environment is not always perceived as safe. This is why, in recent years, most of schools have implemented different programs and strategies to make the road environment (at least in the influencing area of

the school) more friendly and safe for children, their parents and other users of the roads, with the aim of reducing the risk of traffic crashes and subsequent impairments for the integrity of scholars.

Regarding the aforementioned strategies, scholar programs aimed to improve child's road safety might be implemented selecting the most important objectives, based on previous empirical data [45]. Nowadays, the most relevant variables in this regard are the risk perception, positive attitudes towards road safety, observed behaviors (mainly in parents and family members) and safe behaviors on the road [46,47]. Such programs should be aimed at ensuring that children have a good sense of security in their daily routine, but also to create and strengthen a road safety culture [19].

Undoubtedly, actions and strategies built to enhance children's road safety and security in general should involve diverse stakeholders, belonging to different spheres of child's environment. In this case, we will emphasize both in parents as their children, considering that the approach to the "good road safety education" for children has been significantly related to parents through most of the existing research in the area [48,49], and that parents are a key stakeholder to strength raising of self-regulation, risk perception, awareness, favorable attitudes and safe behaviors among children [50].

Study Framework

The most relevant theoretical basis of this study are the relationships between road safety education and later outcomes in terms of traffic safety. Both factors are as complex as difficult to assess, keeping in mind the large amount of variables involved in these processes. However, recent scientific evidence has shown the existing relation of the road safety education and different key variables, such as attitudes towards road safety, risk perception, observed and reported behaviors on the road, subjective well-being and health outcomes.

From this approach, road health has to be treated from a comprehensive perspective, i.e. taking into account the biological, psychological, and social aspects, involving some key stakeholders such as parents, members of the scholar system and other institutions.

Moreover, it is important to understand the factors associated to the learning of road safety, in order to prevent future risky behaviors, traffic crashes and, also important, to promote the awareness and risk perception among children. This is why this article was framed within a large-scale project on research in road safety, developed by the University Research Institute on Traffic and Road Safety (INTRAS).

This global research into road safety education and children's environmental issues used a questionnaire composed by a set of items in different sections. First of all, the questionnaire was used to collect socio-demographic and psychosocial data on participants and their parents.

The study described in this article is based on some items of the section "Children, cities and road safety".

Purpose of the Study

The central objective of this study was to describe the factors related to the perception of road safety in the children's environment and how different environmental factors affect it, from the perspective of children and their parents.

Regarding the significance of this study, it has to be mentioned that empirical evidence has demonstrated the importance of assessing the specific factors, agents and determinants that have influence on the state of art and effectiveness of road safety education of children. Furthermore, referring to the designing of future intervention strategies, it is fundamental to understand environmental, social and individual dynamics and processes that could explain potentially better outputs in RSE among Spanish children.

2. Methods

2.1. Participants, Design and Instruments

For the case of this study, it was conducted a survey process taking into account both familiar groups as their children, in different cities of Spain. The age of the children for this study were between 8 years old to 12 years. The data was collected realizing 1267 interviews, of which 1079 were also been answered by children.

From the total of 1267 conducted interviews, regarding parents, the 35% of them were 39 years and the 39% had between 40-44 years old. Finally, 19% of the parent's age were between 45-49 years old and a 6% had 50 or more years old. 28% of the parents participating in this study were fathers, and the 72% were mothers. In the 94% of the families interviewed, parents were living together with the interviewed children.

The number of participants represents an error margin for the general data of ± 2.75 with a 95% confidence interval in the most unfavorable case of $p=q=50\%$.

2.2. Data Processing

In the case of this study, descriptive analyzes (frequencies and measures of central tendency) were taken, in order to describe and characterize the prevalence of factors associated with road safety education (RSE) in Spanish children. In addition, comparative analysis with Chi-square (X^2) were performed to study potential associations according to the characteristics and habits of road users (children and their parents) who participated in the study. Once the data was obtained, the relevant statistical analyses were performed using IBM SPSS (Statistical Package for Social Sciences), version 22.0.

2.3. Ethics

For this type of study, ethical approval and formal consent are not required. The research type described in the manuscript did not require the official intervention of the Ethics Committee in Experimental Research, (consultative and advisory department of the University of Valencia), as no personal data are used and the participation was anonymous. However, the *Research Ethics Committee for Social Science in Health* of the University Research Institute on Traffic and Road Safety at the University of Valencia was consulted, certifying that the research subject to analysis responds to the general ethical principles, currently relevant to research in Social Science, and issued a favorable opinion to carry out such research

in Spain. Additionally, all the parents have authorized the participation of their children in this study.

3. Results

The results obtained about perceived security in children's environment showed that, for instance, almost 7 of each 10 of children ($\pm 70\%$) feel relatively safe when they circulate by their city as pedestrians; on the other hand, 13% of children affirm they don't feel safe during circulation along their cities. Only 17% of them feel safety in their environment sometimes. In terms of perceived safety depending if they circulate alone or with a parent, children feel more safety if they go accompanied (21%), and if they circulate by an environment in which people know them (16%). However, the fundamental reasons to feel not safe are the risks perceived in the cars that use the road (13%) and the presence of strange people (10%).

Children affirm, also, that to feel more safety in their cities it must be occur changes related to the improvement of road safety in general (43%), more outstanding and respect for the traffic rules (9%), decreasing of the traffic level (8%), installing more traffic lights (6%) and building more parks and play zones for them (6%).

Globally, approximately 30% of participants believe that the municipality where they live is pretty unsafe (unsafe or quite unsafe) from the perspective of road safety (Figure 1), arguing as principal motives: the amount of traffic (40%), not respecting traffic regulations by different road users (31%) and road insecurity in general (20%), as shown in Figure 2. On the other hand, and referring to principal reasons to perceive living city or town as a safe environment, from 65% of respondents who perceive that (safe or quite safe), main stated reasons were: the city or town is small in size (33%), road safety status is good (28%) and the little traffic existence makes circulating easier (20%).

Regarding the safety perceived inside and outside the scholar environment, each three out of ten respondents believe that school and its vicinities are fairly safe environments from the point of view of road safety, due to the existence of more police presence (48%), pedestrian crossings (28%), semaphores (14%) and less traffic in this kind of zones (11%). Otherwise, 68% of respondents who perceive the environment as quite unsafe argue the principal reason as the existence of much traffic (43%), because drivers do no dot respect the traffic rules, the presence of drivers parking in double or triple line (21%), the lack of presence of police (18%), and road insecurity in general.

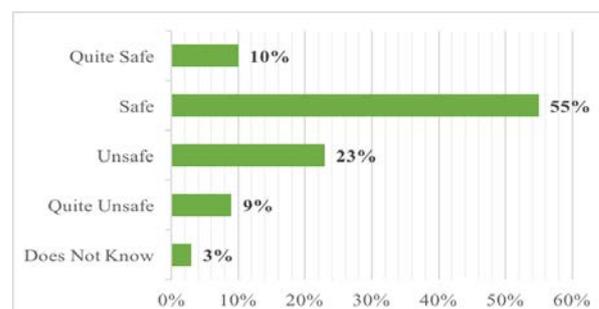


Figure 1. How much do you perceive your city/town as a safe environment from the approach of Road Safety?

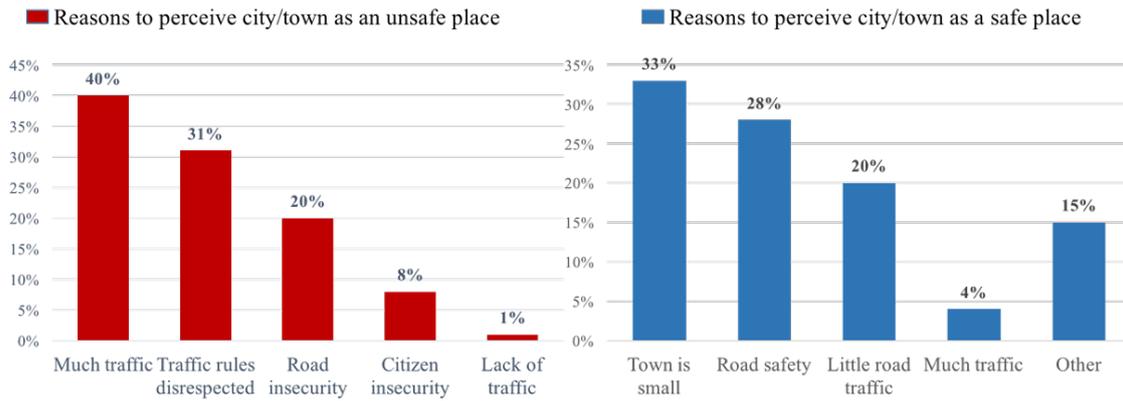


Figure 2. Reasons for which participants perceive their city/town as a safe/unsafe place

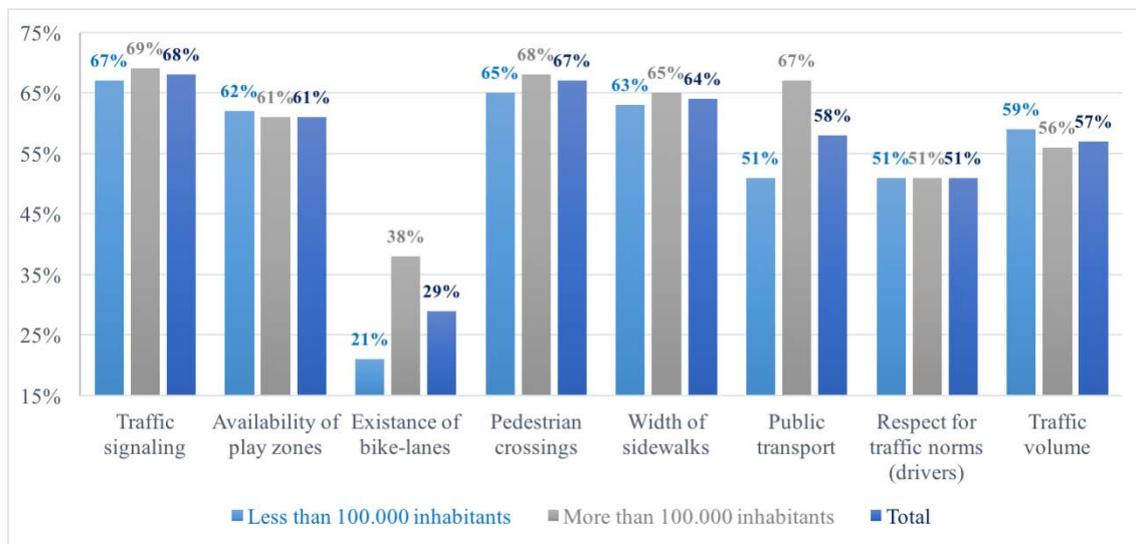


Figure 3. Assessment of safety level perceived in different elements of children's environment (percentages)

Finally, regarding observed differences between participants living in cities/towns with less or more than 100,000 inhabitants (small or medium/big size), the attributed value to different conditions and elements of the environment -aimed to improve the road safety- was analyzed both separately as jointly according to this condition, as shown in Figure 3. In general, it was found that (for example) inhabitants of smaller municipalities tend to assess more positively the presence of play zones, and controlling traffic volume than people living in medium or big cities. On the other hand, scores assessing positively the existence of traffic signaling, pedestrian crossings, bike-lanes broader sidewalks, and public transport were comparatively higher important for inhabitants of municipalities with more of 100,000 inhabitants.

4. Discussion

The increasing global accident rates involving children have become a very important problem with repercussion in the public health of community [1,2], especially when talking about child and adolescent population [3,4,5]. It is clear that potential measures and strategies to reducing the impact of this problem must be approached through the research of causes and contributing factors for traffic

accidents [10,13]. Furthermore, it is indisputable the importance of education in the early stages of development as a key element to acquire more and better competences to present better outcomes in terms of protective behaviors and road safety [50]. In this article, and according to the previous research, we have stated that many skills, attitudes and habits are necessary to develop a better interaction between children and road environment. Nevertheless, this process does not take part in an isolate manner, but should integrate different social levels and actors, such as parents, peers, professors, police and the educational system in general. Regarding the last, it has been described in different scientific sources that learning plans might conceive Road Safety Education as a fundamental pillar of future safe behavior, that will have a positive impact on the perception of security road in the environment of the children for their lifelong [14].

However, when we analyze the existing plans and official curricula for Road Safety Education (at least in the case of Spain and some European countries) we can see with perplexity how RSE takes up little space in primary and secondary school curricula. This aspect must change to be able to sensitize and empower some of the most vulnerable population groups with effective results: not only as a mere part of some curricular programs or isolated actions (as has been observed in some programs with no any systematic approach), but as a holistic and

progressive process. In this sense, the studies affirm that preventive strategies are those that show greater efficiency and economic and social profitability. These interventions must be carried out from the school and from the families, collaborating both institutions in this field, seeking a greater sensitization in the population in general. Scientific research, pedagogy, psychology, ethics, politics, and all branches of knowledge, from an interdisciplinary approach [15,16], must collaborate in the creation of responsible behavioral patterns and civic consciousness that has repercussions on the quality of life and welfare of people.

Referring to specific results found in this research, it is worth mentioning that the fact of perceiving the road environment as unsafe according to factors such as the high amount of traffic (40%), the lack of respect for traffic normative (31%) and the road insecurity in general (20%), highlights the attributed importance of road safety issues for people. In this sense, and regarding the elements that explain perceiving the environment (town or city) as a safer place, we have to mention the influence of the size of the town (when it is small, with 33%) as a reason for the participants to state the perception of safety. Furthermore, road safety (28%), little amount of traffic (20%) and much traffic (4%) are also associated to increasing of environmental perception of safety. Despite the size of the cities/towns of participants, drivers' respect for traffic norms are equally conceived as a mid-important element (with a mean valuation of 51%) to strengthen the perceived security in children's environment. In this sense, the driver behavior is still representing an undervalued factor for security, when comparing to technical and environmental measures, such as traffic signaling (68%), pedestrian crossings (67%) and availability of play zones (61%). However, some studies have stated the phenomenon of attributing more importance to the technical and physical elements of the road than for the case of human factors [51], even when human behavior explains a high percentage of children's injuries and deaths by traffic worldwide.

Briefly, this issue –environmental safety perception– concerns not only children, a large part of whom still perceive their city as an adverse and dangerous context for their integrity, because it is no use for them to learn to identify the risk behavior of other road users, whether drivers, pedestrians and passengers are not included in the road education programs and still performing several misbehaviors that can affect the integrity of children and their parents. For this reason, the implementation of education programs become, nowadays not only a scholar, but a social need [45,48]. Both school, families and other social institutions and stakeholders must be involved in RSE and Road Training (e.g. organizations with its employees) in various aspects that have potential positive repercussions in road behavior and road safety outcomes through the development of a Road Safety Culture.

Regarding aforementioned results, we can see how children usually perceive safety in their environment when favorable measures for pedestrian are implemented, such as the case of pedestrian crossings, semaphores and broader sidewalks. Nevertheless, although this kind of measures may potentially decrease the objective risk of suffering a road accident, the road user' behavior

improvements are an indisputable need for road safety [52]. For the particular case of children and (for instance) the prediction of accident outcomes, and in addition to the usefulness of Road Safety Education provided by scholar system, along the first stages of life it is important to remark the influence of parents, familiars and a safe environment as key factors to improve future outcomes as road users.

5. Conclusions

Social institutions such as school and family become clear sources of influence on children, as evidenced by the different studies presented, and it is necessary to delimit the obligations and responsibilities that derive from each one of them on children's Road Safety Education and adjustment to the objective level of safety of the environment.

In many cases, children perceive environments as safe spaces, but there are many environmental elements and factors related to road traffic that influence a negative perception of environmental safety.

The existence of (e.g.) presence of police, pedestrian crossings and less traffic enhance the perception of road environment as safe, but some hazardous elements such as drivers' misbehaviors and high amounts of traffic makes the perception of safety much lesser among children.

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