

Speed and road accidents: risk perception, knowledge and attitude towards penalties for speeding

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ABSTRACT

Speed is one of the elements that most contributes to road fatality, and this explains the fact that it is often dealt with in the road safety field. The objective of this research was to understand the risk perception, attitude, and knowledge of the participants towards speeding and penalties for speeding. A sample of 1,100 Spanish drivers over 14 years old was used and they filled in a questionnaire. The average rate assessment of the risk of traffic crash was 8.3 (on a scale of 0 to 10). Participants would punish the speeding behaviour with great severity; an average of 8.2 on a scale of 0 to 10. Almost all participants (97.1%) agreed that speeding is a punishable behaviour. It is necessary to educate drivers to respect speed limits, to improve roads' infrastructure, to establish appropriate speed limits, to put signs properly, to improve vehicle engineering, and to use in-vehicle devices to control speeding.

Keywords: speeding, speed limits, speeding penalty, traffic violation

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1. Introduction

There is wide scientific evidence about the fact that speeding is the factor that most contributes to the risk, severity and fatality (of motor vehicle collisions (Aarts, Van Schagen, 2006; Elvik, Christensen, Amundsen, 2004; Elvik, 2012). Specifically, the World Health Organization (2004) agrees that excessive and inappropriate speed, which is one of the largest contributors to traffic accidents (Martínez, Mántaras, Luque, 2013), is the main cause of approximately one in every three serious or fatal crashes in the countries with high rates of motor vehicles use. This data is the main reason why most governments consider speeding as a huge problem for road safety.

It is important to understand that speeding (as well as other traffic violations) is a dangerous behaviour and drivers should be aware of its consequences for them and for other people.

Taking into account some countries considered as leaders in the field of road safety, the New Zealand Government published a wide revision titled *Down with speed* on the relation between speed and accidents (Patterson, Frith, Small, 2000). In the same vein and among others, the Australian Transport Safety Bureau (2001) identifies the speed compliance/imposition as one of the key-actions of the 2001–2010 National Safety Strategy. The relationship between speed and road safety also has long been an important topic for research. Recent studies have attempted to model the relationship mathematically, with somewhat different results (Elvik, 2012). However, the speed-accidents relation is complex (Swow, 2009) since it is influenced and modulated by many factors, without forgetting the partially random nature of accidents. Among the factors that contribute to the speed-accidents relation, it is worth mentioning: the driver's characteristics (demographic and psychological factors) (Svenson, Eriksson, Slovic, Mertz, Fuglestad, 2012), the aspects related to the vehicle, and factors related to the road environment (NHTSA, 2007).

A key element for driving is the speed in which drivers decide to drive in different types of roads with different speed limits, in different environmental situations, and in different traffic conditions. This decision is influenced by a series of demographic characteristics (age, gender, driving experience, occupation, among others), psychological factors (speed estimation, risk perception, attitudes or beliefs towards the rule, the supervision, the penalties, the underlying motivations, and the related emotions), involvement and responsibility in traffic violations, as well as driving habits (Elvik, 2012; Bener, 2013; Zhang, 2013).

From this perspective, among the psychological aspects that mediate the speed-accidents relation, it is possible to find the errors caused by one's perceptual system when estimating speed. These errors may appear when certain speed is kept for a long period of time, in transitions in which drivers have to adjust to certain speed limits, and when the visual information is reduced (OCDE, 2006; Bella, 2013).

Speeding is determined by three subjective speed assessments: the speed perceived as the riskiest, the speed perceived as the safest, and the speed perceived as the most pleasurable. If these assessments are high, drivers are expected to circulate faster (Lheureux, 2012). In addition, some studies have shown that the perceived risk together with the motivation to speed represents significant predictors with the level of non-compliance of the regulation (Warner, Åberg, 2008).

If we focus on the risk perception related to speeding, the fact that 90% of the drivers consider that they have more skills than the average driver represents an essential factor when explaining the estimation of the limited probability of being involved in a traffic collision due to speeding and even the choice of driving faster than what signs say (Taylor, Lynam, Baruya, 2000).

In general terms, drivers (82%) think that driving too fast is one of the factors that cause more traffic accidents (SARTRE 3 Project, European Commission, 2004). In addition, they consider that the other drivers are the ones that exceed the speed limits (Silcock, Smith, Knox, Beuret, 1999). Moreover, they consider they seldom speed and, at the same time, they state that these limits are only indicative, which is clearly linked with the non-compliance of these limits. As a result of this combination of factors, the traffic violation rates related to speed are between 50% (Elvik, Christensen, Amundsen, 2004) and more than 75% (OCDE, 2006).

In general, there is a generalized support for the installation of speed control devices and black boxes in the vehicles (62%). The support for the installation of technological devices in the vehicle aiming at limiting speed seems to have increased over time, though there are still important differences between countries (SARTRE 3 Project, European Commission, 2004). According to Elvik et al. (2004), the technology installed in the vehicle to support drivers or to force them to adjust to the speed limits is reliable enough and it may be used to eliminate the traditional measures of supervision and, according to another study, speed limiters is the most effective measure for drivers (Comte, Jamson, 2000). Likewise, 41% of drivers consider that police do not enforce the speed limit enough (OCDE, 2006). In addition, another study revealed that drivers, in general, consider any measure aimed at reducing traffic crashes as positive, except those measures that involve any economic cost (Alonso, Sanmartín, Calatayud, Esteban, Alamar, Ballestar, 2005a).

In this sense, and thanks to the SARTRE 3 Project (2004), the main recommendations of the European Commission for the European countries refer to prioritizing and intensifying the measures aimed at respecting the speed limits. It is important to remember that not all the traffic violations have the same consequences for road safety so, the behaviors that are the most common cause of traffic crashes should be addressed and corrected (Alonso, Esteban, Calatayud, Medina, Alamar, 2005b). In this sense, the effectiveness of the intervention measures depends on the wide knowledge and understanding of the aspects aforementioned (Hatakka, Keskinen, Gregersen, Glad, Hernetkoski, 2002; Paris, Van den Broucke, 2008; Victoir, Eertmans, Van der Bergh, Van den Broucke, 2005; Warner, Åberg, 2008) so, research should focus on them.

1.1 *Study framework*

Law, and all its related aspects, has an essential part that comes from legal science. Moreover, law applies to individuals and societies, so it has a lot to do with sociology and psychology. Individuals and societies may or may not know the laws, they may or may not accept them, they may or may not share their principles, and they may or may not obey them. In order for laws to be applied and obeyed, different sciences must be involved when developing them. In addition, the law is not the only thing to take into account; rules make no sense unless there are conse-

quences when they are not obeyed. From this approach, traffic laws have to be treated from a comprehensive perspective.

Moreover, it is important to understand legislation and everything it involves and to regulate drivers' behavior since reckless behavior not only affects the driver itself but other people (drivers and pedestrians on the road). Therefore, it is preserving one's life and the life of others. So, this is why the framework of this article was a large-scale project based on "traffic laws and road safety" to raise people's awareness regarding this matter (Alonso, Sanmartín, Calatayud, Esteban, Alamar, Ballestar, 2005a; Alonso, Esteban, Calatayud, Medina, Alamar, 2005b).

This global research on traffic laws and road safety used a questionnaire made up of a set of items in different sections. An important aspect of the questionnaire is the order of the questions. The objective of the items was not to influence the answers in a particular direction.

First of all, the questionnaire was used to collect socio-demographic data (such as age, gender, occupation, etc.). In addition, other descriptive factors relevant to road safety were also taken into account in order to classify drivers: main motive of the journey, driving frequency, professional drivers, driving experience, kilometers per year, type of journey, most frequently used type of road, and record of accidents and penalties.

There were also subsections to collect information related to these areas: unsafe/risky behaviors (speeding, inappropriate speed in specific situations, unsafe following distance, shouting or verbally insulting while driving, driving under the influence of alcohol, driving without a seat belt, smoking while driving, driving without insurance, driving without the required vehicle inspection). It was also interesting to learn about the beliefs, knowledge, and attitudes of participants towards the areas of "legislation", "penalties", "law enforcement", "law and traffic laws", and the "effectiveness of the measures to prevent traffic crashes".

The study described in this article is based on some items of the section "unsafe/risky behaviors", and the "speeding" subsection. First of all, in this section of the questionnaire participants were asked to provide information about reasons for speeding and frequency, estimated probability of penalty, penalties received, evaluation of the severity of such penalty, and its effectiveness (see Alonso, Esteban, Calatayud, Sanmartín, in press). Subsequently, participants provided information about the risk of speeding, severity of the penalty, knowledge about the possibility of penalty, and type of penalties (analyzed in this study).

1.2 *Objective*

The specific objectives of the study were:

- To understand the level of risk of speeding for drivers,
- To detect participants' attitude towards penalties for speeding through the assessment of their severity and, finally,
- To identify the level of knowledge regarding penalties for speeding (participants were asked whether speeding is a punishable behavior for them and the type of punishment to be applied for this behavior).

2. **Methods**

2.1 *Participants*

Participants were part of a wide-ranging research on different aspects of traffic laws and road safety. The sample used was composed of 1,100 Spanish drivers over 14 that had any kind of driving license, 678 men (61.63%) and 422 women (38.36%). The starting sample size was proportional by quota to the Spanish population segments of age and gender. The number of participants represents an error margin for the general data of ± 3 with a 95% confidence interval and a level of significance of 0.05.

The gender distribution was closely linked with age; the higher the age, the lower the percentage of women. So, the number of women from 45 onwards decreased, just like it happens with the general population of drivers. Drivers completed a telephone-based survey. Interviews were completed for 1,100 drivers and the response rate was 92.3%; as it was a survey dealing with social matters, the vast majority of people wanted to collaborate. There were 91 (7.7%) people who did not want to participate in the interview.

2.2 *Measurement instrument*

In this study drivers were asked about their level of agreement, on a scale of 0 to 10, regarding accident risk attributed to speeding. In order to analyze the attitude of participants towards penalties for speed-

ing, the interviewees provided the level of severity in which they would penalize such violation (a scale of 0 to 10). Finally, participants were asked whether speeding is a punishable behavior or not. If their answer was “yes”, they were asked what kind of penalties could be imposed for speeding and they had to choose between these answers: *financial penalty, prison, or temporary or total withdrawal of the license* (dichotomous Yes/No answer for each one).

2.3 Procedure and design

The survey was conducted by telephone. A national telephone household sample was constructed using random digit dialing. Each household was screened to determine the number of adult (age 14 or older) drivers in the household. The only selection criterion was being in possession of any type of driving license. One eligible driver was systematically selected in each eligible household by the interviewers. The survey was conducted using the computer-assisted telephone interviewing (CATI) system to reduce interview length and minimize recording errors, guaranteeing at all times the anonymity of the participants, and stressing on the fact that the data would only be used for statistical and research purposes. The importance of answering honestly to all the arisen questions was emphasized, as well as the non-existence of wrong or right answers.

Once the data was obtained, the relevant statistical analyses were carried out with the Statistical Package for the Social Sciences (SPSS). For the comparison of mean values the unifactorial ANOVA test was used, followed by Bonferroni’s post-hoc test. Statistical significance was set at $p < 0.05$.

3. Results

3.1 Level of risk that drivers attribute to speeding

The average rate assessment of the risk of being involved in a traffic crash caused by speeding was 8.3 on a scale of 0 to 10, and more than 75% of drivers rated this risk with over 8 points.

Traffic crash risk perception by speeding was lower in those participants who sped more frequently.

The perception of risk of being involved in a traffic crash was higher for women, drivers that are currently active (compared to students and retired people), and those driving less kilometers per year.

On the contrary, the participants that had had a traffic crash and those who had received more penalties showed a lower risk perception.

In statistical terms, these accident risk perception differences are significant for gender ($F(1, 1092) = 55.609, p < 0.001$), penalty record ($F(2, 1091) = 13.031, p < 0.001$) and the frequency in which drivers sped ($F(4, 1089) = 34.616, p < 0.001$) (Tab. 1). However, there were no significant differences regarding the type of roads drivers used.

		N	Mean	SD	gl	F	Sig
Gender	Women	423	8.84	1.49	1	55.61	0.000
	Men	671	8.03	1.91			
Penalties record	None	624	8.58	1.678	2	13.03	0.000
	One	228	8.04	0.122			
	Two or more	242	8.02	0.127			
Frequency in which drivers speed	Almost always	44	6.25	2.89	4	34.62	0.000
	Frequently	36	7.08	1.95			
	Sometimes	330	7.98	1.71			
	Almost never	391	8.63	1.61			
	Never	293	8.85	1.53			

Tab. 1 - Drivers' penalties record and speeding frequency

3.2 Attitude of the participants towards the penalties for speeding

Regarding the assessment of the level of severity of penalties for speeding, most of the participants answered that they would punish the speeding behavior with great severity, scoring an average of 8.2 on a scale of 0 to 10. Specifically, one third of drivers would penalize speeding with the highest level of toughness (10), while 36.5% said that the level of severity for this traffic violation should be between 8 and 9.

Women, participants doing housework, unusual drivers, those who have not been penalized, and those who have not been involved in a traffic crash were the participants who thought that penalties for speeding should be more severe, and students would be less severe.

Statistically, regarding the level of severity of penalties for speeding, differences were significant for gender ($F(1, 1067) = 32,134, p < 0.001$) and for those who had had at least one traffic accident ($F(1, 1060) = 5,772, p < 0.001$). Likewise, there was no significant difference regarding age, level of education, and type of roads used by drivers when they stated the level of severity they would apply for drivers speeding.

3.3 Identify the level of knowledge regarding the penalties for speeding *Drivers' opinion on whether speeding is a punishable behavior or not*

Regarding the knowledge of participants when they were asked whether speeding is a punishable behavior or not, almost all drivers agreed that it is; specifically, 97.1% of participants considered that it is a punishable behavior, while the remaining 2.9% considered it is not (Tab. 2).

	N	Percentage
Yes	1062	97.1
No	32	2.9
Total	1094	100

Tab. 2 - Participants' answers where they were asked: "Is speeding a punishable behavior?"

3.4 Assessment of the type of penalty for speeding

Regarding the type of penalties for speeding, 90% of drivers thought that the penalty should involve a fine, 90% of participants thought the drivers speeding should have their driving license suspended, while 43% considered that those drivers should go to prison (Fig. 1).

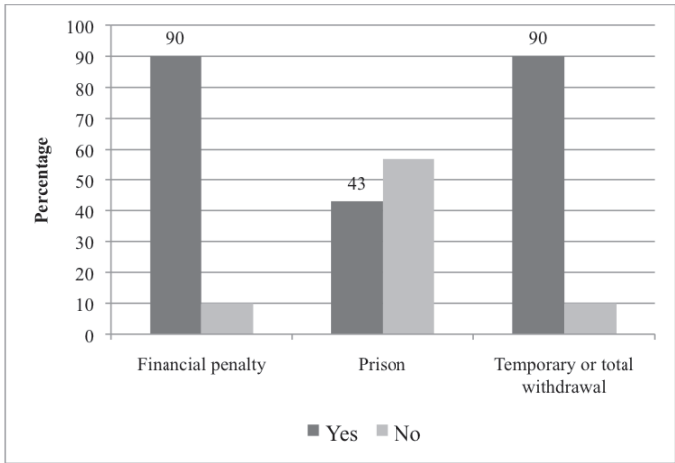


Fig. 1 - Percentage distribution of drivers' answers on the possible penalties for speeding.

4. Discussion

First of all, it was observed that there is a high social awareness about the risk of speeding since more than three quarters of drivers assessed the risk of being involved in a traffic crash due to speeding with 8 points.

However, the fact that accident risk perception decreases when drivers increase their speeding habits shows that this traffic violation is reinforced, thus being dissociated from the accident risk attribution. In addition, it was observed that drivers with a higher level of accident risk perception were those who sped the least. This demonstrates the relationship between the risk perception and its avoidance.

It was proved that the accident risk perception related to speeding is influenced by demographic (gender) and personal variables (work activity), and variables related to driving (driving frequency, being involved in an accident and penalties).

In this sense, the drivers that travel fewer kilometers per year are the ones who think that the risk of speeding is higher, so this shows that driving experience reinforced by the increase of the perception of

skills and capabilities becomes an element that leads the driver to assume higher levels of risk.

Regarding the attitude towards penalties for speeding, drivers do have a positive attitude towards the regulation since they would penalize speeding severely (8.2 on a scale of 0 to 10). In general terms, drivers have an appropriate knowledge of penalties for speeding. In addition, regarding the types of penalties that could be imposed, almost all participants considered penalties for speeding could be fines and the withdrawal of the driving license, while only a small part (43%) thought imprisonment could be a speeding penalty.

Conclusions

Resolving the paradox of trips being short, fast, and safe at the same time involves managing speed by means of interdisciplinary balance and coordination among several measures. Regarding the roads, it is clear that there is a need to improve the infrastructure, to establish acceptable and plausible speed limits, to put signs properly, and to improve vehicle engineering, among other measures. In addition, there is also a need to use in-vehicle devices aimed at controlling speeding.

It is clear that drivers are responsible for the speed in which they drive, so there is a need to develop and implement education, awareness, and training strategies in order for them to respect the speed limits. Specifically, there is a need to understand drivers' perception regarding speeding since the risk perceived is a predictor of the level of compliance of the regulation. So, it is necessary to design intervention measures to increase risk perception related to speeding in different types of road.

The fact that accident risk perception related to speeding is related to a series of demographic variables shows the need to design interventions according to the characteristics of risk groups.

Regarding risk perception, there is a need to insist on the consequences of speeding, its disadvantages (human, legal, and economic consequences), the aspects that may be avoided, and the benefits derived from driving appropriately. It is necessary to assume that there are other intervention objectives such as drivers' attitudes and expectations, apart from those objectives related to regulations.

The positive attitude of drivers towards penalties and regulations shows that it would be convenient to increase police supervision as a complementary measure to the education, awareness, and road training strategies.

Finally, it is important not to forget about the design and implementation of education, awareness, and dissemination campaigns aimed at the general public since they are essential for other measures in order for drivers to reduce speed. It is also important not to forget that every single negative element in traffic begins with a mistake or violation of the road user.

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