

Smoking while Driving: Frequency, Motives, Perceived Risk and Punishment

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Abstract When dealing with the duality of traffic accidents and road safety, smoking while driving is one of the factors that, despite the social beliefs and/or misconceptions, causes a large number of injuries and deaths worldwide. Although smoking is a well-known harmful behavior for people's health, it affects health and safety in many ways, perhaps more than some segments of the population can imagine. This is the specific case of drivers. The main objective of this study was to describe the behavioral and representational aspects of drivers that modulate the smoking-accidents relation. Specifically, it focuses in the frequency and reasons why drivers smoke while driving. On the other hand, it was also considered the perception of drivers regarding the probability of penalty, the penalties imposed, and their severity. Finally, drivers' opinion on the effectiveness of such penalty in order to change this behavior was also studied. A sample of 1100 Spanish drivers was obtained from a national sampling process. The results showed that approximately the 11% of drivers circulate regularly smoking. Among the specific reasons, the most common is that constitutes a habit of the interviewed driver. Regarding punishment, drivers considered as limited the probability of being caught. Moreover, there has been no respondents who have been fined for this behavior while driving. In general, it seems that drivers are aware of the risk implied by this behavior. However, there are very few drivers who value this as a high-risk behavior. This agrees with the respondents' opinion that it is, in other words, driving under a low sense of responsibility. This, it results logical that the sanction that the respondents believe more appropriate for the behavior of smoking while driving is an economic penalty. As a conclusion, it has been remarked that there is a clear lack of correspondence between the risk perceived in this misbehavior and the frequency and motives argued to perform it while driving. It is worth mentioning that it makes important to improve the awareness and monitoring of this behavior among Spanish drivers as a manner to, first, promote healthy habits among key sectors of population, and, second, to prevent potential road crasher related to the psychomotor impairments that this behavior implies on driving performance.

Keywords: *smoking, driving, road safety, infraction, normative, driving misbehaviors*

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1. Introduction

Traffic accidents are a major cause of death and injury in the world. According to the World Health Organization, 1.23 million people worldwide die each year because of a traffic accident [1,2]. Note that, despite the progressive increasing in terms of population and vehicles, this number has been relatively stabilized since 2007, indicating an improvement in road safety practices, and a relatively low growing in Road Safety Education (RSE) in recent years [3,4]. Other particular and relevant fact related to traffic crashes is that it constitutes the leading cause of death among people between 15 and 29 years [1,5,6]. If we focus particularly in Spain, in 2011 this country had a rate of 45 deaths per million inhabitants, below the average of the European Union. Further, since 2008, traffic accidents have passed from being the first external cause of death, to be the second one [7]. It can be considered as a positive

advance that there is a progressively lower rate of casualties in traffic accidents producing less deceased and injured persons. This fact could be substantially explained in part by public awareness and partly by the measures and countermeasures implemented from traffic administrations in different regions, and, of course, due to a better behavior from drivers and other road users [8,9,10]. But despite all this, traffic accidents remain being a serious problem for society, taking into account that the goal or ideal status use to be its reduction to "zero incidents" [9].

In this sense, the psycho-juridical question regarding why the people are willing to comply with the law and to cooperate with institutional forces such as the police has received more attention along the past years [11]. According to the procedural justice model, this phenomenon is caused by the fact that when civilians trust in the police and other agents of control, and feel honestly and fairly threatened, they will perceive them as a legitimate institution that deserves respect and obedience [12]. It has a certain relevance remaining that, normally, traffic safety policies

are still conventionally ranked on financial and environmental criteria in developing countries, yet the equity concept can be advantageously used as an integral part of the process of traffic safety policy making [13]. Further, *equity* in transportation is defined as “how appropriately and equally the impacts of transportation are distributed among different types of users” [14].

Moreover, within the risk factors and main causes of traffic accidents, the human factor have been found involved in almost 80%-90% of road accidents in different empirical studies [15,16]. People, for various reasons such as (e.g.) fatigue, stress, distraction, inexperience and/or substance consumption may commit different mistakes and violations in driving, consciously or unconsciously, that may be fatal when causing a traffic accident [17,18]. In the large study of factors related to Spanish drivers' road safety, it has been analyzed a wide set of functional factors of drivers' behavior, in order to describe various perceptual and applied aspects about them. Thus, potentially problematic and risky behaviors that are performed in the driving such as speeding, not keeping a safe distance, smoking while driving, not wearing a seat belt or circulate with no insurance have been analyzed in depth [19]. In brief, in this article it has been focused the behavior of smoking while driving.

Smoking, by itself, is a harmful behavior for the person, as it affects health in many ways, not only causing respiratory diseases, as is commonly perceived [20]. For example, apart of the wide organic morbidity it has, a driving who smokes during the operation of a vehicle increases its potentially to be involved in an accident in a relevant amount. Igniting a cigarette, giving it a sneak, or even holding it in the hand are key impairing factors that inevitably produce distractions, increases the response time to road demands and decreases general driving performance in the person who performs this behavior [21]. In the case of drivers, road users who must be attentive to the many circumstances that surround this complex task, these distractions may result simply lethal [22]. There are also studies in which the risk of an accident during the simultaneous task of smoking increases up to 50% with respect to non-smoker drivers, regardless of whether they smoke at the wheel or not [23].

In a study developed in England, smoking has been found to be one of the most distracting behaviors in the driver, along with talking to a passenger or talking on the mobile phone [24]. In this way, 8% of road accidents are produced by distractions such as picking up an object from inside the vehicle or, in this case, when the driver smokes while driving [21,25].

In this sense, there are existent research outputs that recommends not only banning smoking in public places such as restaurants or parks, but also in some private spaces, such as the car. This consideration becomes relevant for the fact that the latent risk of suffering an accident during smoking while driving does not involve only the driver, but also the passengers traveling with him and external road users [26].

1.1. Study Framework

Law, and all its related aspects, and its interaction with decision-making and psychological processes, 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 consequences 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 [19,27,28]. 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 motives for journey, driving frequency, if being or not professional drivers, driving experience, kilometers per year, types of journey, most frequently used type of roads, and, as complimentary indicators, records 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”. In this section of the questionnaire, participants were asked to provide information about several behaviors potentially performed while driving: reasons and frequency, severity of the penalty, estimated probability of penalty, type of penalties, and penalties received (evaluation and effectiveness).

1.2. Objectives

The general objective of this study was to describe various response models related to the misbehavior of smoking while driving.

It has been analyzed a set of key aspects related to the behavior of smoking while driving, such as the frequency in which is performed, the main reasons attributed by drivers to do it, and the reasons why is not realized, the harshness with which drivers would sanction the behavior

and the perceived probability of being punished in case of going smoking while driving, among others aspects.

2. Materials and Methods

2.1. Participants

The sample was obtained from a simple random sample (SRS) based on gender, age, habitat and the region. The criteria for the distribution of the sample are: The election of households in proportional samples to the universe by Autonomous Community and habitat. For the election of individuals: proportional to the population studied by age group and sex. The survey is aimed at drivers with driving license. The proportion of subjects is a reflection of the census; it includes drivers from 14 years to over 65 years. In terms of age (as shown in Table 1), it can be clearly seen how the percentage distribution is proportional to the general census of drivers. So, the age group most represented is the group between 30 and 44 years old (38.01%), and people between 14 and 17 years are the less represented.

The sample size was $n=1100$ surveys, and consisted of $n=678$ men (61.60%) and $n=422$ women (38.40%), representing operating with a margin of error for the general information of ± 3 with a confidence interval of 95% in the most unfavorable case of $p=q=50\%$, and a level of significance of 0.05. The gender distribution is closely related to age, the older the proportion of women decreases. From age of 45 years, the percentage of women is reduced, as generally happens in the driving-active population.

Table 1. Distribution of the number of drivers and sample based on age

Age	Census	Distribution	Sample
14-17	248.62	1,21	13
18-24	1.987.05	9,67	106
25-29	2.635.76	12,83	141
30-44	7.809.78	38,01	418
45-65	6.158.15	29,97	331
> 65	1.706.37	8,31	91
Total	20.545.73	100	1.100

2.2. Procedure and Design

This cross-sectional study, consisted in the national administration of a questionnaire, in which people was asked about their views, reports and perceptions on (in this case) specifically the behavior of smoking while driving.

The questionnaire included measures related to the knowledge, attitudes and behaviors of users regarding traffic and road safety. Its comments refer to both 'assessment of current traffic rules as assessment of the behavior on the road scenario. The survey consists of a series of questions structured around a few different sections which address the objectives pursued in the investigation. The questionnaire was applied through a semi-structured telephone interview with a maximum duration of 20 minutes by staff of EMER-GfK. The staff responsible for conducting the survey countries have

followed the instructions the research team. The average duration of the interview was 20 minutes, with some variability due to individual differences themselves.

To achieve the proposed aims, the next variables were taken into account:

- Demographic variables: sociodemographic factors, as age and education level.
- Driving behavior: Subsequently, the drivers were asked about their opinions on the following behaviors: the mainly behaviors asked by this study were: "excess speed" and "inappropriate speed" on roads, weather conditions, etc. Moreover, this study also refers to the following behaviors: "not maintaining a safe distance", "driving after drinking", "driving without insurance" and "driving without seat belt in the rear seats and in the city", "shouting or insulting verbally while driving" and, "smoking while driving".
- Information on driving behavior: information was extracted from these variables: behavior frequency, performance reasons, reasons by which it is not done, perception of the accident risk, strength level of sanction, the punishable behaviors and the behavior modification.

The interview covers various issues used to understand the behavior of road users about smoking while driving. To do this, first participants were asked about the frequency for smoking while driving, to answer according to a Likert scale with the following response: almost always, often, sometimes, rarely and never. Thus, according to their response asked openly or reasons why smoking or drive without smoke. Second, they are asked to assess the risk to smoking while driving as a cause of accidents from 0 to 10, being 0 the minimum and 10 the maximum observed scores. Third, they are asked to value again between 0 and 10, with what degree of hardness penalize a person who smoking while driving.

Fourth wonders whether smoking while driving is punishable with the response options "Yes", "No" and "Do not know". If the answer is yes, you will be asked to answer how many times it penalizes the behavior of smoking while driving of a total of 10 occasions. The fifth question concerns whether the sanctions provided for smoking while driving are economic, imprisonment, temporary or total suspension of license, where you answer "yes" or "no" for each of the options.

Sixth question asks whether the respondent has received a penalty for smoking while driving. And the way that values the hardness of the penalties for smoking while driving according to the options: excessive, adequate and poor. Finally, it was asked if the driver have received a penalty wonders whether following its receipt to modified or not their behavior.

2.3. Data Processing

Once the data was obtained, the relevant statistical analyses were carried out using the Statistical Package for the Social Sciences (SPSS), version 23. For the comparison of mean values, it was conducted One-way ANOVA test for the General Linear Model (GLM) procedure was used, followed by Bonferroni's post-hoc test. Statistical significance criteria was set at $p < 0.05$.

2.4. 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 body 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.

3. Results

The broader research on which this study is based analyzed the results observed for the case of multiple behaviors that occur in the field of road using. Specifically,

models of response for different behaviors such as driving exceeding speed limits -in the case of existing standards of speed in different types of roads-, do not match every time to existing conditions and regulations, such as not maintaining safe distance, shouting or verbally insulting while driving, driving after drinking any alcoholic beverage, driving without seat belts (including rear and city squares), smoking while driving, driving without insurance and driving in a not certified vehicle, according to the current normative standards or required inspections (e.g. ITV, for the case of Spain).

Specifically, in this article, it has been examined in depth one of these response models: smoking while driving. First of all, it is shown in the [Figure 1](#) how the vast majority of respondents drives without smoking. Thus, 77.2% never performed this offense, and only 11.3% of Spanish drivers use to smoke regularly when circulate (i.e. always, and in many cases). It should be noted that we do not know with total accuracy the percentage of people composing this sample who smoke, and therefore if a part of the participants does not smoke at the wheel because they never smoke, independent on if they are driving or not.

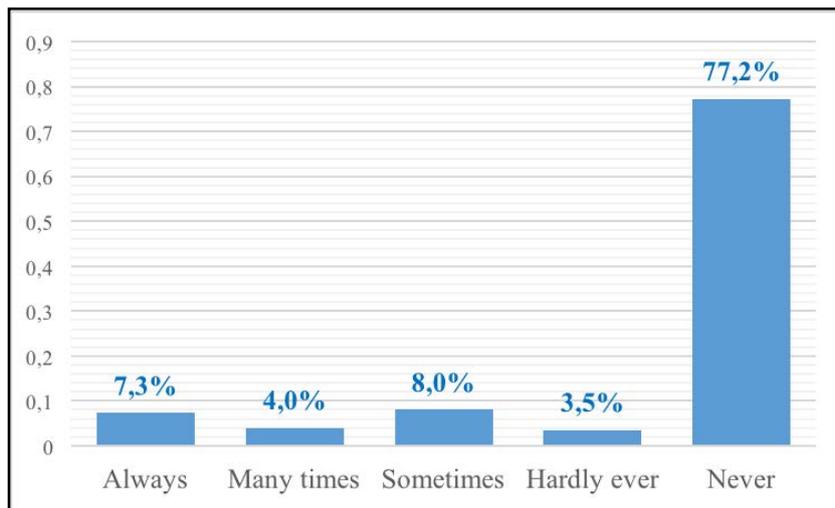


Figure 1. "Percentage distribution of drivers in function of the frequency of the behavior "Smoking while driving"

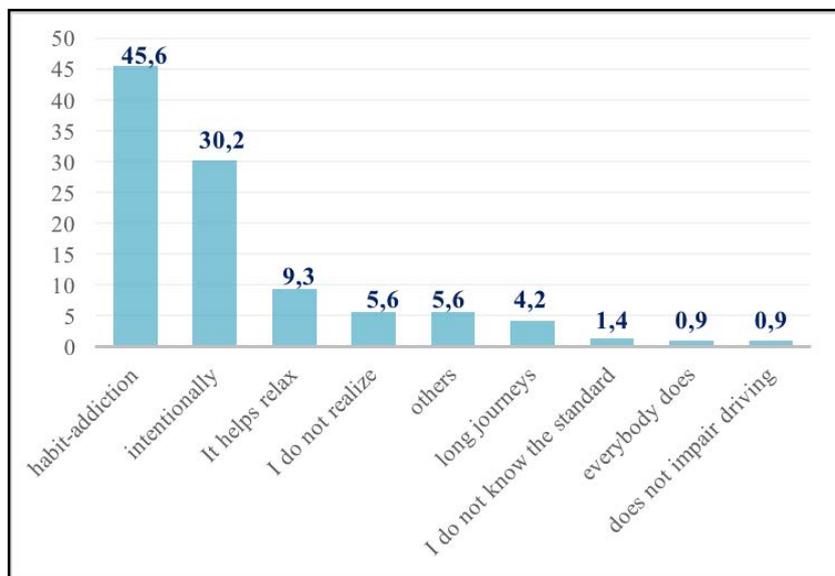


Figure 2. Reported reasons to smoking while driving

Regarding the reasons why drivers perform such misbehavior, they are many drivers (45.6%, concretely) who report their addiction -or habit to perform this behavior everywhere as possible- as the main reason, and a third part (30.2%) indicating that they do it, explicitly, in an intentional manner. For 9.3% of those interviewed, tobacco helps them relax when driving, and it constitutes the main reason to smoking. Regarding if drivers perceive mayor risks in terms of driving performance, only 0.9% think it does not impair driving, as shown in the [Figure 2](#).

As for the reasons why respondents do not smoke while driving, it must be said that about 30% of people who avoid this behavior refers as main reason the possibility of directly having a traffic accident, while on 16.5% is a precautionary measure, since they use to estimate that it impairs driving. Finally, 15.8% say they do not like or do not feel comfortable

smoking while driving, as shown in the [Figure 3](#).

Regarding the perception of the risk related to the behavior of smoking while driving, compared with other risky behaviors, it is in the second place among less-risk misbehaviors listed in the opinion of respondents ($X=5.3$; $SD=2.686$). Therefore, it is evaluated as a fairly low-risk behavior. In other words, there are very few drivers who value smoking while driving as a high-risk behavior, as shown in [Figure 4](#).

Taking into account the theoretical background provided by previous research, gender of respondents have been a key factor to assess, since there have been significant differences between men and women ($F_{(1,1096)}=9,641$; $p<0,05$). Thus, in general, women drivers show to be more aware of the risk in the specific behavior of smoking while driving ($X=5.6$; $SD=2.675$) than men ($X=5.1$; $SD=2.68$).

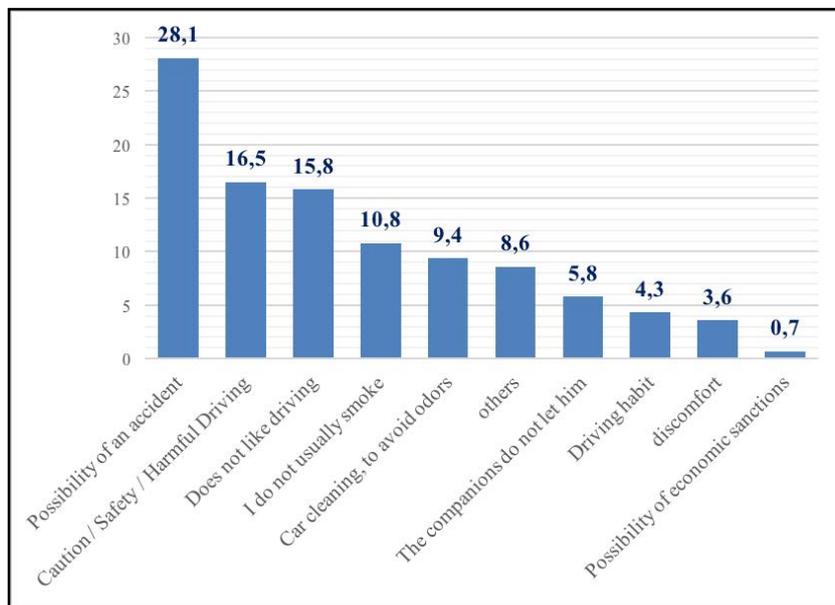


Figure 3. Reasons to avoid smoking while driving.

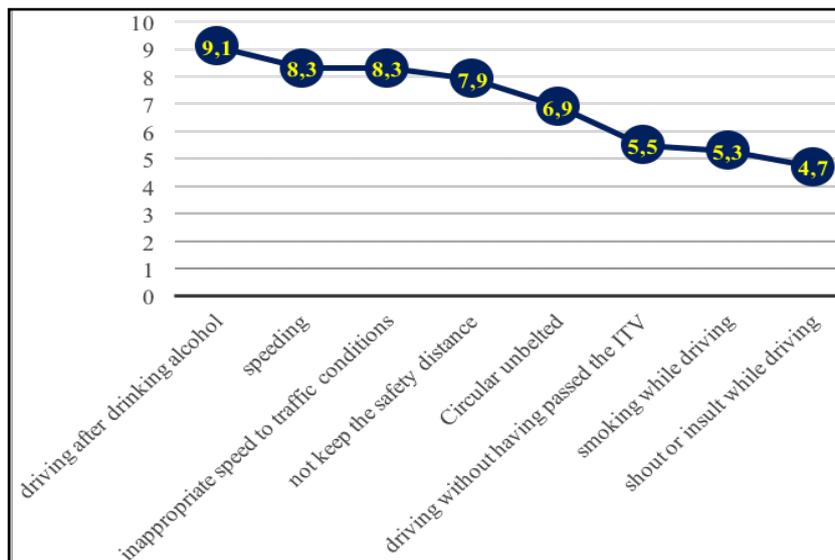


Figure 4. Perceived risk of accident related to smoking while driving and other specific misbehaviors

Meanwhile, although the perception of risk associated with the behavior of smoking while driving is quite low,

again people who never or almost never smoke while driving estimate the risk of getting this behavior as a cause

of traffic accident (Figure 5). Scores between those who almost always or often smoke while driving differs from those who never or almost never do. But it is noteworthy that, actually, we do not know the net percentage of respondents who are smokers. Therefore, some of those who never smoked at the wheel may be because they do not use to smoke in any circumstance of their life.

Also, and regarding perceived probability of be punished for this behavior, significant differences were found depending on the number of received sanctions ($F_{(2,1096)}=13,210$; $p<0,05$), between drivers those who have not received the most higher score ($X=5.7$; $SD=2.564$), compared to those who have received a sanction ($X=5.0$; $SD=2.819$), and with those who have received more than one traffic ticket ($X=4.8$; $SD=2.73$). On the other hand, drivers who have not reported suffering traffic accidents, tend to score significantly higher ($X=5.6$; $SD=2.628$) than people who have had a traffic accident ($X=5.0$; $SD=2,72$) regarding the probability of being punished for smoking while driving ($F_{(1,1096)}=10,993$; $p<0,05$) (see Figure 6).

In relation to the degree of hardness which respondents would sanction the misbehavior of smoking while driving, there is a high agreement that is the second least punishable behavior with a score of 4.2 ($SD=3,122$). Thus, they would agree to perceive a less sanction probability related to this behavior.

Depending on the gender of respondents ($F_{(1,1087)}=8.89$; $p<0,05$) regarding perceived punishability, women tend to score higher ($X=4.5$; $SD=2.724$) than men ($X=4.0$; $SD=2.724$), for an average total mean of $X=4.2$. On the other hand, those who have not had a traffic accident have obtained higher scores ($X=4.5$; $SD=3.085$) than those who have had ($X=3.9$; $SD=3.134$), significantly ($F_{(1,1088)}=10.654$; $p<0,05$). And as the number of sanctions ($F_{(2,1087)}=14.857$; $p<0,05$), people who have received no sanction ($X=4,6$; $SD=3,112$) scored significantly higher than those who have received one sanction ($X=3,6$; $SD=3,01$) or more than two penalties ($X=3,59$; $SD=3,078$).

On the other hand, most respondents believe that smoking while driving constitutes a behavior that should not be punishable. Thus, only 35.5% agree with punishment on this fact, while a high 64.5% disagree. It is noteworthy that this is the only behavior, except for yelling or insulting, that the percentage of people who disagree with that punishment is higher than the percentage of them that look its sanction as appropriate.

It is also noteworthy that the behavior being studied only gets a mean score of $X=1.5$ out of 10 ($SD=2.190$) on the risk assessment, comparing with other risk behaviors while driving. Thus, smoking while driving is the second behavior in terms of less risk from the opinion of respondents, as shown in Figure 7.

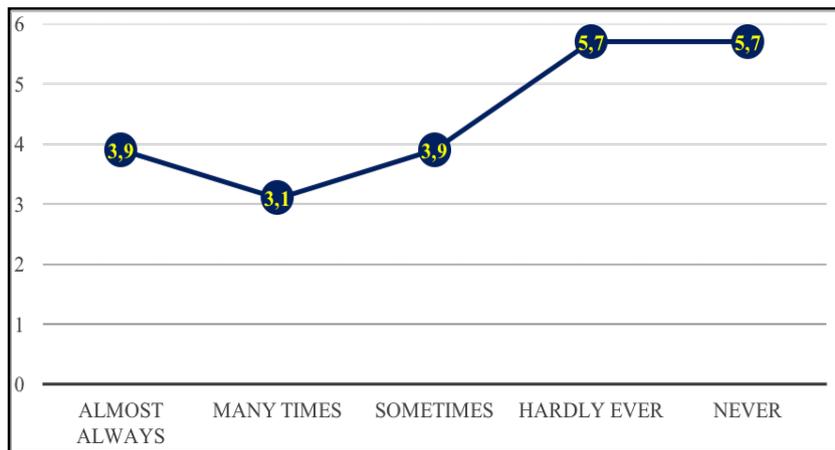


Figure 5. Perceived risk of accident in function of the frequency of the behavior

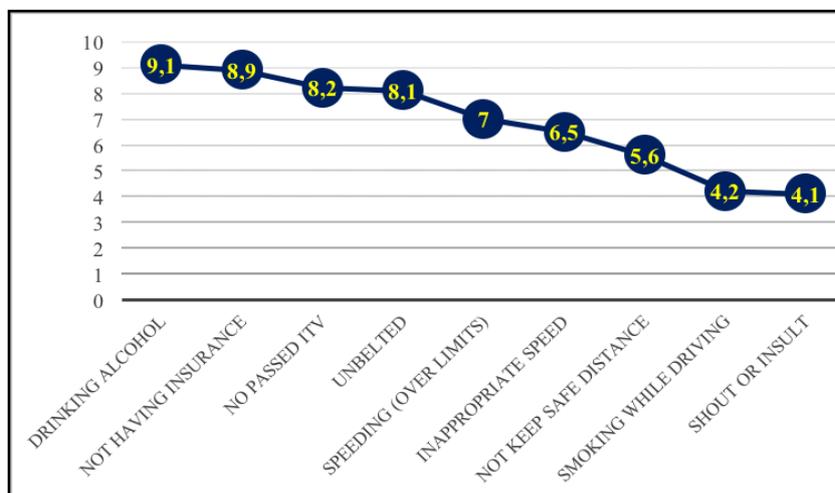


Figure 6. Comparison of perceived punishability of road misbehaviors

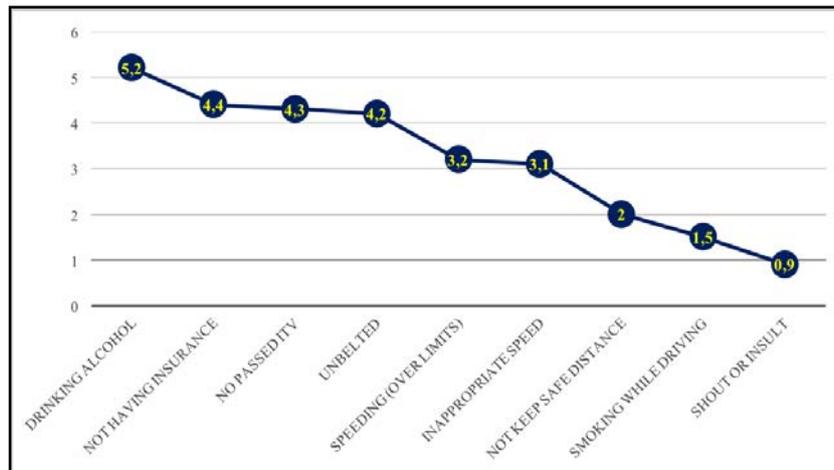


Figure 7. Perceived risk of road misbehaviors

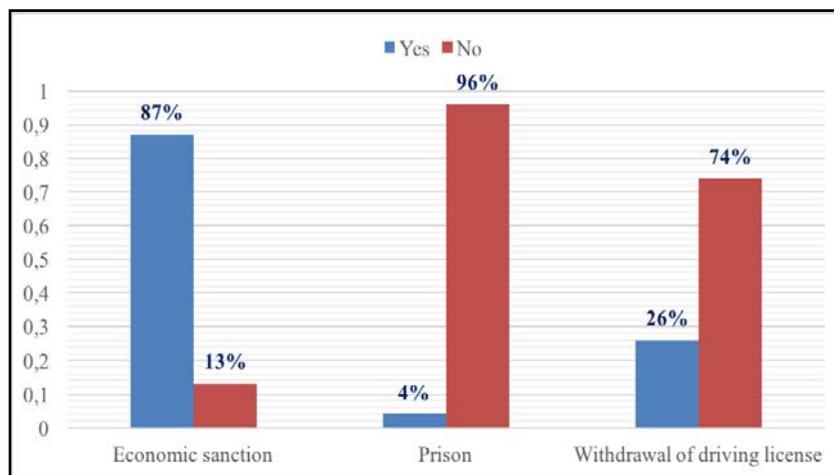


Figure 8. Expected type of sanction associated with the behavior

If we focus on the type of sanction that drivers associated with the behavior of smoking while driving, 87% think it falls a financial penalty, 4% believe in the possibility of punishing with imprisonment such conduct, 26% think which can cause temporary or complete suspension of license (see Figure 8).

4. Discussion

At first glance, the behavior of smoking while driving is not very common according to respondents' self-reports. This fact contrasts with other research outputs, where it seems that smoking while driving, even with drivers travel with small children in the car, is more common. In the case of a study carried out in Italy, 65.5% of smokers, reported the performing of this misbehavior [29].

Even so, there is a relevant percentage of drivers in our study which states the addiction-habit as the main reason to performing this behavior. This is complementarily consistent with results from other studies conducted in countries as Bangladesh, where the main reason for smoking while driving was habit, followed by the influence of other people and stress relief [30]. Instead, people who do not smoke while driving do so to avoid possible accident in their majority. It is important to note that we do not know what percentage of these people do

not smoke while driving because they do not actually smoke normally in any moment of their life.

Smoking is a behavior that affects driving because, among other aforementioned factors, tends to impair driving performance, distracting the driver and causing a slower reaction time and a worse adaptation to the conditions and demands of the vehicle, the road and the environment in general [21,24]. However, in spite of the many inconveniences that can cause and that in terms of absolute frequencies is a relatively uncommon behavior, it is wrongly perceived as a low-risk behavior for causing traffic accidents. In other words, the majority of respondents believe that the risk of having an accident due to smoking while driving is low, being one of the less valued risky behaviors in this aspect, comparing to other research findings [29]. In this sense, although there is a greater number of people who smoke while driving, the population is more likely to be prohibited and punish this type of behavior, and others related to potentially harmful or anti-social behaviors [31,32,33].

Regarding the observed gender differences in the appraisal of the risk derived from smoking while driving, it is worth mentioning that a few studies have found key differences regarding: a) the general behavior of smoking, and b) some specific risky behaviors behind the wheel, according to the gender. Regarding the first, Syamlal et al. [34] have found that, among American adults in working

age, approximately 22.8% of men and 18.3% of women have the habit of smoking. Further, De la Iglesia et al. have found that worldwide (with the exception of Sweden) the prevalence of tobacco consumption is higher among men than in the case of women [35]. As a global fact, results statistically consistent with the obtained trend for the case of the risk perceived on “smoking while driving”, and it is possible that, the general attitude and prevalence of general (unspecific) behavior of smoking could be statistically translated to the driving field. Other studies have found that, for instance, there are gender-related effects on road safety attitudes, such as risk perception, which tends to be the same for both genders, but, in the case of male drivers (who in this study have lower scores regarding perceived risk in the specific misbehavior of smoking while driving), there is a less concern about the risk of suffering a road crash [36]. Later, recent studies have found that, for women, associations between the consumption of diverse types of substances and risky behaviors behind the wheel are significant for offenses, serious offenses, and crashes. Specifically regarding smoking, it has been determined that cigarette using is positively and significantly associated in both genders with traffic incidents, being the exception the case of single vehicle crashes among women [37]. Finally, some empirical experiences analyzing the differential role of gender have concluded that, taking into account the psychological differences between genders, this variable has to be reminded along the designing and implementation of preventive and promotive strategies on health and road safety [38].

Regarding the mere risk perception of drivers, there are actually few drivers who value this misbehavior with high risk, in the case of explaining a potential road crash. In this respect, it is worth mentioning the need of strengthen the sense of responsibility of drivers, who, often, perform certain misbehaviors even when they are aware of the potential risk, punishment and implications for own and others' safety, as have been described in other studies dealing with Spanish population [28]. In relation to this, and taking into account the observed features of motives (normally habits), frequencies (not negligible), risk perception (not very high) and issues related to punishment (i.e. a low perceived probability of being punished), it is logical that the sanction that the respondents believe more appropriate for the behavior of smoking while driving be an economic penalty. Thus, both prison and administrative sanctions such as the loss of the driving license are assessed from drivers as less relevant as punishment alternatives for this behavior.

In this way, having accurate information the risks involved in smoking and other misbehaviors occurred while driving, would be very convenient that smoke-free laws should therefore be extended to private and public transport vehicles, particularly if they are carrying vulnerable groups of road users, such as children [39,40]. Moreover, warning labels on cigarette packages should include information on the increased risk of accidents when smoking while driving, but, in fact, the key to reducing this and its related misbehaviors while driving should focus in the strengthen of responsibly driving, as part of the road safety education of drivers [29].

5. Conclusions

Globally, traffic normative is not only designed to limit the range of action of people, but also to help to preserve the rights and safety of all people. Road safety regulations allow the correct interaction of all users whatever their role on the road: pedestrians, passengers, drivers and cyclists. With no doubt, it is necessary that all people are aware of these regulations. In the specific case of drivers, the performing of risky behaviors such as smoking while driving shows the lack of effectiveness of road safety education and law accomplishment in consistence with existing normative.

Despite the legal approaching, it is important to remark that, taking into account the provided reasons by drivers which smoke while driving, it has to be also considered as a public health problem.

In short, to know the rules and signals that are more infringed, and the potential risks of misbehavior' performing could serve to emphasize those aspects in training, sanctions and the media. In other words, more awareness and consciousness among drivers represent a valid effort to avoid many road accidents and promote the road safety culture.

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