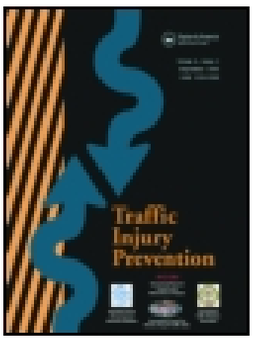

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Road traffic accidents and self-reported Portuguese car driver's attitudes, behaviours and opinions: Are they related?

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ABSTRACT

Objective: This study aims to characterize Portuguese car drivers in terms of demographic characteristics, driving experience, and attitudes, opinions and behaviours concerning road traffic safety. Furthermore, associations between these characteristics and self-reported involvement in a road traffic accident as a driver in the last three years were analysed. A final goal was to develop a final predictive model of the risk of suffering a road traffic accident.

Methods: A cross-sectional analytic study was developed, based on a convenience sample of 612 car drivers. A questionnaire was applied by trained interviewers, embracing various topics

related to road safety such as driving under the influence of alcohol or drugs, phone use while driving, speeding, use of advanced driver assistance systems and the transport infrastructure and environment (European Project SARTRE 4, Portuguese version). From the 52 initial questions, 19 variables were selected through principal component analysis. After that, and in addition to the usual descriptive measures, logistic binary regression models were used in order to describe associations and to develop a predictive model of being involved in a road traffic accident.

Results: From the 612 car drivers, 37.3% (228) reported being involved in a road traffic accident with damage or injury in the past three years. In this group, the majority were male, older than 65, with no children, not employed and living in an urban area. In the multivariate model, several factors were identified: being widowed (vs. single) (OR = 3.478, CI95%: 1.159–10.434); living in a suburban area (vs. a rural area) (OR = 5.023, CI95%: 2.260–11.166); having been checked for alcohol once in the last three years (vs. not checked) (OR = 3.124, CI95%: 2.040–4,783); and seldom drinking an energetic beverage such as coffee when tired (vs. always do it) (OR = 6.822, CI95%: 2.619–17.769) all suffered a higher risk of being involved in a car accident.

Conclusions: The results obtained with regard to behavioural factors meet the majority of the risk factors associated with car accidents referred to in literature. This study highlights the relation of relatively minor accidents (the majority with no injuries) with urban (or semi-urban) context and involving older drivers. These accidents are not usually the focus of road safety literature (mainly death and serious health loss) but, additionally to the economic costs involved, they can have a huge impact on road safety (e.g., pedestrian). Specifically the following interventions can be proposed: more detailed clinical examinations to identify real competencies to drive especially in older drivers (active aging can constitute a new challenge in road safety and

new paradigms can arise); education campaigns in how to cope with fatigue. Future studies in large samples and not based on self-reported behaviours should be developed.

Keywords

road traffic accident, behaviour, attitudes and opinions, car drivers

INTRODUCTION

Worldwide, nearly 1.24 million people are killed on road traffic accidents every year and more than 20 million are injured or disabled. Therefore, road traffic accidents remain a serious public health problem with high costs for societies in terms of population health and economics matters (Peden et al. 2004; WHO 2013). Previous research has associated socio-demographic characteristics to the risk of being involved in a road traffic accident (Alver et al. 2014; Peden at al. 2004; Twisk and Stacey 2007; Yannis et al. 2013).

Besides the sociodemographic characteristics, several studies have established the links between risky driving behaviours and accident liability, namely speeding, drunk driving as well as driving under the influence of drugs, driving tired and use of cellular telephones while driving (Peden et al. 2004; Redelmeier and Tibshirani 1997; RoSPA 2001; Vardaki and Yannis 2013).

In Portugal, according to the National Road Safety Authority (ANSR), there were 29,867 road traffic accidents with injuries in 2012, with a total of 718 deaths counted within 30 days of the date of the road accident. More than 1,941 people were seriously injured and 36,164 were slightly injured (ANSR 2012a). The rates of road traffic accidents in Portugal, and their socio-economic costs, were historically high compared to others European countries, despite the commitment of the Portuguese government and nongovernmental organizations. The increase in police enforcement and campaigns for awareness and information about road traffic accidents has helped to improve road traffic data (ANSR 2012b; MS.ANSR 2012). Nevertheless, around the world, road safety indicators remain a problem and several studies believe that in addition to law modifications and law enforcement, it is necessary to reach drivers, leading them to change attitudes and opinions concerning road safety in order to modify behaviours (ETSC 1999;

Horvath et al. 2012; Nævestad and Bjørnskau 2012; Vardaki and Yannis 2013; Vereeck and Vrolix 2007; Ward 2007). For that, it is necessary to produce knowledge about car driver populations.

In Portugal no study has been conducted to analyze the association between self-reported car drivers' behaviours, attitudes and opinions with regard to road traffic accidents. This study aims to provide knowledge about Portuguese car drivers' characteristics and to study the associations between injurious traffic accidents as drivers and self-reported behaviours on the road, as well as their attitudes and opinions about some of the risk factors. The objectives of this study are to identify target groups and instigate strategies for motivating behaviour to change risk as well as to provide directions for policymakers.

METHODS

In 1991, based on consortium of road safety institutes in Europe, the European project SARTRE was launched to explore and compare car driver's attitudes concerning road safety in order to recommend road safety measures at the national or European level (Antov et al. 2012). Until now, four missions have been developed (SARTRE 1, 2, 3 and 4), contributing to an updated knowledge about road traffic risks, attitudes regarding road safety issues and reported road traffic behaviours. Portugal didn´t officially participate in SARTRE4 but developed a similar and independent project. This project intended to analyze and compare declared behaviours, attitudes and opinions of European drivers through a survey concerning prevention and road safety matters. The survey consists of 52 questions covering various topics related to road safety such as driving under the influence of alcohol or drugs, phone use while driving, speeding, use of advanced driver assistance systems and the transport infrastructure and environment (Antov et al.

2012). It also addresses socio-demographic characteristics. A cross-sectional analytic observational study was developed, based on the questionnaire survey of SARTRE4 (Portuguese version). A convenience sample with the same dimension as the European Project SARTRE4 (target: 600 car drivers) was used, stratified geographically according to NUTS 2 regions, sex and age. Criteria for inclusion in the survey were having a valid driver's license, having driven a car in the past 12 months and residing in Portugal.

As a first step, the questionnaire was translated and adapted to Portuguese by a panel of experts, mainly composed of statisticians and road safety specialists. Based on ten drivers, a pre-test was carried out. After that, based on face-to-face interviews, the questionnaire was applied by trained interviewers in nine Citizens Advice Bureaus, taking into account both rural and urban areas across Portugal, between June and July 2013. Ethical issues related to informed consent, anonymity and possibility of leaving at any time were ensured.

The target variable (involved in at least one accident in the past three years - dichotomous variable Yes/No) was computed based on two primary questions: "In the past three years, how many accidents have you been involved in as the driver of a car in which someone, including yourself, was injured and received medical attention?" and "In the past three years, how many damage only accidents have you been involved in, as the driver of a car?."

From the initial 52 questions, principal component analysis (PCA) was used to select a subset of variables powerful (more information), potentially independent and complementary considering all dimensions (opinions, attitudes and behaviours), through the identification of the variables that load highest in component analyses based on Varimax method (Marôco 2011). This exploratory approach does not ensure that there are not correlations among the variables selected,

though it would likely reduce the intercorrelations among the variables selected. Criteria used were eigenvalues higher than one and/or cumulative percent >0.5. Due to the magnitude of the survey, Table 1 only shows variables selected by this process: cell phone use (two variables); speed (two variables); consumption of alcohol (eight variables); driving under fatigue (four variables); other types of behaviours (three variables). Ten variables were grouped in new classes, due to small numbers of cases in some categories and to potentially increase the coherence of the study (namely variables with superscript c in table 1). After that, to characterize the event "involvement in an accident as a car driver", crude and adjusted odds ratios were computed (logistic regression model, method: enter and adjusted only by sex, due to the fact that age was not statistically significant). Finally, a predictive model of being involved in a road traffic accident was built based on the selected variables (multiple model, method stepwise) and all the assumptions were verified. SPSS version 20 statistical software was used to perform the analysis of data, using a significant level of 5%.

RESULTS

In total, 612 car drivers were included in the study, of whom 224 (36.6%) were from the North, 157 (25.7%) from the centre, 163 (26.6%) from Lisbon, 43 (7.0%) from Alentejo and 25 (4.1%) from the Algarve.

Socio-demographic and driving experience characteristics are presented in Table 2, globally and considering the occurrence (or not) of an accident in the last three years. Only 6.4% of these accidents have associated physical injuries and received medical attention.

This convenience sample was composed of 57.8% males and 42.2% females, 93.3% having secondary education or more and 58.3% married or living as married; 75.4% were employees

and 41.3% lived in an urban area. On average, car drivers are aged 40.06 years, drive between 5,000 and 10,000 kilometres per year and have 11–25 years of driving experience. In total, 37.3% of car drivers report that they have been involved in a road traffic accident with material and/or physical damage in the past three years. Men reported more accidents (41.7%), as did drivers over 65 years of age (52.6%), drivers with further education (38.8%), those widowed (70.0%), those unemployed (38.7%) and those living in an urban area (40.7%). Drivers with six to ten years of driving experience and who had driven fewer than 5,000 kilometres per year or more than 30,000 kilometres per year reported having more road traffic accidents than other drivers.

Concerning the 19 variables selected by PCA, only eight were found to be statistically associated with the risk of having a road accident. Table 3 only evinces the results (crude and adjusted odds ratio) of those eight variables; the remaining 12 referred in Table 1 were not statistically associated with the risk of being involved in a road traffic accident in any of the analyses done (variables 2, 3, 4, 9, 10, 11, 14, 15, 16, 17, 18, 19).

Male drivers seem to have been more exposed to a road traffic accident compared to female car drivers (OR = 1.575). Widowed car drivers were more highly exposed to road traffic accidents compared to single car drivers (OR = 3.437). Drivers living in a large city and in a suburban area suffered 2.189 and 2.150 times more road traffic accidents than drivers living in rural area. The car driver's age was not statistically associated with the risk of being involved in a road traffic accident although with some non-negligible variations between age classes (OR = 1.8 to older drivers compared with younger). The same has been found regarding education, occupation, having or not children, driving experience and number of kilometres driven per year.

Regarding speed, drivers who were "very" much in agreement with the surveillance of speeding between two distant points by automated cameras were exposed to a higher number of road traffic accidents than drivers who did not agree at all (OR = 2.420). On the subject of alcohol, drivers who did not much agree that if they drink and drive they would be stopped and fined by the police were also more highly exposed to the risk of suffering a road traffic accident compared with drivers who "very" much agreed (OR = 1.608). Those who reported "rarely/sometimes" and "often/very often" driving a car after having drunk even a small amount of alcohol over the last month were exposed 1.512 and 1.696 more times to a road traffic accident than drivers that reported never doing it. Drivers that answered that they had "only once" and "more than once" been checked for alcohol while driving in the past three years were exposed to a higher number of road traffic accidents (vs. those who had never been) (OR = 2.424 and OR = 2.173; Drivers who agree that drinking and driving is "often/very often" the cause of car drivers being involved in a road accident were 1.540 times more highly exposed to a road traffic accident than those who agreed "always."

About fatigue topics, car drivers that "rarely/sometimes" and "often/very often" consume caffeine/energy drinks when feeling tired while driving were 2.981 and 2.297 times more highly exposed to a road traffic accident than those who "always" reported doing it. Drivers who "rarely/sometimes" talk to passengers when feeling tired while driving were 1.874 times more highly exposed to a road traffic accident than those who "always" talk (OR = 1.874).

When adjusted to gender, little difference can be identified, being the most relevant one related with widow status and alcohol consumption (variable 6).

The final model (Table 4) has included those explanatory variables with the greatest influence on the risk of having a road traffic accident: the living area; family situation; consumption of alcohol as a driver in the last three years; and associated behaviours: drinking coffee/energy drinks while driving and feeling tired.

The model presents the following statistics: G^2 (4) = 81.715; p< 0.001; χ^2_{HL} Hosmer-Lemeshow (4) = 8.725; p = 0.366 and R^2 Nagelkerke = 0.185. The percentage of correct classification of drivers who had a road traffic accident was 65.4% with a specificity of 65.2% and a sensitivity of 65.7%. This means that the model has reasonable predictive capabilities. Furthermore, the model has an acceptable discriminating capacity, shown by the area under the ROC curve (c = 0.712, p < 0.001; CI95%: 0.671–0.753). Car drivers living in a rural area were less exposed to a road traffic accident as well as drivers who had never been checked for alcohol in the past three years. The same occurrence was identified in car drivers married or living as married and car drivers that referred to drink caffeine/energy drinks when tired and driving.

DISCUSSION

Concerning demographic characteristics, the results of this study indicate that the typical Portuguese car driver is male, aged between 25 and 44 years, has at least secondary education, is married and employed and lives in an urban or suburban area. In comparison to SARTRE3 no differences were noted except that the level of education has increased in the last ten years (SARTRE 2004).

According to the results of this study, the typical driver involved in a road traffic accident in the past three years is male, over 65 years of age, has no education or primary education, is widowed, unemployed and lives in an urban area. These findings are consistent with the

literature. Although several studies have shown that younger (until 24 years old) drivers and single drivers more often report being involved in road traffic accidents (Antov et al. 2012; Peden et al. 2004), here, young adults (18-24) have more probability of being involved in an accident than middle-aged adults (between 34–54) but less probability than drivers over the age of 55. Previous research showed associations between gender and age with the risk of being involved in a road traffic accident (Parker et al. 1995; Vardaki and Yannis 2013). In this study, only gender was revealed to be statistically significant and associated with the risk of being involved in a road traffic accident. The lack of statistical association between age and road traffic accidents may be due to the small sample size, with particular impact in a variable with six categories and with small frequencies in older and younger classes. Additionally it is important to stress the definition of the event (accident with or without injuries) and not focused on deaths or serious health losses. The impact of older drivers can be more relevant with urban and small accidents (with no injuries), related with a different societal dynamic related with aging, with more active behaviours, driving more and until more advanced ages. In agreement, this study showed that car drivers widowed are higher exposed to a road traffic accident than other classes of car driver's family situation. Concerning the living area, the present work found a correlation between the occurrences of road traffic accidents with the area of residence of car driver. Blatt and Fureman (1998), Holz-Rau and Scheiner (2013) and Ward (2007) showed that rural areas consistently have a higher risk of fatal accidents and traffic fatalities. However, like in our study, when analyzing the number of non-fatal car accidents, there are more road traffic accidents in urban and suburban areas. Concordantly, in Portugal, the project performed and presented by Prevenção Rodoviária Portuguesa (PRP) in 2012 reported a higher number of road traffic injuries

in Portugal in urban areas than on highways or rural areas. These possible explanations must be evaluated in further studies.

Concerning speeding, literature indicates that this risky behaviour is an important contributing factor present in one third of road traffic accidents and is a common and a socially accepted behaviour (Roidl 2013; TRB 2010). In accordance with SARTRE 4, drivers who perceived speed as a potential dangerous behavior are more likely to be involved in an accident than others drivers. In general, these drivers can believe that speeding is rather widespread among other drivers, their attitude towards speed enforcement and speed reduction tends to be rather negative (although a fairly large proportion would not object to punishments becoming more severe, like in this study even if without statistical significance) and do not feel that they themselves are at risk of being caught or indeed being involved in an accident (SARTRE 2004; Stanojević et al. 2013). In the present work, car drivers who "very" much agree with the surveillance of speeding between two distant points by automated cameras were more highly exposed to road traffic accidents (OR = 2.420), in agreement with previous rationale.

Driving under the influence of alcohol is a risky driving behaviour that has been widely explored. Several studies have shown that even a small amount of alcohol can affect driving performance and increases both the number of traffic accidents and the severity of the collision (Alver et al. 2014; Horwood and Fergusson 2000; Peden et al. 2004). The perception of alcohol as the cause of car drivers being involved in a road accident has also been reported in several studies and car drivers strongly agree and accept that (Peden et al. 2004; Vannlar et al. 2008; Antov et al. 2012; SARTRE 2004). Findings from the present study support the same conclusion: car drivers who reported "rarely/sometimes" drinking even a small amount of alcohol and

driving had a higher risk of being involved in a road traffic accident than those who "never" did it.

As expected, this study found that drivers who do not much agree with the possibility of being stopped and fined by the police if they drink and drive have a higher risk of being involved in a traffic accident. Taking this risk in driving behaviour depends on traffic law enforcement. Shinar (2007), cited in Stanojević et al. (2013), contends that if certain drivers both like to drink and believe that a certain amount of alcohol does not affect their driving skills, then in the absence of law enforcement, they are likely to consume alcohol and drive. If enforcement is present, however, these drivers will always have a reason to refrain from driving while under the influence of alcohol. Also, Peden et al. (2004) state that "…the only consistently effective strategy for dealing with the problem of excess alcohol is to increase the perceived risk of being caught. Such a perception is considered a better deterrent than the severity or swiftness of the penalty." So the results of the present study are consistent with literature—car drivers who perceive lower risk of being caught by the police while driving under the influence of alcohol increase their risk of being involved in a traffic accident. The same can be applied to car drivers that have been checked by the police once or more than once for driving under the influence of alcohol. The probability of being checked is also highly correlated with the presence of check points in some specific areas and at certain times—for example, near to nightclub areas and during the night, as described in the DRUID project (Schulze et al. 2012). Furthermore, when conducting a surveillance action with regard to alcohol, police can select drivers in two ways: random or targeted. If randomly and not because there is a suspicion that the driver is drunk (strange behaviour or in a critical area and/or time), this value represents the real proportion of

drivers driving under the influence of alcohol (ETSC 2011). Results of this work show that drivers checked by the police in the past three years have a higher risk of being involved in a road traffic accident than those who have never been checked, and this can be potentially related and justified if the police mainly do target surveillance actions.

Regarding self-reported behaviours related with fatigue, those which were revealed to be associated with the risk of being involved in a road traffic accident were: drinking caffeine/energy drinks and talking to passengers when feeling tired while driving. When OR analyzed, car drivers who "rarely/sometimes" or "often/very often" drink coffee/energy drinks and talk with others passengers when feeling tired while driving also had a higher risk of being involved in a road traffic accident than car driver who reported "always" doing it. Despite a relatively extensive body of research on fatigue in relation to driving, its impact on traffic safety is not well literature in the EU. In Portugal, such a study has not been conducted.

The present study has limitations which need to be taken into account when the results are interpreted. Firstly, all the results were obtained based on self-reported answers. This method of collecting data may lead to the possibility of collecting data that are distorted due to receiving socially desirable answers from the respondents and/or to memory bias. Secondly, the small sample size can have impact on the results, specially their statistical significance and on the presence of low frequency classes. Moreover the definition adopted here, event - accidents with and without injuries, can be a challenge to the discussion. Additionally, it must be highlighted that this study evaluates the attitudes, opinions and behaviours in a specific moment and associates them with a previous experience of an accident. It means that it is impossible to know if the attitudes, opinions and behaviours were the same before the accident or if they changed

after the accident, and the results should be carefully interpreted. Although the presence of scarce number of missing values in the majority of considered variables, minor impacts were expected. Despite these limitations, this study brings useful information about attitudes, opinions and behaviours among Portuguese car drivers that can be used in the near future to provide new strategies. Additionally, the majority of results are consistent with what is described in literature about car drivers' road traffic accident risk factors.

In conclusion, in the last three years, 37.3% of car drivers reported being involved in a road traffic accident with material and physical damage. Men reported having more accidents (41.7%), as well as drivers older than 65 years (52.6%), those widowed (70.0%), those unemployed (38.7%) and those living in an urban area (40.7%). Drivers with six to ten years of driving experience and who had driven more than 30,000 kilometres per year reported having more road traffic accidents. Additionally, this study found associations between self-reported attitudes, opinions and behaviours and the risk of being involved in a road traffic accident that cannot be ignored. Taking advantage of what is already developed and implemented by several documents and programmes with high impact on road safety, enforcement of strategies and approaches focusing on those at risk groups and self-reported attitudes, opinion and behaviours could be redesigned. Also the pertinence of target surveillance actions has been shown, as a way to catch dangerous drivers but not necessary (is not possible to demonstrate on this study) as a way to change their behaviours. Traffic safety authorities could exploit these results in designing and implementing follow-up studies, education campaigns and enforcement programmes and in helping to define priorities. The results obtained with regard to behavioural factors meet the majority of the risk factors associated with car accidents referred to in literature. This study

highlights the relation of relatively minor accidents (the majority with no injuries) with urban (or semi-urban) context and involving older drivers. These accidents are not usually the focus of road safety literature (mainly death and serious health loss) but, additionally to the economic costs involved, they can have a huge impact on pedestrian's safety (most vulnerable road users), among others. Specifically the following interventions can be proposed: more detailed clinical examinations to identify real competencies to drive especially in older drivers (active aging can constitute a new challenge in road safety and new paradigms can arise);; education campaigns in how to cope with fatigue.

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Table 1 -- Survey (19 Variables selected by PCA)

Characteristics of car drivers	Gender; Age; Education; Family situation; Occupation; Children; Resident area description; Driving experience; kms/year driven;
Speed	1[a]. Do you agree with surveillance of speeding between two distant points by automated cameras; 2[b]. Do you agree that penalties for speeding offences should be much more severe
Alcohol and drugs	3[a]. Do you agree with the existence of an "alcolock" that prevented the car to start if the driver exceeds the legal alcohol limit for driving; 4[a]. Do you agree that you can drink and drive if drive carefully; 5[a]. Do you agree that if you drink and drive you will be stopped and fined by the police; 6[c]. Over the last month, How often have you driven a car after having drunk even a small amount of alcohol; 7[d]. How often have you been checked for alcohol while driving, in the past 3 years; 8[c]. How often do you think drinking and driving is the cause of car drivers being involved in a road accident; 9[a]. Dangerous to drive while taking a medication that carries a «warning: it may influence your driving ability»; 10[d]. Checked for the use of drugs/medication while driving in the past 3 years
Fatigue	11[c]. Behavior when feeling tired while driving: pull over and sleep; 12[c]. Behavior when feeling tired while driving: consume caffeine/"energy" drink; 13[c]. Behavior when feeling tired while driving: talk to passengers; 14[c]. Stop and take a break because too tired while driving, in the past 12 months
Cell phone	15[c]. While driving how often you make/answer a call with hand free phone; 16[c]. How often do you think make/answer a call with handheld phone is the cause of car drivers being involved in a road accident
Others behaviors	17[c]. How often do you think aged people driving (65 and over) are the cause of car drivers being involved in a road accident; 18[a]. How dangerous do you consider driving a car (regarding accidents); 19[c]. How often do you drive through a traffic light that is on amber
Road traffic crash in the past 3 years	"In the past 3 years, how many accidents have you been involved in, as the driver of a car, in which someone, including yourself, was injured and received medical attention?" and "In the past 3 years, how many damage only accidents have you been involved in, as the driver of a car?"

[a]very, fairly, not much, not at all; [b] strongly agree, agree, neither, disagree, strongly disagree; [c] always, very often/often, rarely/sometimes, never; [d] never, only once, more than once.

Table 2. Sample socio demographic characteristics

	Global n(%)	Accident	
		Yes n(%)	No n(%)
Total	612	228 (37.3)	383 (62.7)
Gender (n = 608)			
Male	352 (57.8)	146 (41.7)	204 (58.3)
Female	256 (42.2)	80 (31.3)	176 (68.7)
Age (n = 611)			
[18;24]	51 (8.3)	19 (37.3)	32 (62.7)
[25;34]	195 (31.9)	77 (39.7)	117 (60.3)
[35;44]	164 (26.8)	54 (32.9)	110 (67.1)
[45;54]	110 (18.0)	33 (30.0)	77 (70.0)
[55;64]	53 (8.7)	25 (47.2)	28 (52.8)
≥65	38 (6.2)	20 (52.6)	18 (47.4)
Children (n = 609)			
Yes	369 (60.9)	134 (36.3)	235 (63.7)
No	240 (39.4)	94 (39.2)	148(60.8)
Education (n = 605)			
None/ Primary	34 (5.6)	13 (38.2)	21 (61.8)
Secundary	292 (47.7)	104 (35.6)	188 (64.4)
Further	279 (45.6)	108 (38.8)	170 (61.2)
Family situation (n = 612)			
Single	184 (30.1)	74 (40.4)	109 (59.6)
Living as married/Married	357 (58.3)	119 (33.3)	238 (66.7)
Separated or divorced	51 (8.3)	21 (41.2)	30 (58.8)
Widowed	20 (3.3)	14 (70.0)	6 (30.0)
Occupation (n = 610)			
Self employed	44 (7.2)	15 (34.9)	28 (65.1)
Employed	460 (75.4)	171 (37.2)	289 (62.8)
Unemployed	106 (17.4)	41 (38.7)	65 (61.3)
Living Area (n = 181)			
Rural/village	67 (10.9)	16 (23.9)	51 (76.1)
Small town	148 (24.2)	51 (34.7)	96 (65.3)
Suburban/city outskirts	144 (23.5)	58 (40.3)	86 (59.7)
Urban/city large/large town	253 (41.9)	103 (40.7)	150 (59.3)
Driven kms/year (n = 604)			
[0;5000]	105 (17.4)	43 (41.0)	62 (59.0)
]5000;10.000]	162 (26.8)	54 (33.1)	109 (66.9)
]10.000;15.000]	103 (17.1)	37 (35.6)	67 (64.4)
]15.000;20000]	90 (14.9)	33 (36.3)	58 (63.7)
]20000;30000]	73 (12.1)	29 (39.2)	45 (60.8)

>30 001	71 (11.8)	31 (43.7)	40 (56.3)
Driving experience (years) (n = 599)			
≤2	18 (3.0)	5 (27.8)	13 (72.2)
[3-5]	45 (7.5)	17 (37.8)	28 (62.2)
[6-10]	100 (16.7)	45 (44.6)	56 (55.4)
[11-25]	294 (49.1)	103 (34.7)	194 (65.3)
>25	142 (23.7)	56 (39.4)	86 (60.6)

Table 3. Road traffic accidents risk factors

Variable (R.C), n	n	Category	OR CI95%, p	OR*aj*** CI95%, p
Gender (Female*), 256	352	Male	1.575 (1.122;2.210),0.009	-
Age ([18-24]*), 51	195	[25;34]	1.108 (0.587;2.094),0.751	1.019 (0.536;1.941),0.953
	164	[35;44]	0.827 (0.430;1.591),0.569	0.783 (0.404;1.516),0.468
	110	[45;54]	0.722 (0.359;1.452),0.361	0.679 (0.335;1.379),0.284
	53	[55;64]	1.504 (0.687;3.290),0.307	1.311 (0.593;2.900),0.504
	38	≥65	1.871 (0.797;4.392),0.150	1.475 (0.615;3.535),0.384
Family situation (Single*), 184	357	Married or living as married	0.736 (0.510;1.064),0.104	0.712 (0.490;1.035),0.075
	51	Separated or divorced	1.031 (0.549;1.938),0.924	1.035 (0.548;1.955),0.915
	20	Widowed	3.437 (1.263;9.351),0.016	2.724 (0.980;7.566), 0.055
Living area (Rural/ village*), 67	147	Small town	1.693 (0.878;3.264),0.116	1.629 (0.842;3.154), 0.147
	144	Suburban/city outskirts	2.150 (1.119;4.130),0.022	2.051(1.064;3.954),0.032
	253	Urban/ city large/ large town	2.189 (1.183;4.049),0.013	2.072 (1.115;3.849),0.021
1 Speed surveillance (Not at all*), 69	106	Very	2.420 (1.276;4.589).0.007	2.437 (1.276;4.651),0.007
	200	Fairly	1.076 (0.595;1.946),0.809	1.165 (0.641;2.118),0.616
	235	Not much	1.368 (0.769;2.436),0.287	1.450 (0.811;2.594).0.210
5 Alcohol - fine(Very*), 143	230	Fairly	1.287 (0.827;2.005),0.264	1.212 (0.774;1.898),0.401
	213	Not much	1.608 (1.030;2.511),0.037	1.459 (0.927;2.297),0.103
	22	Not at all	0.808 (0.297;2.203),0.677	0.741 (0.270;2.033),0.561
6 Alcohol consumption (Never*),	280	Rarely/Sometimes	1.512 (1.067;2.142),0.020	1.755(0.178;17.267),0.629
	52	Often/Very often	1.696 (0.927;3.101),0.086	2.339(0.240;22.825),0.465
	4	Always	0.713 (0.073;6.950),0.771	2.630(0.256;27.041),0.416

274				
7 Checked for alcohol (Never*), 316	181	Only once	2.424(1.654;3.551),<0.001	2.353(1.598;3.465),<0.001
	114	More than once	2.173 (1.395;3.385),0.001	2.028 (1.288;3.192),0.002
8 Drinking as cause of accident (Always*), 139	10	Never	1.540 (0.413;5.740),0.520	1.446 (0.385;5.434),0.585
	67	Rarely/Sometimes	1.289 (0.696;2.389),0.420	1.125 (0.602;2.104),0.712
	396	Often/Very often	1.540 (1.017;2.330),0.041	1.450 (0.954;2.204),0.082
12 When tired- energy drinks (Always*), 49	79	Never	1.702 (0.732;3.958),0.217	1.643 (0.701;3.851),0.253
	247	Rarely/Sometimes	2.981 (1.424;6.241),0.004	2.833 (1.348;5.953),0.006
	233	Often/Very often	2.297 (1.092;4.834),0.028	2.223 (1.053;4.693),0.036
13 When tired- talk (Always*), 71	26	Never	0.765 (0.268;2.183),0.617	0.810 (0.282;2.326),0.695
	203	Rarely/Sometimes	1.874 (1.042;3.372),0.036	1.841 (1.019;3.328),0.043
	311	Often/Very often	1.525 (0.866;2.685),0.144	1.476 (0.835;2.611),0.181

*reference class

**Odds Ratios adjusted by gender; Variables: 1. Surveillance of speeding between two distant points by automated cameras; 5. If you drink and drive you will be stopped and fined by the police; 6. Over the last month, How often have you driven a car after having drunk even a small amount of alcohol; 7. Checked for alcohol while driving, in the past 3 years; 8. How often do you think drinking and driving is the cause of car drivers being involved in a road accident; 12. Behavior when feeling tired while driving: consume caffeine/"energy" drink; 13. Behavior when feeling tired while driving: talk to passengers.

Table 4. Final model: method forward LR		
		OR (CI95%), p
Family situation (single*)	Married or living as married	0.788 (0.510;1.188), 0.246
	Separated or divorced	1.123 (0.558;2.261), 0.745
	Widowed	3.478 (1.159;10.434), 0.026
Living area (rural/ village*)	Small town	2.673 (1.211;5.897), 0.015
	Suburban/city outskirts	5.023 (2.260;11.166), p<0.001
	Urban/city large/large town	4.028 (1.889;8.587), p<0.001
7 Checked for alcohol (Never*)	Only once	3.124 (2.040;4.783), p<0.001
	More than once	3.781 (2.263; 6.317), p<0.001
12 When tired- drink energy drinks (Always*)	Never	5.123 (1.769;14.839), 0.003
	Rarely/sometimes	6.822 (2.619; 17.769), p<0.001
	Often/very often	4.614 (1.774;12.001), 0.002

*reference class

