

Riding a motorcycle while impaired

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Abstract

The objective of this research is the analysis of road safety attitudes and perceptions of motorcyclists with respect to riding a motorcycle while impaired (i.e. by alcohol, drugs / medication or fatigue) in Europe. Data are collected from the European SARTRE-4 survey, co-funded by the European Commission, which was conducted in 19 European countries. A total sample of 4,483 motorcyclists was interviewed in total, using a common questionnaire, with questions on road safety attitudes, perceptions, beliefs, motives etc. The present study allowed to identify differences in attitudes towards alcohol, medication and fatigue impaired riding, between groups of motorcyclists and different countries, and to assess the perceived impact of related road safety measures (e.g., legal blood alcohol concentration, breath testing and alcohol interlock) on intended behaviour.

Key words: Motorcyclists; Attitudes; Perceptions; Alcohol; Drugs/Medications; Fatigue; Safety.

1. Introduction

Drink-driving is one of the major causes of road accidents. However, alcohol consumption by motorcyclists has not been extensively explored. International literature indicates that motorcyclists are more sensible to the effects of alcohol than car drivers (Lin & Kraus, 2009). This result is confirmed by the fact that they are involved in fatal crashes with lower levels of alcohol in their blood than car drivers (Voas et al., 2007; Watson & Garriott, 1992). Motorcyclists are aware of this and thus have a specific relationship with drink-driving: indeed a great number of motorcyclists are also car drivers and they often decide to choose their car rather than their motorcycle when they go to some place where they know that they are going to drink alcohol (Syner & Vegega, 2000). Despite this "adaptation" attempt reserved to heavy drinking situations, 24% of killed motorcyclists in France in 2010 were under the influence of alcohol, with a BAC higher than 0.5g/l (ONISR, 2010) and 27% of killed motorcyclists in 2005 in the US were under the influence of alcohol, with a BAC higher than 0.8g/l (NHTSA, 2008).

Motorcycle and moped fatalities in Europe show a small decrease during the last decade, but in some countries (e.g. Greece, Italy) they remain still high (ERSO,

2011). In addition, motorcycle use across Europe is highly variable: in Italy there are 156 Powered Two-Wheelers (PTW) per 1000 inhabitants, whereas in Ireland there are 9 PTW/1000 inhabitants (ACEM, 2011). The type of motorcycle and the engine size is an often discussed factor of risk taking and accident severity (Yannis et al., 2005). It is thus expected to observe differences between countries in regard with motorcyclists' attitudes to drink-driving and driving while impaired (DWI) behaviours. Although alcohol is the most frequent impairment factor among DWI offenders, the consumption of some type of medication (e.g., benzodiazepines) may also affect driving skills and behaviour. It may also represent a non marginal part of road accidents (Engeland et al., 2007). For instance, in a recent study on the impact of medical drug use on the risk of road crashes in France, the authors reported that 18% of the drivers involved in accident were exposed to at least one prescribed medicine of level 1, 2 or 3 (Orriols et al., 2010). However, little is known about the frequency or the effects of drugs-impaired motorcycle riding.

Aside from alcohol and drugs / medication, fatigue also seems to play a significant role in motorcycle safety, as it impairs driver alertness and performance. Although there are some studies dealing with car drivers' fatigue (Corfitsen, 1986; Hwang et al., 2008), no PTW-fatigue related studies were found in literature.

2. Data, Objectives & Methodology

This paper has three objectives:

- to identify the frequency of alcohol, drugs and fatigue- related riding as stated by motorcyclists
- to identify differences of attitudes towards the use of alcohol, medicines and fatigue while driving between different groups of motorcyclists and different countries
- to evaluate the perceived impact of road safety measures (e.g., legal blood alcohol concentration, breath testing and alcohol interlock) on intended behaviour

In order to achieve these objectives, data from the European SARTRE-4 survey were used. The SARTRE-4 survey, co-funded by the European Commission, was conducted in 19 European countries, namely 18 EU Member States (Austria, Belgium, Cyprus, Czech Republic, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Netherlands, Poland, Slovenia, Spain, Sweden) and Israel. A total sample of 4,483 motorcyclists was interviewed in total, using a common questionnaire, with questions on road safety attitudes, perceptions, beliefs, motives etc.

The questionnaire was designed with the same structure and methodology as in the previous SARTRE surveys, so that trends over time could be observed. The survey includes 14 questions relevant to alcohol consumption and 5 for medication use.

The first topic is associated with driving while impaired (DWI) behaviours. For alcohol-impaired driving, two questions are relative to one's reported drink-driving (*even after a small amount, when you may have been over the limit*) and one question is about respondent's friends' behaviour (*Most of your motorcycle-driving friends*

would drink and drive a motorcycle). For medicine-impaired driving, participants were questioned about their own use (*Have you driven while taking medication, how many times have you been fined for the use of medication while driving*).

The second topic deals with the perception of road risk associated with such behaviours. Physical risks and legal risks perception have been assessed for both alcohol and medicine-impaired driving. Physical risks perception corresponds to the estimated link between road crashes and the use of alcohol at the wheel (*You can drink and drive if you do it carefully, Drinking and driving a motorcycle increase the risk of crash, Drinking and driving causes crashes*) or the use of medicine at the wheel (*How dangerous do you think it is to drive while taking a medication*). Legal risk perception corresponds to the perceived risk of apprehension (*How many times were you checked for alcohol while driving a motorcycle, on a typical motorcycle journey, how likely is it that you will be checked for alcohol*).

The third topic includes attitudes towards various measures against driving under the influence behaviours: attitudes towards the law (*tolerated BAC threshold*), attitudes towards police checks and fines (*Penalties for drink-driving offences should be more severe*), and finally attitudes towards security devices (*alcohol interlock*).

The paper mainly focuses on two aspects- alcohol and legal drugs. In addition, fatigue riding is examined. For each aspect, descriptive statistics and deeper analyses are presented. Descriptive statistics focus on differences between motorcycle users and between countries. The analytic part is associated with statistical tests such as chi square tests.

3. Results

3.1 Alcohol

Almost 20% of the SARTRE-4 sample was motorcyclists, including 3885 men and 598 women. Their mean age is about 39.5 years old, which shows that motorcyclists in the sample are significantly younger than Car Drivers (mean = 43 years old) and Other Road Users (i.e. pedestrians, cyclists etc. - mean = 45 years old) in our sample.

3.1.1 Drink-Drive Behaviour

More than one out of ten (nearly 13%) of motorcyclists stated that they may have driven their motorcycle while being probably over the legal BAC during the previous month. The proportion of motorcyclists, who declared that they drove at least once during the last month after they had drunk even a small amount of alcohol, is 23%. Most of them declared that they performed this behaviour rarely though.

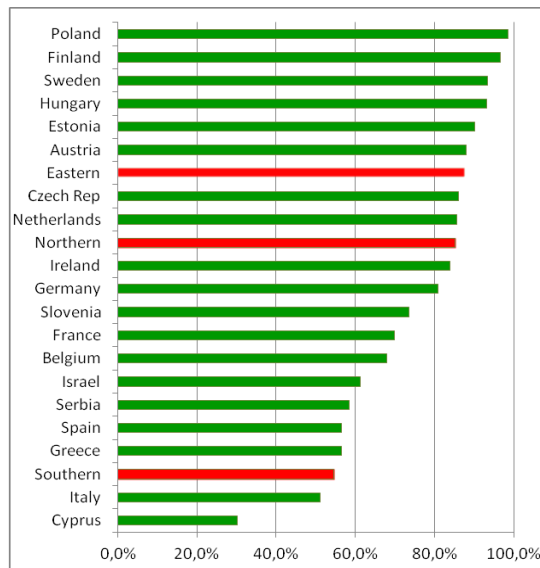


Figure 1. "Over the last month, how often have you driven a motorcycle after having drunk even a small amount of alcohol?", % never.

Significant variations between countries seem to exist (see Figure 1). First, a regional grouping¹ seemed to exist. Northern (e.g., Finland, Sweden) and Eastern (e.g., Poland, Hungary) countries have declared almost only sober drivers, whilst Southern countries have a significant number of motorcyclists declaring some drink-driving during the last month (Israel, Spain, Greece, Italy, and Cyprus especially with only 30% of never DWI motorcyclists). There was no significant difference between Northern and Eastern countries. Southern countries declared significantly more drink-driving than the two other groups, $F_{(2, 4464)} = 323.07, p < .001, \eta^2 = .13^2$. The more restrictive legislation in Eastern countries could explain the low rate of declared drink-drive behaviour. Indeed, all Eastern countries have a 0.0g/l or 0.2g/l legal BAC except Slovenia. The DWI differences between Northern and Southern countries, where legislations are mostly equivalent (0.5g/l legal BAC except for Sweden where the legal BAC is 0.2g/l), could be due to better road safety culture and attitudes in general (Wegman et al. 2005). Moreover, a marginal gender difference was found. Female riders (85%) were more consistently sober than men (75%), $F_{(1, 4465)} = 20.92, p < .001, \eta^2 = .004$. When examining these results for each country, it appeared that the difference was significant only in Southern countries, $F_{(1, 1399)} = 39.19, p < .001, \eta^2 = .027$. However, it has to be noted that the proportion of women motorcyclists in Northern and Eastern countries was small.

Similarly, the effect of age also differed between European regions. In Northern and Eastern countries, younger and older adults tended to drink-drive equally often. On the other hand, in Southern countries, younger adults drink-drive more often than their older ones, $F_{(5, 1394)} = 4.78, p = .009, \eta^2 = .017$. More specifically, the 25-34 years old category tended to drink-drive significantly more than the 35-44 and 45-54 age categories, $F_{(2, 999)} = 11.14, p < .001, \eta^2 = .022$.

¹ Countries have been divided in 3 categories. The Eastern category regroups countries of the Warsaw pact and ex-Yugoslavia. The Southern category regroups Mediterranean countries. The Northern category (in contrast with Southern) regroup Nordic and Central countries.

² η^2 represents the variance explained by the relation between the variables.

Finally, the frequency of declared drink-driving decreases as the engine size increases. Nearly, 80% of 999cc-or-more motorcycle owners declared that they remained always sober while riding during the last month, while this number is lower than 70% for the 126cc-or-less engine motorcyclists.

3.1.2 Drink-Driving and Accident Risk

The great majority of drivers (almost 93%) stated that alcohol increases (very much or fairly) the probability of collision with another road user. There was no statistically significant difference by gender or by age. Drinking and driving a small amount or over the legal limit, was correlated with the belief that drink-driving did not increase the risk of accident ($r = .20, p < .001$ and $r = .24, p < .001$ respectively).

3.1.3 Alcohol Consumption and Riding if Careful

Nearly 80% of motorcyclists totally disagree with the statement that it is possible to drink and drive if you do it carefully. There was no significant difference between men and women. Figure 2 shows differences by country for this question. There was no difference between Eastern ($M = 3.72$) and Northern ($M = 3.77$) countries. Yet, Southern motorcyclists reported more frequently that you can drink and drive if you do it carefully, $F_{(2, 4468)} = 57.79, p < .001, \eta^2 = .025$.

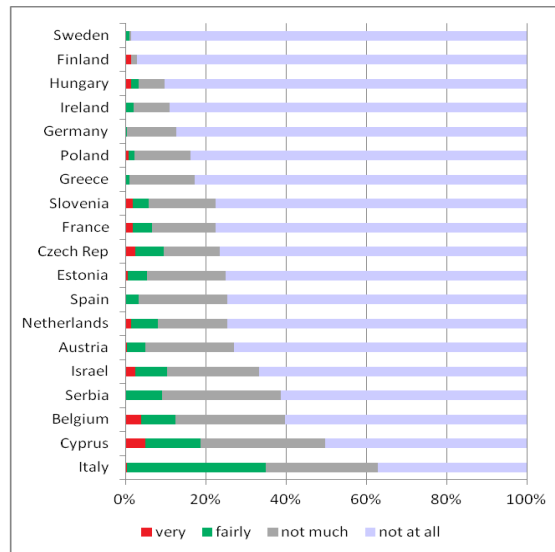


Figure 2. "You can drink and drive if you do it carefully", by country.

3.1.4 Perception of Alcohol as an Accident Contributory Factor

Motorcyclists were asked whether they thought that drinking and driving was a cause of road accidents. Country comparisons (see Figure 3) show that the rankings were totally different than for the previous questions. For example, in Sweden people were fully aware of the increased risk of accident when drink-driving and perceived, on the other side, a low involvement of this factor in road accidents. It may be that Swedish motorcyclists are convinced that very few of them are actually driving under the influence of alcohol. On the contrary, in Germany high proportions of positive

answers for both questions were found maybe because German motorcyclists perceive a high risk in drink-driving and associate it with a high involvement of this factor in road crashes.

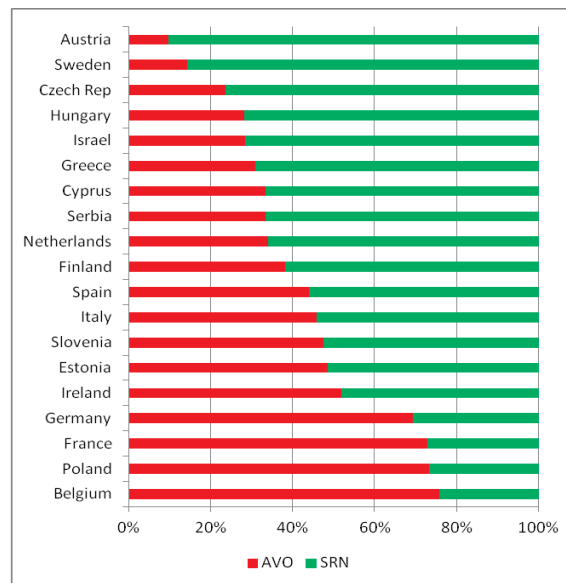


Figure 3. "How often do you think that drinking and motorcycling is the cause of motorcyclists being involved in road accidents ", by country.³

3.1.5 Alcohol Tickets Received Over the Past 3 years

In general, motorcyclists rarely declared that they had been fined for drink-driving: on average, only 3% of them over the past 3 years. There was however a great variability between countries with percentages ranging from 0% to 15%. In some countries, the proportion of motorcyclists having been fined for alcohol is $\leq 1\%$ (Austria, Estonia, Finland, France, Germany, Ireland, Italy, Netherlands and Sweden) whereas in some others the proportion is $> 6\%$ (Belgium, Cyprus, Israel and Serbia). In order to gather information about fine's effect on recidivism, we analyzed how the participants that received a ticket for drink-driving during the past 3 years changed or not their behaviour. Results indicated that among fined participants ($N = 125$), 44.8% answered that they never drove a motorcycle when they may have been over the legal limit during last month. So, in spite of the punishment, most of participated motorcyclists stated that they have reoffended recently.

Some variables have a link with the number of alcohol tickets received: driving experience ($\chi^2 = 40.4, p < .001$), prior injury accident ($\chi^2 = 78, p < .001$) and motorcycle frequency of use ($\chi^2 = 35.1, p < .001$). Although alcohol tickets remain infrequent, they increased by 6% for drivers already fined for speeding (98% vs. 92% never fined for alcohol, $\chi^2 = 106.4, p < .001$). This could indicate a tendency for some motorcyclists to commit several violations.

3.1.6 Alcolock, More Severe Penalties for Drink-Driving, and BAC Change

³Note: AVO is the sum of "Always", "Very often" and "Often" answers. SRN is the sum of "Sometimes", "Rarely" and "Never" answers.

Most of the motorcyclists interviewed support “alcolock” for all drivers (73% approved this measure "very" and "fairly") and for recidivist only (79%). They were also 78% in agreement with the statement that penalties for drink-driving offences should be much more severe. Italy is an exception, as it was the only country where the majority disapproved the alcohol interlock measure for all drivers (52% of "not much" and "not at all" in favour) and only 52% of them support more severe penalties for drink-driving offences.

Motorcyclists’ attitudes towards legal BAC changes were quite different. A high number of participants on average (60%) thought that motorcycle drivers should be allowed to drink "no alcohol at all" and "less alcohol than at the present". However, there were important differences between countries. Firstly, in the countries where the legal BAC is actually zero, the rate was higher than the average (72% for Czech Republic and 90% for Hungary). They were few to claim a change in legislation. These results showed a good acceptance of the more restrictive measure that exists in Europe. Secondly, in the countries that allow a single unit BAC, the majority of respondent reported that they were in favour of more restrictive legal BAC (Estonia 58%, Poland 97%, Serbia 54% and 72% in Sweden). Finally, the results seemed to provide some cultural information: Southern countries were less in favour of more restrictive BAC legislation than Northern and Eastern countries, $F_{(2, 4463)} = 143.54, p < .001, \eta^2 = .06$. In fact, Southern was the only region where a minority of participants (45%) claimed a change in the way of "less alcohol" and "no alcohol at all", while 70% of participants thought so in Northern countries.

The results revealed a consistent pattern linking attitudes toward legal measures and reported frequency of drink-driving. Motorcyclists who reported drink-driving over the legal limit during the last month were less in favour of alcohol interlock measures, especially when it was aimed at recidivists ($r = .14, p < .001$). In addition, the more the participants reported drink-driving the less they were prone to claim more severe penalties ($r = .22, p < .001$ for both few amount of alcohol and over the legal limit). Finally, drink-driving was significantly correlated to the opinion that legal limit should be higher than at present ($r = .39, p < .001$ with "even a small amount of alcohol"; $r = .30, p < .001$ with "over the legal limit"). It was not surprising that those who drink and ride are those who wish less legal restrictions and punishments. On the other hand, motorcyclists who do not drink and ride are very supportive to legislation as it may be a way to improve safety.

3.2 Drugs

Figure 4 illustrates that motorcycle riding under the influence of medication was reported even more rarely in the sample than driving under the influence of alcohol . 81% of the motorcyclists reported that they "never" drive while taking a medication that carries a "warning: it may influence your driving ability".

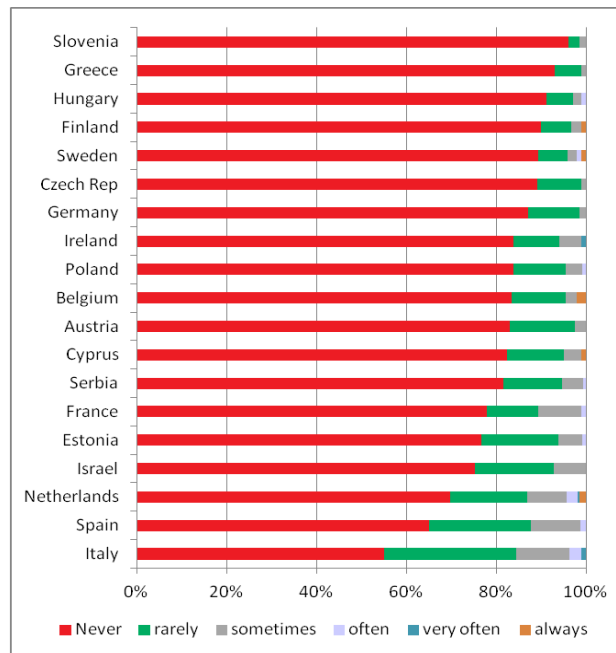


Figure 4. "Have you driven while taking a medication that carries a "warning: it may influence your driving ability"', by country.

A great majority of the respondents were aware of the danger associated with driving under the influence of medication. 86% of them think that it is "very" or "fairly" dangerous to drive while influenced by medication. However, those who did not think that DWI was really dangerous were more prone to report driving while medicated ($r = .28, p < .001$). Thus, an important way to prevent such behaviour could be to increase awareness of the risks. Moreover, medication-affected driving was significantly correlated with associated risk attitudes as driving: when too tired ($r = .14, p < .001$), after a few amount of drink ($r = .14, p < .001$) and after drinking probably over the legal limit ($r = .14, p < .001$).

3.3 Fatigue

Figure 5 shows that the great majority of respondents in Europe never or rarely drove in the past 12 months feeling too tired. More specifically, the percentage of motorcycle riders who responded 'never' ranges from 30% (Israel) and 40% (Greece, Estonia, Cyprus, Finland and Serbia) to almost 60% (France, Sweden, Belgium, Ireland, Hungary, Slovenia, Germany and Netherlands). On the other hand, motorcycle riders who responded 'rarely' range from 20% to 40%. 'Sometimes' average EU response is 14.1%. Finally, 'very often', 'always' and 'unknown' replies range from 0% to 1.9%.

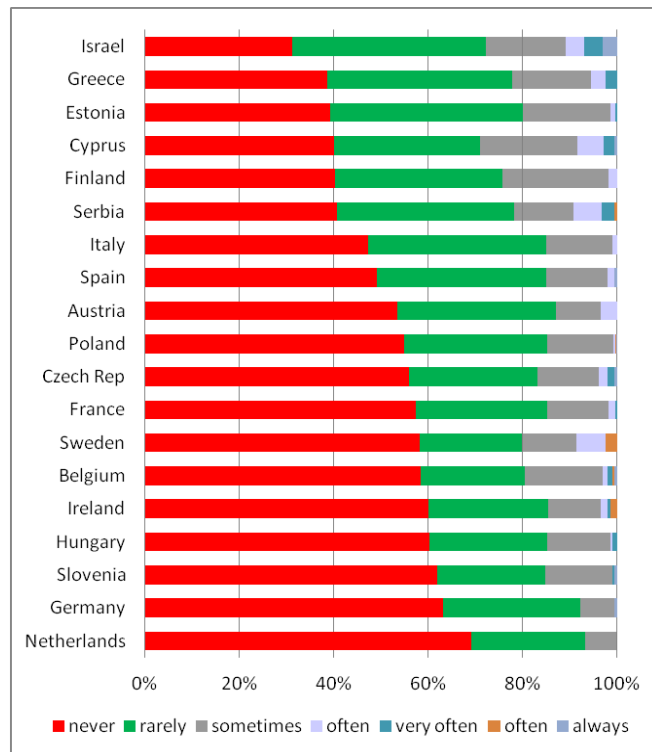


Figure 5: “In the past 12 months while driving a motorcycle how often did you realize that you were actually too tired to drive?”

4. Conclusions

Riding a motorcycle while impaired is one of the most dangerous situations known in road safety. The impact of alcohol on riding skills is even greater than for driving skills. The vast majority of motorcyclists seem to be aware of the risks. Unfortunately, there seems to be a non-negligible proportion of motorcyclists who drink-and-ride, and under-estimate the related risk, especially young males and riders of small motorcycles, and especially in Southern countries. Further communicating on this risk and informing motorcyclists about it appears thus of little effectiveness and other means of deterrence have to be found. From the results of the detailed descriptive analysis presented in this study, a number of conclusions can be summarised as follows:

- The percentage of motorcyclists who declared that they ride at least once during the last month after they had drunk even a small amount of alcohol is about 23%. Frequent motorcyclists reported drink-driving more often.
- The following regional pattern was revealed: Northern and Eastern countries have declared very low frequencies of drink-driving, whereas Southern countries have a significant number of motorcyclists declaring some drink-driving during the last month. This may be partly the poorer road safety culture combined with less systematic police enforcement in these countries compared to the rest of Europe.
- Young and male motorcyclists as well as riders of light motorcycles reported more frequent drink-driving, especially in Southern countries. This confirms existing

research findings, as these groups are often associated with reckless and risk taking behaviour and negative road safety attitudes.

- Motorcyclists who reported more frequent drink-driving were less in favour of more severe BAC limits and penalties. Interestingly, in countries with higher BAC limits, more frequent drink-driving behaviours were reported, suggesting on the one hand that riders are quite compliant to stricter limits, and on the other hand that more lenient limits may lead riders to attempt to fully use the rights “offered” by the limits.
- Despite the fact that 80% of motorcyclists totally disagree that it is possible to drink and drive if you do it carefully, smaller proportions were identified in Southern countries.
- Although 93% of riders believe that alcohol increases the probability of a road accident, riders who reported more frequent drink-driving appear to have lower perception of that risk.
- Despite the large acknowledgment of the risk of drink-driving a motorcycle, there is quite some variation between countries as regards the extent to which alcohol is a major contributory factor of motorcycle accidents. It is likely that in several countries other factors are considered to be more important.
- Only 3% of the participants have been fined for alcohol in the last 3 years, although the results reveal some variation in different countries. It was also found that motorcyclists fined for alcohol were also fined for speeding.
- The vast majority of respondents never consumed drugs and medications before riding.
- The vast majority of respondents never or rarely felt tired while riding.

The results of the present research have to be moderated by geographical considerations. Indeed, motorcycle use is very different among SARTRE countries because of both cultural and weather differences, especially between northern and southern countries. Profiles of motorcyclists, the frequency of use and the number of motorcyclists differs widely between those European regions. Moreover, the above mentioned potential action targets seem to have different impacts depending on the country location. In this research, it was revealed that very different attitudes, perceptions and behaviours as regards riding a motorcycle while impaired exist in different countries. As a consequence, different enforcement strategies depending on the geographical situation of the target country are recommended. Southern countries should be regarded as priority as they cumulate a high proportion of motorcycle use within local population and a high frequency of impaired riding.

5. Acknowledgements

The research leading to these results has received funding from the European Commission under grant agreement n° TREN/09/SUB/E3/229/SI2.544555/SARTRE4. The opinions expressed in this paper are those of the authors and not of the European Commission.

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