Road safety culture among car drivers and motorcycle riders in Norway and Greece: Examining the influence of national road safety culture

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Abstract: Although recent studies indicate the importance of road safety culture (RSC) for safety among non-professional road users, little is known about how RSC comes about in these settings, and how it is related to accident involvement. To examine this, the present study compares RSC across transport modes (Car-MC) and regions in two countries with distinctly different road safety records. The aims of the study are to: 1) Compare road safety behaviours among car drivers and motorcyclists in Norway and Greece, including five different regions, 2) Examine the factors influencing road safety behaviours, and 3) Examine the relationship between road safety behaviours and accident involvement. The study is based on survey answers from car drivers (N=596) and motorcycle riders (N=137) in Norway and car drivers (N=286) and motorcycle riders (N=193) in Greece. RSC is defined as shared patterns of behaviour and shared expectations to other road users. Results indicate different RSCs in the two countries, and also a unique RSC on a Greek island that is included in the data material. Our analyses indicate that RSC is important, as it is closely related to road safety behaviours, which in turn is related to accident involvement. This suggests that accidents may be reduced by influencing RSC. To contribute to such efforts, we discuss how and where RSC is created, based on our results.

1 Introduction

1.1 Background

Road safety remains a health issue of international interest, as it is still ranked among the ten leading causes of deaths worldwide (WHO, 2018). The number of annual road traffic deaths has reached 1.35 million, while between 20 and 50 million people are non-fatally injured (WHO, 2018). The numbers of people killed or severely injured in road crashes have gradually been reduced in recent years, as a result of traditional safety strategies focusing on safety behaviours, technology, and infrastructure (Elvik et al, 2009). It has been argued that additional reductions are contingent on developing new approaches to prevention, like e.g. the safety culture approach (Ward et al, 2010; Nævestad & Bjørnskau, 2012; Edwards et al, 2014).

High quality studies of safety culture interventions in organisations employing drivers at work, with pre- and post-measurements, test and control groups, have indicated up to 60% decrease in crash risk in the road sector (e.g. Gregersen et al, 1996). These studies focus, however, on the more established concept of organisational safety culture, which refers to shared and safety relevant ways of thinking and acting that are recreated in social interaction within organisations (Nævestad, 2010). Previous studies also indicate that road safety culture (RSC) in sociocultural contexts that are not work organisations (nations, regions, communities, peer-groups), is important, as it influences road safety behaviours, which in turn influence drivers' accident involvement (cf. Nævestad et al, 2019a). Thus, by influencing RSC, we may be able to reduce road fatalities and injuries. We define RSC as shared patterns of behaviour, shared norms prescribing certain road safety behaviours and thus, shared expectations regarding the behaviours of others (Nævestad et al, 2019a).

At the current stage, little is, however, known about how RSC comes about in the sociocultural contexts that are not work organisations. The non-professional road users are not culturally bonded through organizational units, e.g. with managers, policies and systems aiming to facilitate safe behaviours (Nævestad et al, 2014; Ward et al, 2010). It is important to examine the influence of different sociocultural contexts (e.g. country, community, peer groups) on different road safety behaviours, as this knowledge may indicate both the socio-cultural mechanisms through which RSC influences the behaviours of non-professional road users, and thus at which analytical levels preventive measures should be directed.

One important way of developing such knowledge is to examine sociocultural groups with presumably different RSCs, and discuss influencing factors. To examine this, the present study compares road safety behaviours and shared expectations to other road users at three different levels: 1) Country (Norway and Greece), 2) Transport mode (car drivers and motorcycle riders), 3) Region/community (three regions in Norway and two in Greece).

The two countries were chosen for comparison, as they have distinctly different road safety records. Norway had the lowest road mortality rate in Europe with 20 road deaths per million inhabitants in 2018, while the corresponding mortality rate in Greece in 2017 was 64 (ETSC, 2019). Several factors that could influence road safety culture are national (e.g. traffic rules, the police enforcing the rules, road user interaction, infrastructure). Thus, it is not unreasonable to assume the existence of different national RSCs in these countries, shared by both car drivers and motorcycle riders. In accordance with this several shared aspects of national RSC among car drivers, bus driver and heavy goods vehicle drivers in Norway and Greece were found in a previous study (cf. Nævestad et al, 2019a).

We also compare two different groups of road users, with distinctly different risk of accidents: car drivers and motorcycle riders. Research from Norway indicates that riders of heavy motorcycles have approximately six times higher risk of personal injury accidents than car drivers, and that the risk is even higher for riders of light motorcycles (Bjørnskau, 2015). Existing research also indicates higher risk among riders than drivers in Greece (up to 3.5 times depending on driver's age), Yannis et al, 2017). It is not unreasonable to expect the existence of a common motorcycle RSC,

extending across countries and geographical communities, based on the unique experiences of motorcycle riders, compared to e.g. car drivers (e.g. higher physical vulnerability, higher accident risk, different behaviours, the possible existence of a common motorcycle rider identity) (cf. Tunnicliff et al, 2014).

Finally, we also compare the importance of region/community for road safety culture (cf. Luria et al 2014). The drivers and riders in Greece were sampled from the capital (Athens) and a Greek island (Rhodes). The sampling was based on an assumption that the RSC on an island could be different from that in the capital, as an island is a geographical enclosed area and has many tourist drivers. The drivers and riders in Norway were sampled from the capital (Oslo) and two additional Norwegian counties, [a1]which were selected based on differences in accident risk and attitudes, as indicated in previous studies (Storesund, Hesjevoll & Fyhri, 2017).

1.2 Aims

The aims of the study are to: 1) Compare road safety behaviours among car drivers and motorcyclists in Norway and Greece, including five different regions, 2) Examine the factors influencing road safety behaviours, focusing especially on shared national descriptive norms, and 3) Examine the relationship between road safety behaviours and accident involvement.

2 Previous research

2.1 Motorcycle riding in Norway and Greece

When comparing motorcycle riders in Norway and Greece, it is important to note that powered two wheelers (PTWs), mopeds and motorcycles are common in Southern European countries[a2]. In comparison, motorcycle riding is generally a seasonal (summer) activity in Norway, which often is related to leisure (e.g. Bjørnskau et al, 2012). Based on this, we may expect that the purpose of the motorcycle trips in Norway and Greece often are different (e.g. leisure vs. practical daily transport), that the average rider characteristics (e.g. age, gender) are different, and that the types of motorcycles are different (e.g. larger and more expensive motorcycles in Norway). To make the motorcycle rider samples as comparable as possible, we have only included motorcycle riders from both countries, and not riders of powered two wheelers (PTW) in general.

2.2 Road safety behaviours among drivers and riders

The present study compares five types of road safety behaviour among car drivers and motorcycle riders.

Over speeding: Previous research indicates that motorcycles have a higher accident risk than cars, and that this to some extent is related to a higher prevalence of risk taking behaviours like over speeding (Bjørnskau et al, 2012; Dacota, 2012). It should also be

noted that previous research comparing car drivers, find more self-reported speeding in Northern European countries than in Southern European (Özkan et al, 2006; Warner et al, 2011).

Overtake a slow driver on the inside. Warner et al (2011) found a significantly higher prevalence of "overtaking a slow driver on the inside" among car drivers in Greece and Turkey, compared with drivers in Sweden and Finland. Moreover, Warner et al (2011) also found this behaviour to be significantly correlated with accident involvement among Greek car drivers.

Aggressive violations. Previous studies indicate higher levels of aggressive driving in Southern European countries compared with Northern European countries. Warner et al (2011) found higher prevalence of aggressive violations (e.g. become angered and indicate hostility, sound the horn to indicate annoyance) in Greece and Turkey than in Sweden and Finland. Comparing road safety behaviours in Northern European and Southern countries, Özkan et al (2006) found that Greek drivers committed more aggressive violations than other nationalities, especially behaviours indicating their annoyance and hostility to other road users. Comparing levels of aggressive behaviour among motorcyclists and car drivers, Rowden et al (2014) found lower levels of aggression among motorcyclists, presumably as the relative lack of protection offered by motorcycles may cause riders to feel more vulnerable and therefore, to be less aggressive when they are riding compared to when they are driving cars.

Race away from traffic lights. This behaviour is originally categorized as an aggressive violation in studies of car drivers, and it could therefore have been included in our index measuring aggressive behaviours. Since we study car drivers and motorcycle riders in the present study, we do, however, compare this behaviour separately for each group. The reason is that we expect that this is a type of behaviour that the motorcycle drivers could score higher on across countries, as previous research has indicated more speeding and risk taking among motorcycle drivers, including speeding on shorter distances to "test" the motorcycle and/or the driver skills (Bjørnskau et al, 2012).

Driving under the influence of alcohol. Previous studies have compared car drivers' and motorcycle riders' driving under the influence of alcohol. Results from the SARTRE study, based on data from 12507 car drivers and 4483 powered two-wheelers from 19 countries, show that, in most countries, motorcyclists drink and drive almost as often as car drivers do (Cestac et al, 2014). Thus, we do not expect to see differences between car drivers and motorcyclists when it comes to driving/riding under the influence of alcohol. Previous studies do, however, generally find a higher prevalence of drinking and driving among riders and drivers in Southern European countries, compared with Northern European countries (Cestac et al, 2014).

2.3 Factors influencing road safety behaviours

2.3.1 Demographic variables

Previous research has indicated that violations (which seem to be the behaviour most strongly related to accidents) seem to be more prevalent among young drivers and male drivers (Parker et al, 1998). Similar results have been found in studies of motorcycle riders (Dacota, 2012; Bjørnskau et al, 2012). The above-mentioned studies of driver behaviour also indicate the importance of nationality for behaviour (Özkan et al, 2006; Warner et al, 2011). Car drivers' education has also been found to influence road user behaviour. Sucha et al (2014) report of lower levels of "dangerous violations" and "dangerous errors" with increasing levels of education.

2.3.2 Road safety culture

There are no commonly accepted definitions of road safety culture (Edwards et al, 2014). As noted, we define RSC as shared patterns of behaviour, shared norms prescribing certain road safety behaviours and thus shared expectations regarding the behaviours of others (Nævestad et al, 2019a). In the present study, shared norms prescribing certain road safety behaviours are operationalized as descriptive norms, which refer to individuals' perceptions of what other people (in the relevant reference group) actually do (Cialdini et al, 1990). Descriptive norms may influence behaviour by providing information about what is normal in certain groups (Cialdini et al., 1990). It has been argued that the research on road safety culture often seems to lack an explanation of the theoretical link between safety culture and safety behaviours (Ward et al, 2010), and that such a theoretical link is required to bring this research forward. Based on Cialdini et al (1990), we may hypothesize that the mechanism explaining the relationship between RSC and road safety behaviours is subtle social pressure to behave in accordance with "what is normal" in your primary reference group (cf. Nævestad et al, 2019a). Finally, it is also important to note that descriptive norms can also influence behaviour through the false consensus bias, in which individuals overestimate the prevalence of risky behaviour among their peers in order to justify their own behavior (Berkowitz, 2005).

In the present study, we examine three sources of RSC, based on the unique factors influencing culture at three different analytical levels: 1) country, 2) transport mode and 3) region/community. Several factors may generate RSC at the national level. First, previous research indicates that road user interaction seems to be an important RSC, as road users continuously (re)create norms for behaviour by behaving in certain ways, sanctioning unwanted behaviours etc. (Özkan et al, 2006; Bjørnskau, 2017). In this manner, norms for commonly accepted behaviours may be created. Second, the interaction of road users and road user behaviours can be influenced by infrastructure, e.g. road markings, the design of junctions, road capacity (Özkan et al, 2006). Third, certain road safety behaviours, and thus, expectations to other road users can to some extent be "normalized" in formal driver training (Nævestad et al, 2019a). Finally, the perceived level of enforcement in a country is also a relevant factor (Özkan et al, 2006). Based on these four factors, we may expect different national RSCs among riders and drivers in Norway and Greece.

In the present study, we also examine the importance of region or community for RSC. We hypothesize that the interaction between road users is a crucial factor influencing RSC (cf. Özkan et al, 2006). Provided that most non-professional drivers usually drive within relatively limited regions on a daily basis, it is not unreasonable to expect that local community or regional RSC may form in some areas, based on the interaction of road users in the area. This may especially apply on islands, which are relatively geographically enclosed areas. Community RSC may also be influenced by the type and composition of road users in a region (e.g. a high proportion of old drivers, tourists).

Finally, it is not unreasonable to expect the existence of a common motorcycle RSC, extending across countries. Cars and motorcycles are different in several respects: physical vulnerability, accident risk, behaviours. Moreover, previous research also indicates that motorcycle riding more often than car driving is related to identity, and that those in the group with which one rides represent an important source of social influence (Tunnicliff et al, 2014).

2.4 Factors influencing accident involvement

Car drivers versus motorcycle riders. Heavy motorcycle (>500 ccm) riders have approximately six times higher risk of personal injury accidents than car drivers, while the risk of light motorcycles was even higher (Bjørnskau, 2015). The fatal accident risk of riders is also higher for riders than for drivers in Greece (Yannis et al, 2017).

Road safety behaviour. In a meta-study examining the relationship between car drivers' road safety behaviours and self-reported accidents, De Winter and Dodou (2010) found especially violations, but also errors, to be related to accidents. Warner et al (2011) found a relationship between aggressive violations and accident involvement. They also found that the behaviour "Overtake a slow driver on the inside" predicted Greek car drivers' accident involvement (Warner et al, 2011). Moreover, speeding appears to be a bigger problem for PTW crashes, compared to other modes (Dacota, 2012, Strandroth & Person, 2005). Strandroth and Person (2005) found that 40% of rider involved in fatal accidents had an excessive speed. Excessive speed was also related to road-racing replica motorcycles (sport motorcycles). This was also reported in Bjørnskau et al (2012). Additionally, driving under the influence of alcohol is also referred to as a risk factor related to motorcycle accidents, but results on the prevalence also differ on this type of behaviour (e.g. Huang and Preston, 2004; MAIDS, 2009; DRUID, 2010). Given the physical requirements of motorcycle riding, it seems, however, that riders' accident risk is influenced by lower levels of alcohol than drivers' risk.

Demographic variables. Nationality is a crucial demographic variable influencing the accident risk of both car drivers and motorcycle riders. As noted, the road mortality rate in Greece was 3.2 times higher than that in Norway (ETSC, 2019). Moreover, age is also an important variable influencing accident risk for both riders and drivers (Bjørnskau et al, 2012; Yannis et al, 2017). The same applies to gender: male drivers

have a higher risk of being involved in accidents than female drivers and riders (Bjørnskau et al, 2012; Yannis et al, 2017).

Mileage. The number of kilometres driven each year is an important risk factor influencing the risk of being involved in an accident (Elvik et al, 2009). In this respect, it is important to remember that motorcycle riding largely is a seasonal activity in Norway, probably generating fewer kilometers per year than in Greece.

2.5 Hypotheses based on previous research

First, we expect more over speeding among riders than drivers, especially among the Norwegian respondents (Hypothesis 1). Second, we expect a higher prevalence of overtaking slow drivers on the inside among the Greek respondents than among the Norwegian respondents (Hypothesis 2). Third, we expect more aggressive road user behaviour among the Greek respondents, but generally less aggression among motorcycle riders in both countries (Hypothesis 3). Fourth, we expect a higher prevalence of racing away from traffic lights among the riders than the drivers in both countries (Hypothesis 4). Fifth we expect higher prevalence of driving under the influence among the Greek respondents than among the Norwegian respondents (Hypothesis 5). Sixth, we expect that the following behaviours primarily will be related to the national level and expectations to other drivers in each country: overtaking on the inside, aggressive violations and driving under the influence (Hypothesis 6). Seventh, we expect that over speeding and racing away from traffic lights primarily will be influenced by the rider-driver dimension (Hypothesis 7). Eighth, we also expect that region will influence respondents' RSC (i.e. road safety behaviours and expectations to other drivers), especially among the respondents on the island, as this is a geographically enclosed area (Hypothesis 8). Ninth, we expect that the influence of country and region on behaviour primarily will be mediated by descriptive norms (Hypothesis 9). Finally, we expect that drivers and riders' road safety behaviours will be related to their road safety behaviours [a3](Hypothesis 10).

3 Method

3.1 The Safe Culture project

The study was conducted within the research project "Safety culture in private and professional transport: examining its influence on behaviours and implications for interventions", undertaken by the Institute of Transport Economics of Norway (TOI) in cooperation with the National Technical University of Athens (NTUA). Results from this project focusing only on bus drivers in Norway and Greece have been presented in Nævestad et al (2019b), and results from both professional and private drivers in Norway and Greece have been presented in Nævestad et al (2019a). The present study builds on and takes further a previous conference paper, focusing only on riders and drivers in Greece (Nævestad et al, 2019c).

3.2 Recruitment of Respondents

The study is based on survey answers from car drivers (N=596) and motorcycle riders (N=137) in Norway and car drivers (N=286) and motorcycle riders (N=193) in Greece. The Norwegian car drivers were recruited through the Preference Database of the Norwegian Postal Service. In September 2017, e-mails with web-links to the survey were sent to people in three Norwegian counties, including the capital Oslo. Counties were selected based on differences in accident risk and attitudes. Of the 45452 people who received the e-mail, 6727 people (14.8%) opened the e-mail, and 645 (9.6%) completed the survey. The Norwegian motorcycle riders were recruited with the help of the Norwegian motorcycle union, which distributed the survey link to its members in Oslo and the two counties. To increase response rates, Norwegian respondents were informed that they could participate in a draw for a present card of 2000 NOK, if they wanted to.

The Greek car drivers and motorcycle riders were recruited through a marketing research company in Greece, which was under the scientific supervision of researchers from the NTUA. Recruitment of drivers in Greece was also difficult, therefore, it was decided to approach candidates in person and further explain the scope of the survey. This helped eliminate their doubts and fears about confidentiality, and the use of the information they would provide. The private drivers in Greece were sampled from two different areas: the capital Athens and a Greek island. This sampling is based on an assumption that the RSC on an island could be different from the capital, as an island is a geographical enclosed area, and as it has many tourist drivers.

3.3 Survey Themes

Background variables. Both surveys among car drivers and motorcycle riders included questions on background variables like age, experience as a driver, gender, kilometers driven with a car, or motorcycle in the last two years, how often respondents drive/ride and what kind of car or motorcycle they drive/ride and respondents' highest level of education.

Road safety behaviours are measured by means of eight items taken from the Driver Behaviour Questionnaire (DBQ). The DBQ answer alternatives have been changed from relative to absolute alternatives (e.g., Question: "For every ten trips, how often do you …?", Alternative answers: "Never", "Once or twice", "Three or four times", "Five or six times", "Seven or eight times", "More than eight times but not always", "Always").

Two questions measure over speeding: "Disregard the speed limit on a residential road", "Disregard the speed limit on a motorway road". These were combined into an index (Cronbach's Alpha: .498).

Three questions measure aggressive violations: "Sound your horn to indicate your annoyance to another road user", "Become angered by a certain type of driver and indicate your hostility by whatever means you can", and "Become angered by

another driver and give chase with the intention of giving him/her a piece of your mind". These were combined into an index (Cronbach's Alpha: .767).

We also included the following items: "Drive when you suspect you might be over the legal blood alcohol limit", "Race away from green traffic light to beat the driver next to you" and "Overtake a slow driver on the inside".

The eight items measuring these behaviours were chosen, as they have been found to be related to accident involvement, and as they are applicable and comparable for both car drivers and motorcycle riders.

National descriptive norms. In addition to drawing inferences about national RSC based on shared patterns of behaviour in the two countries, we also measure national RSC by means of seven questions measuring national descriptive norms. Respondents were asked: "When driving in my country, I expect the following behaviour from other drivers:" 1) "That they sound their horn to indicate their annoyance to another road user", 2) "That they become angered by a certain type of driver and indicate their hostility by whatever means they can", 3) "That they overtake a slow driver on the inside", 4) "That they drive when they suspect they might be over the legal blood alcohol limit", 5) "That they drive without using a seatbelt", 6) "That they disregard the speed limit on a motorway road", and 7) "That they disregard the speed limit on a residential road". Five answer alternatives ranged between 1 (none-very few) and 5 (almost all/all). The seven items were combined into a national descriptive norms index (Cronbach's Alpha: .897).

Safety outcomes. We report results for one question on respondents' crash involvement while driving in the last two years, with four answer alternatives: 1) no, 2) yes involving property damage, 3) yes, involving personal injuries, 4) yes, involving fatal injuries.

3.4 Analysis

When comparing the mean scores of different groups, one-way Anova tests, which compare whether the mean scores are equal (the null hypothesis) or (significantly) different are used. Tukey post-hoc tests are conducted. Five regression analyses have been conducted. In the four first analyses, the factors predicting respondents' answer on dependent variables measuring different types of unsafe road safety behaviours are analysed. Hierarchical, linear regression analyses are used, where independent variables are included in successive steps. In a fifth regression analysis, the factors predicting respondents' answers on a dependent variable measuring accident involvement are analysed. Logistic regression analysis is used in this analysis, as the dependent variable has two values (no=1, yes=2). B values are presented, and they indicate whether the risk of accident involvement is reduced (negative B values) or increased (positive B values), when the independent variables increase with one value. Of course, it is impossible to conclude about causality, as this is a cross-sectional and correlational study. The term predict is nevertheless used when the regression analyses are described.

4 Results

4.1 Description of the sample

Table 1 provides a distribution of drivers/riders in Norway and Greece, including the proportion of males and age groups.

Table 1: *Distribution of drivers/riders in Norway and Greece, proportion of males and age groups*

Groups	Number	Proportion	Males	<26	26-35	36-45	46-55	56+
Car Norway	596	49%	59%	7%	27%	23%	18%	26%
MC Norway	137	11%	94%	3%	9%	16%	41%	31%
Car Greece	286	24%	64%	5%	23%	30%	28%	14%
MC Greece	193	16%	85%	14%	31%	26%	19%	10%
Total	1212	100%	68%	7%	25%	24%	23%	21%

Note: Motorcyclists (MC)

Table 1 indicates that nearly half of the sample is comprised of car drivers from Norway, while 40% of the sample is comprised of riders and drivers from Greece. The share of males is higher for motorcycle riders in both countries, but especially in Norway. Looking at the five regions included in the study, the share of males was highest on the island (75%) and lowest in one of the Norwegian counties (56%).[a4]

Table 1 also indicates that respondents from Norway generally are older than the respondents from Greece.[a5] Differences between the age groups are statistically significant at the 1%-level. Looking at the five regions included in the study, the share of respondents over 56 years old was lowest on the island (2.5%) and highest in one of the Norwegian counties (32%). The differences in riders'/drivers' experience are in accordance with the age differences. Over half of the riders and drivers in Norway had over 20 years of experience, while the corresponding shares in the Greek sample were 25% and 37%. The three most prevalent motorcycle types in Norway were touring (44%), classic (18%) and other (18%). The three most prevalent motorcycle types in Greece were scooter (55%), classic (21%) and other (8%). Riders were also asked about the engine capacity of their motorcycles, and 98% of the Norwegian respondents answered over 500 ccm, while 77% of the Greek riders answered up to 500 ccm. The three most prevalent car types in the Norwegian sample were passenger car (50%), station wagon (29%) and SUV (15%), while 90% of the drivers in the Greek sample drove passenger cars. Results on respondents' highest level of education indicate that the share of respondents with at least 3-4 years of university/college education was 76% among the Norwegian drivers, 61% among the Norwegian riders, 54% among the Greek drivers and 48% among the Greek riders.

Questions were also included about drivers'/riders' accident involvement (property damage, personal injury, fatal) in the course of the last two years. A proportion of 14% had been involved in an accident (at least property damage). This applies to

10% of the car drivers and 14% of the motorcyclists in Norway, and 17% of the car drivers and 23% of the motorcyclists in Greece. Differences were statistically significant at the 1%-level.

4.2 Road safety behaviours

Shared patterns of road safety behaviours is the first element in our definition of national RSC. Table 2 shows mean scores for five road safety behaviour variables in the four groups.

Table 2: *Mean scores for five road safety behaviour variables in the four groups: Over speeding (min: 2, emax: 14), Overtake a slow driver on the inside (min: 1, max: 7), Aggressive violations (min: 3, max: 21), Race away from traffic lights (min: 1, max: 7), Driving under the influence (DUI) (min: 1, max: 7)*

Group	Over speeding	Overtake on the inside	Aggressive violations	Race away from traffic lights	Driving under the influence
Car Norway	5.1	1.3	4.2	1.5	1.03
MC Norway	5.9	1.3	3.9	2.3	1.01
Car Greece	5.1	2.0	5.8	1.6	1.37
MC Greece	5.0	2.2	6.2	2.1	1.42
Correlations with:					
National norms	.189**	.452**	.435**	.233**	.309**
Accidents:	n.s.	.115**	.087**	.065*	.067*

$p < 0.05$ * $p < 0.01$**

We conducted post-hoc tests (Tukey) to examine whether the differences between the mean scores were significantly different, using one-way ANOVA. We did this, both based on a variable with one value for each of the four groups in Table 2, and for a variable with ten groups, comparing riders and drivers in each of the five studied areas (two in Greece and three in Norway). [a6]

Table 2 indicates that Norwegian riders score higher on over speeding than the other groups. Comparing means for the over speeding index, the main result is that the score of riders in Norway were significantly different from drivers in Norway at the 5%[a7] level. When we look at riders and drivers within the five studied areas, we see that riders/drivers in Athens have the lowest scores (4.3), followed by car drivers in the Norwegian counties (4.8-5.1) while riders in the three Norwegian counties (5.7-6.5) had the highest scores together with drivers and riders (6.2-7) on the Greek island (we refer to this as the "island" in the rest of the paper). Thus, motorcycle samples had four of the five highest scores on over speeding. Over speeding seems to be related to mode (motorcycle) country (Norway) and region (island).

Comparing means for overtaking a slow driver on the inside, we see that the difference between the scores of drivers and riders in Norway was not statistically

significant, neither was the difference between riders and drivers in Greece. Differences were, however, statistically significant at the 1% level across countries, indicating different national patterns for this behaviour. Comparing riders and drivers within the five different areas, we see that respondents on the island have the highest score (2.8), followed by respondents in Athens (1.7) and Oslo (1.4). Respondents from the two counties in rural Norway had the lowest scores on this behaviour (1 and 1.1). Thus, this behaviour seems to be related to region and country.

Looking at aggressive violations, the difference between the scores of car drivers and motorcycle riders in Norway was not statistically significant. The same applies to the difference between riders and drivers in Greece. Differences were, however, statistically significant at the 1% level across countries, indicating different national patterns. When we compare riders and drivers within the five different areas, the score of the respondents on the island is twice as high (8.2) as the scores in the Norwegian sample (4.2). The score among the respondents in Athens is 4.8. Thus, aggressive violations seem to be related to region and country.

Comparing scores for the variable "Race away from a green traffic light with the intention of beating the driver next to you", difference between the scores of riders in Norway and Greece were not statistically significant. The same applies to the difference between drivers in Norway and Greece. Differences were, however, statistically significant at the 1% level across transport modes. This indicates that this behaviour primarily is related to mode, and that we see shared patterns across countries. Comparing riders and drivers within the five different areas, we see that riders on the island (3.1) and Oslo (2.5) have the highest scores on this question, followed by car drivers on the island (1.9). This behaviour is primarily related to mode.

Comparing means for driving under the influence, the difference between the scores of drivers and riders in Norway were not statistically significant, neither were difference between riders and drivers in Greece. Differences were, however, statistically significant at the 1% level across countries. This indicates shared behavioural patterns within countries. Looking at the five different areas, we see that respondents on the island have the highest score (1.7), followed by respondents in Athens (1.3), while respondents in Norway have the same, lowest possible score (1). Driving under the influence seems primarily to be related to country.

4.3 National descriptive norms

National descriptive norms are the second element in our definition of national RSC.

We made a national descriptive norms index based on the sum scores of the seven questions measuring this (cf. section 3.2.2) (Cronbach's Alpha: .897) (min 7, max 49). Table 3 shows results on the index for the different groups.

Table 3 National descriptive norms index

Nationality/Group	National descriptive norms	
	Mean	S.D.
Car Norway	10.7	3.6
MC Norway	10.8	2.7
Car Greece	18.6	7.1
MC Greece	17.2	6.4

Results show generally higher national descriptive norm scores among drivers and riders in Greece, indicating that the Greek respondents generally expect more aggression and violations from other road users in their country than the Norwegian riders and drivers. We conducted post-hoc tests (Tukey) to examine whether the differences between the mean scores were significantly different, using one-way Anova. We did not find significant differences between car drivers and motorcycle riders in Norway on the national descriptive norms index, indicating that they expect the same level of aggression and violations from other drivers in their country. Comparing riders and drivers in Greece, we found that the score of the Greek drivers were significantly higher than the motorcycle riders in Greece. The difference was statistically significant at the 5%-level. Thus, Greek car drivers expected slightly more violations and aggression than Greek motorcycle riders. The higher score for the car drivers is related to the higher score of the car drivers from the island in the sample. Looking at the five different areas,[a8] we see that respondents on the island (especially car drivers) have the highest score on the national descriptive norms index (22), followed by respondents in Athens (16), while respondents in the three Norwegian counties have the same and lowest scores (10-11). Thus, these data indicate that Greek respondents in general have different expectations to other drivers than Norwegian drivers, and that respondents on the island stand out in the data, as they expect the highest level of aggression and violations. This is also indicated by the higher standard deviations for the Greek mean values.

4.4 Factors influencing road safety behaviours

In this section, we conduct regression analyses to examine the variables predicting road safety behaviours. We focus on the behaviours that were significantly correlated with accident involvement: 1) Overtake a slow driver on the inside, 2) Aggressive violations, 3) Race away from green traffic lights, and 4) Drive when you suspect you might be over the legal blood alcohol limit.

4.4.1 Variables influencing "Overtaking a slow driver on the inside"

Table 4 shows the results of nine regression models with "Overtake a slow driver on the inside" as the dependent variable.

Table 4: Linear regression. Dependent variable: "Overtake a slow driver on the inside" (Min=1, Max=7) Standardized beta coefficients.

Variables	Step 1	Step 2	Step 3	Step 4	Step 5	Step 6	Step 7	Step 8	Step 9
Gender	**-.138****	**-.166****	**-.139****	**-.131****	**-.123****	**-.115****	**-.111****	**-.112****	**-.112****
Age group		**-.191****	**-.149****	**-.096****	**-.095****	**-.108****	**-.083****	**-.081****	**-.081****
Nationality			**.285****	**.069***	.061	.039	-.015	-.020	-.020
National norms				**.387****	**.389****	**.395****	**.317****	**.319****	**.319****
Car-MC					.033	.029	.015	.007	.006
Education						**-.096****	**-.079****	**-.078****	**-.079****
Greek island							**.225****	**.224****	**.224****
Scooter								.018	.018
Pick up/Van									-.003
Adjusted R^2	.018	.053	.132	.228	.229	.237	.270	.269	.269

$p < 0.05$ * $p < 0.01$**

Table 4 indicates five main results. The first is that National norms is the most important variable predicting drivers' and riders' tendency to overtake a slow driver on the inside. This is the variable with the strongest contribution in the model, when we control for all the other variables. This means that respondents who expect higher level of aggressive behaviour and violations among other drivers in their own country are more likely to overtake slow drivers on the inside. As expected, this variable is strongly correlated with nationality. Nationality correlated positively with "overtaking a slow driver on the inside" in Step 3, but was strongly reduced in Step 4, when National norms was included in the analysis. This means, as indicated in Table 2, that the Greek drivers reported higher incidences of overtaking slow drivers on the inside.

The second main result is that island is the variable with the second strongest contribution in the model. The contribution of this variable indicates a higher prevalence of overtaking slow drivers on the inside among drivers and riders on the island. This also applies when we control for background variables like age, gender, education, car and motorcycle type. Thus, it is not necessarily related to the sampling of respondents on the island.

The third main result is that demographic background variables like respondents' gender, age and education also contribute significantly and negatively. This means that the behaviour of overtaking slow drivers on the inside are reduced for older drivers, female driver and drivers with higher levels of education.

Fourth, it is important to note that neither motorcyclemotorcycle type, nor car type contributes significantly in the model. These were included, as they were the variables with the highest mean scores on the studied behaviour.

Fifth, it should also be noted that the driver versus rider dimension does not seem to be important for this type of road safety behaviour, as indicated by the comparison of means in Table 2. Car versus motorcycle does not contribute significantly in any of the models.

Finally, the adjusted R value is .269 in Step 9, indicating that the model explains 27% of the variation in the dependent variable.

4.4.2 Variables influencing "Aggressive violations"

Table 5 shows the results of nine regression models with "Aggressive violations" as the dependent variable.

Table 5: Linear regression. Dependent variable: "Aggressive violations" (Min=3, Max=21) Standardized beta coefficients.

Variables	Step 1	Step 2	Step 3	Step 4	Step 5	Step 6	Step 7	Step 8	Step 9
Gender	**-.106****	**-.138****	**-.110****	**-.103****	**-.101****	**-.093****	**-.087****	**-.089****	**-.085****
Age group		**-.211****	**-.168****	**-.121****	**-.121****	**-.134****	**-.096****	**-.094****	**-.098****
Nationality			**.292****	**.096****	**.094****	**.071***	-.010	-.016	-.009
National norms				**.351****	**.351****	**.357****	**.240****	**.242****	**.242****
Car-MC					.008	.003	-.018	-.030	-.019
Education						**-.099****	**-.073****	**-.072****	**-.072****
Greek island							**.339****	**.336****	**.332****
Scooter								.025	.023
Pick up/SUV									**.049***
Adjusted R^2	.010	.053	.136	.215	.214	.223	.298	.298	.300

$p < 0.05$ * $p < 0.01$**

Table 5 indicates five main results. The first main result is that island is the variable with the strongest contribution to aggressive violations in the model. This indicates a higher prevalence of aggressive violations among drivers and riders on the island. The contribution of age and education is reduced somewhat when island is included, indicating a correlation with these, and somewhat younger respondents with lower levels of education on the island. The contribution of island in the model indicates an "Island effect" in the data, in addition to the national differences. It is, however, important to note that we see independent contributions of both nationality (i.e. Greek) and Island on aggressive violations. Both variables contribute significantly, if we remove National norms, indicated, as noted, that the contribution of nationality is mediated through National norms.

The second main result is that National norms is the second most important variable predicting drivers' and riders' tendency to commit aggressive violations. This means that respondents who expect higher level of aggressive behaviour and violations among other drivers in their own country are more likely to be involved in aggressive violations themselves. As expected, this variable is strongly correlated with nationality, which is strongly reduced when we include National norms in Step 4.

The third main result is that demographic background variables like respondents' gender, age and education also contribute significantly and negatively. Older drivers, female driver and drivers with higher levels of education commit lower levels of aggressive violations.

Fourth, motorcyclemotorcycle type does not contribute significantly in the model, but car type does. Pick up and SUV drivers seem to commit slightly more aggressive violations, controlled for the other variable.

Fifth, it should also be noted that the driver versus rider dimension does not seem to be important for aggressive violations, as indicated by the comparison of means in Table 2.

Finally, the adjusted R value is .300 in Step 9, indicating that the model explains 30% of the variation in dependent variable.

4.4.3 Variables influencing "Racing away from green traffic lights"

Table 6 shows the results of nine regression models with "Race away from green traffic light to beat the driver next to you" as the dependent variable.

Table 6: Linear regression. Dependent variable: "Race away from green traffic light to beat the driver next to you" (Min=1, Max=7) Standardized beta coefficients.

Variables	Step 1	Step 2	Step 3	Step 4	Step 5	Step 6	Step 7	Step 8	Step 9
Gender	**-.177****	**-.204****	**-.202****	**-.197****	**-.136****	**-.130****	**-.126****	**-.124****	**-.121****
Age group		**-.185****	**-.181****	**-.145****	**-.139****	**-.149****	**-.127****	**-.125****	**-.127****
Nationality			.022	**-.128****	**-.189****	**-.207****	**-.254****	**-.246****	**-.240****
National norms				**.269****	**.287****	**.291****	**.223****	**.223****	**.220****
Car-MC					**.235****	**.231****	**.219****	**.199****	**.205****
Education						**-.079****	**-.064***	**-.064***	**-.058***
Greek island							**.198****	**.190****	**.184****
Racing/off-road								**.073****	**.074****
Pick up/Other									**.071****
Adjusted R^2	.030	.063	.063	.063	.109	.162	.187	.191	.196

$p < 0.05$ * $p < 0.01$**

Table 6 indicates six main results. The first is that Nationality is the most important variable predicting drivers' and riders' tendency to "Race away from green traffic light to beat the driver next to you". Interestingly, this variable did not contribute significantly (in Step 3), until National norms was included in Step 4. This is in contrast to the comparison of means in Table 2, which did not indicate significant differences between the two countries. The contribution of Nationality is negative, which means that Greek drivers and riders are less likely to race away from green light, when we control for all the other variables in the model.

The second most important variable is National norms, which contributes positively to the dependent variable. This means that respondents who expect higher level of aggressive behaviour and violations among other drivers in their own country are more inclined to race away from green light. As noted, this generally applies to the Greek drivers and riders. It is therefore interesting to see that nationality (i.e. Greek) contributes negatively, when we also include National norms.

Third, the driver versus rider dimension (Car-MC) is the third most important predictor of this type of road safety behaviour. This is in accordance with the comparison of means in Table 2, which indicated similarities between riders and drivers across countries.

Fourth, island is the variable with the fourth strongest contribution in the model, indicating a higher prevalence of racing away from green traffic lights among drivers and riders on the island. This also applies when we control for background variables like age, gender, education, car and motorcycle type. Thus, it is not necessarily related to the sampling of respondents on the island.

The fifth main result is that demographic background variables like respondents' gender age and education also contribute significantly and negatively. This means that the older drivers, female driver and drivers with higher levels of education report lower levels of racing away from green traffic lights.

Sixth, it is important to note that both motorcycle type (Racing/offroad) and car type (Pick-up/Other) contributes significantly in the model. These were included, as they were the variables with the highest mean scores on the studied behaviour.

Finally, the adjusted R value is .269 in Step 9, indicating that the model explains 27% of the variation in dependent variable.

4.4.4 Variable predicting "Driving under the influence of alcohol"

Table 7 shows the results of nine regression models with "Drive when you suspect you might be over the legal blood alcohol limit" as the dependent variable.

Table 7: Linear regression. Dependent variable: "Drive when you suspect you might be over the legal blood alcohol limit" (Min=1, Max=7) Standardized beta coefficients.

Variables	Step 1	Step 2	Step 3	Step 4	Step 5	Step 6	Step 7	Step 8	Step 9
Gender	**-.093****	**-.115****	**-.088****	**-.084****	**-.083****	**-.081****	**-.079****	**-.080****	**-.078****
Age group		**-.143****	**-.102****	**-.076****	**-.076****	**-.079****	**-.060***	**-.059***	**-.060***
Nationality			**.281****	**.176****	**.176****	**.171****	**.131****	**.139****	**.143****
National norms				**.188****	**.188****	**.189****	**.132****	**.131****	**.129****
Car-MC					.003	.002	-.009	-.031	-.026
Education						-.022	-.009	-.008	-.004
Greek island							**.168****	**.161****	**.157****
Racing/chopper								**.076****	**.077****
Pick up/other									.049
Adjusted R^2	.008	.027	.104	.126	.125	.125	.143	.148	.149

$p < 0,05$ * $p < 0,01$**

Table 7 indicates five main results. The first main result is that island is the variable with the strongest contribution to driving under the influence. This indicates a higher prevalence of driving under the influence of alcohol among drivers and riders on the island.

The second main result is that nationality is the variable with the second strongest contribution to driving under the influence, indicating a higher prevalence of driving under the influence of alcohol among Greek drivers and riders compared with the Norwegian riders and drivers.

Third, National norms is the third most important variable predicting drivers' and riders' tendency to drive under the influence of alcohol. This means that respondents who expect higher level of aggressive behaviour and violations among other drivers in their own country are more likely to be involved in driving under the influence themselves. As expected, this variable is correlated with nationality, which is reduced substantially, when we include National norms in Step 4.

The fourth main result is that demographic background variables like respondents' gender and age also contribute significantly and negatively. Older drivers and female driver report lower levels of driving under the influence of alcohol. Moreover, we also see that motorcycle type (Racing/chopper) is significantly related with driving under the influence of alcohol, controlled for the other variables in the model.

Fifth, it should also be noted that the driver versus rider dimension does not seem to be important for driving under the influence, as indicated by the comparison of means in Table 2.

Finally, the adjusted R value is .149 in Step 9, indicating that the model explains 15% of the variation in dependent variable.

4.5 Factors influencing accident involvement

Table 8 presents the exposure for the different groups, accident involvement and accident risk, measured as accidents with at least property damage, per million kilometres driven. The numbers are based on self-reported data. As expected, the Table indicates higher numbers of kilometres driven for drivers than for riders in both countries, and more kilometres driven in for riders in Greece than Norway, as motorcycle riding is more of a seasonal activity in Norway.

Table 8: Estimated mean thousand kilometres (Kms) driven in the last two years with car motorcycle, including share of respondents who answered that they had experienced an accident in the last two years and estimated risk of accidents with property damage, based on self-reported numbers of kilometres and accidents.

Group	Kms	N	S. D.	Accidents	Acc. risk
Car Norway	22	596	21.4	10%	4.4
MC Norway	12	137	12.8	14%	11.9
Car Greece	22	286	11.4	17%	7.9
MC Greece	16	193	10.7	23%	14.3

As expected, we see a higher risk for motorcycle riders, and generally a higher risk for riders and drivers in Greece than in Norway. The accident risk on the island was 14.9 accidents per million kms for riders and 8.4 for drivers.

A logistic regression analysis was conducted with accident involvement as the dependent variable. In this analysis, the accident involvement variable, which originally had four answer alternatives, was dichotomized, 0=accident, 1=accident. B values are presented and they indicate whether the risk of accident involvement is reduced (negative B values) or increased (positive B values), when the independent variables increase with one value. We include different independent variables step-wise in the analyses to be able to examine the isolated effect of the independent variables, i.e. when the other variables are held constant. Table 9 shows the results of nine logistic regression models with accident involvement as the dependent variable.

Table 9: Logistic regression. Dependent variable: Accident involvement. B values. (No accident: 0, Accident: 1)

Variables	Step 1	Step 2	Step 3	Step 4	Step 5	Step 6	Step 7	Step 8	Step 9
Gender (Female=0, Male=1)	.219	.257	.190	.096	.085	.028	.029	.011	.061
Age (>46 yrs=2, Oth.=1)		**.300***	.210	.211	.213	.160	.181	.176	.157
Nationality (Gr.=0, No.=1)			**-.697*****	**-.619*****	**-.616*****	**-.505*****	**-.554*****	**-.541*****	**-.607*****
Car-MC (MC=0, Car=1)				**-.365***	**-.380***	**-.379***	**-.387****	-.261	.033
Mileage					.002	.002	.002	.001	.003
Overtaking inside						**.151****	**.169****	**.163****	**.142***
Gr. island (=0, Other=1)							.192	.146	-.032
Classic MC (=0, Other=1)								**-.544***	-.550
Incidents									**-1.063*****
Nagelkerke R^2	.002	.007	.032	.037	.037	.044	.045	.049	.098

* p < 0.1 ** p < 0.05 *** p < 0.01

Table 9 indicates five main results. The first main result is that previous incidents is the variable with the strongest contribution to riders' and drivers' accident involvement. As noted, this is defined as near misses in the last two years for riders. For riders, this is defined as situations where the riders or others have had to break and/or turn heavily to avoid collision. For drivers, this is having dented or scratched your car, or touched an object (e.g. a post, a wall, another car while parking).

The second main result is that nationality is the variable with the second strongest contribution to accident involvement, controlled for the other variable in the analysis. The value is negative, indicating that being Norwegian involves a lower risk of being involved in an accident.

Third, overtaking a slow driver on the inside is the third most important variable predicting drivers' and riders' accident involvement. This means that the more involved riders and drivers are in this type of behaviour, the more likely they are to be involved in accidents. The analysis also indicates that this behaviour is related to involvement in incidents, as the contribution of overtaking on the inside was reduced significantly when the incidents variable was included in Step 9.

Fourth, the analysis also indicates that motorcycle type is related to accident involvement and incident involvement. Classic MC contributed significantly in Step 8

at the 10% level, indicating a relationship with accident involvement. Classic mc ceased, however, to contribute significantly in Step 9, when the incident variable was included, also indicating a relationship between Classic MC and incidents.

Fifth, the analysis also indicates the importance of the car versus MC dimension for accident involvement (in addition to the national dimension). This variable contributed significantly in Steps 4-7, until Classis MC was included in the analysis.

The Nagelkerke R^2 indicates the amount of variance in the dependent variable that is explained by the independent variables in the models. In Step 9, the Nagelkerke R^2 is 0.098 which indicates that the independent variables explain 10% of the variance in respondents' accident involvement.

5 Concluding discussion

5.1 Road safety behaviours among riders and drivers

The first aim of the study was to compare road safety behaviours among car drivers and motorcyclists in Norway and Greece. This was done to identify shared patterns of behaviours in the studied groups (country, mode, region), which make up the first element in our operationalization of national RSC.

First, we expected more over speeding among riders than drivers (Bjørnskau et al, 2012; Dacota, 2012), especially among the Norwegian respondents (Özkan et al, 2006; Warner et al, 2011) (Hypothesis 1). With the exception of riders in Athens, Hypothesis 1 was supported by the data: we found similar higher levels of over speeding among riders across countries: the motorcycle samples had four of the five highest scores on over speeding. Thus, in accordance with previous research, over speeding seems to be related to the motorcycle versus car dimension (Bjørnskau et al, 2012; Dacota, 2012). Moreover, in accordance with Hypothesis 1, we also found generally higher level of over speeding among the Norwegian riders. We found, however, high scores among riders and drivers on the island, also indicating the importance of region for over speeding.

Second, we expected a higher prevalence of overtaking slow drivers on the inside among the Greek respondents than among the Norwegian respondents (Hypothesis 2), in accordance with previous research (Warner et al, 2011). Our results partly support this hypothesis, as we found higher scores on this behaviour among the Greek respondents. We found, however, that this to a considerable extent was related to the higher scores among riders and drivers on the island, indicating the importance of region for this behaviour.

Third, we expected more aggressive violations among the Greek respondents (Özkan et al, 2006; Warner et al, 2011), but generally less aggression among motorcycle riders in both countries (Rowden et al, 2014) (Hypothesis 3). In accordance with Hypothesis 3, we found higher levels of aggressive violations among both Greek drivers and riders, compared with the Norwegian, and scores were relatively similar for riders and drivers within countries. The higher score among Greek respondents

largely was, however, to a great extent related to the higher levels of aggressive violations among riders and drivers on the island. This also indicates the importance of region for this behaviour. Based on Rowden et al (2014), we expected lower levels of aggressive violations among motorcyclists, presumably as the relative lack of protection offered to motorcycles may cause riders to feel more vulnerable and therefore, to be less aggressive. Our results do not support this hypothesis.

Fourth, based on previous research, we expected a higher prevalence of "Racing away from traffic lights, with the intention of beating the driver next to you" (Hypothesis 4), as previous research has indicated more speeding and risk taking among motorcycle riders, including speeding on shorter distance to "test" the motorcycle and/or the driver skills (Bjørnskau et al, 2012). In accordance with this hypothesis, we found relatively similar scores among the motorcycle riders across countries that were significantly higher than the car drivers in both countries.

Fifth, based on previous research (Cestac et al, 2014), we expected a higher prevalence of driving under the influence of alcohol among Greek riders and drivers compared to riders and drivers in Norway (Hypothesis 5). Results supported this hypothesis: riders and drivers in Greece scored significantly higher than the Norwegian respondents on this behaviour.

5.2 Factors influencing road safety behaviours

The second aim of the study was to examine the factors influencing road safety behaviours. We conducted regression analyses to examine the variables predicting road safety behaviours. The analyses focused on the behaviours that were significantly correlated with accident involvement.

5.2.1 The influence of the national level

The regression analyses indicate, in accordance with Hypothesis 6, that the national dimension (nationality or National norms) was the most, or second most important variable explaining all of the four behaviours that were examined in the regression analyses. In two of the cases; overtaking on the inside and aggressive violations, the effect of nationality was mediated by National norms, as the contribution of nationality was removed when National norms was included in the analysis. National norms was the most important variable influencing overtaking and the second most important influencing aggressive violations. Nationality was the most important variable influencing "Racing away from green traffic lights", and it was the second most important variable predicting driving under the influence of alcohol. In these two latter behaviours, both National norms and nationality contributed significantly, indicating that the contributions of nationality were due to national factors additional to national norms. The importance of nationality for riders' and drivers' road safety behaviours, are as noted in accordance with previous research (Özkan et al, 2006; Warner et al, 2011). Overall, these results indicate different national patterns in road safety behaviours for all of the studied behaviours.

5.2.2 The mediating effect of national descriptive norms

The variable National descriptive norms contributes significantly in the analyses of all of the studied road safety behaviours. This variable refers to individuals' perceptions of what other drivers in their country do (cf. Cialdini et al, 1990), and we measure it by a sum score index focusing on seven behaviours. Comparing the scores on this index, we saw similar scores for both drivers and riders in the three Norwegian regions, and a higher average score among the Greek respondents. National descriptive norms is the most important variable in two of the analyses, the second most important in one and the third most important in one of the analyses with behaviours as the dependent variable. In the analyses of overtaking on the inside and aggressive violations, the whole contribution of nationality was mediated by national descriptive norms. Thus, our analyses indicate that national norms is an essential variable in the analyses, providing an important explanation to the relationship between nationality and road safety behaviours. This is in accordance with Hypothesis 8, and previous research indicating that descriptive norms may influence behaviour by providing information about what is normal in certain groups (Cialdini et al., 1990); in this case among other drivers in the countries of the respondents. Ward et al (2010) assert that research on road safety culture often seems to lack an explanation of the theoretical link between safety culture and safety behaviours. Based on Cialdini et al (1990), we hypothesize that the mechanism explaining the relationship between national norms and road safety behaviours is subtle social pressure to behave in accordance with "what is normal" among other drivers in your country (or island) (cf. Nævestad et al, 2019a). The different national shared patterns of behaviours and national descriptive norms in the two studied countries indicate different national RSCs.

5.2.3 The influence of region

The regression analyses indicate, in accordance with Hypothesis 8, and previous research (Luria et al, 2014) that region (i.e. island) was an important predictor of all the studied behaviours. Region was the most important predictor of aggressive violations, and driving under the influence of alcohol. It was the second most important predictor of overtaking a slow driver on the inside and fourth most important predictor of race away from green traffic lights. In accordance with our hypothesis, results seem to indicate an "island effect", with significantly different patterns of road safety behaviours on the island. We do not find similar regional effects in the Norwegian data, which by and large do not indicate significant differences between the different counties. This is interesting, and it requires a discussion of the conditions influencing the different RSC on the island. It is also important to note that the respondents on the island also had the highest scores on the national descriptive norms index. Riders and drivers on the island scored on average 11 points higher than the Norwegian respondents on the index, and six points higher than the riders and drivers in Athens. Thus, the different shared patterns of behaviours and national descriptive norms on the island seem to indicate a specific regional RSC on the island.

Although we compare RSC at three different levels in the present study, the national descriptive norms index focuses on the national level, asking respondents about expectations to other drivers: "When driving in my country." We can, however, generally expect that riders and drivers primarily assess this based on their experiences with the drivers on their local roads, in the region where usually drive, and that the scope of respondents' daily geographical driving environment limits their experiences. This means for instance that the riders'/drivers' on the islands expectations to "other road users in their country" largely are based on their experiences with local drivers from their island. The same applies to riders'/drivers' in the Norwegian counties, which are about 2000 kms apart.

5.2.4 The influence of the car versus motorcycle dimension

By comparing drivers and riders in two countries, we wanted to examine the importance of different sources of RSC: the transport mode (car vs. motorcycle) versus the national context (Norway vs. Greece). Our results by and large indicate that patterns of behaviour and national descriptive norms are more similar among drivers and riders within countries, than within modes across countries. The car versus motorcycle dimension was only significant as a predictor in one of the regression analyses, with "Race away from green traffic lights as the dependent variable". It was the third most important variable in this analysis, indicating that riders across countries are more involved in this behaviour than drivers. Thus, we only found partly support for Hypothesis 7, indicating a shared rider RSC, extending across countries, even though cars and motorcycles are different in several respects: physical vulnerability, accident risk, behaviours. The result could also be due to the relatively different types of riders in the two countries, as noted in section 2.1.

5.2.5 Which factors influence road safety culture?

Our analyses by and large indicate that when it comes to facilitating RSC, nation and region are far more important than transport mode, e.g. car versus motorcycle. This requires a discussion of the factors that influence national and regional RSC. Nation and region are geographical variables, and previous research indicates that interaction between road users is a key process in which RSC is created. Through their daily interaction in traffic, road users continuously (re)create norms for behaviour by behaving in certain ways, sanctioning unwanted behaviours etc. (Özkan et al, 2006; Bjørnskau, 2017). In this manner, norms for commonly accepted behaviours may be created, as well as our shared expectations to other road users in our country, or in our local region. These interaction processes in which RSC continuously is created and recreated may also be influenced by the type and composition of road users in a region (e.g. a high proportion of old drivers, tourists) (Nævestad et al, 2019a), infrastructure, e.g. road markings, the design of junctions, road capacity (Özkan et al, 2006). The perceived level of enforcement in a country is also a relevant factor (Özkan et al, 2006). These factors indicate important issues for future research.

5.2.6 The importance of demographic variables

Regression analyses indicate that all the studied road safety behaviours were influenced by demographic variables. Results indicate that female drivers and riders and older drivers and riders are less likely to be involved in unsafe behaviours. This is in accordance with previous research, indicating that risky behaviours are more prevalent among young and male drivers and riders (Parker et al, 1998; Dacota, 2012; Bjørnskau et al, 2012). Finally, in accordance with previous research (Sucha et al, 2014), we also found lower levels of three of the studied road safety behaviours with increasing levels of education. The exception was driving under the influence of alcohol. We also examined the influence of motorcycle type, as previous research has found more unsafe behaviours among riders of "race replica" motorcycles (Strandroth & Person, 2005; Bjørnskau et al, 2012). In accordance with this, Racing/off-road contributed significantly to "Racing away from green traffic lights". Racing/Chopper also contributed significantly to driving under the influence of alcohol.

5.3 Factors influencing accident involvement

The third aim of the study was to examine the relationship between road safety behaviours and accident involvement. In Table 4, we examined the bivariate relationships between the five studied road safety behaviours and accident involvement. Contrary to previous research, these analyses do not indicate a relationship between riders' and drivers' over speeding and accident involvement (e.g. Dacota, 2012; Bjørnskau et al, 2012). The variable that was most strongly correlated with accident involvement was overtaking a slow driver on the inside. This is in accordance with the results of Warner et al (2012), which found this behaviour to predict accident involvement in the Greek sample of car drivers. Based on results from the bivariate analyses, overtaking a slow driver on the inside was included in the logistic regression analyses of variables predicting accident involvement. One of the main results of this analysis, was that overtaking a slow driver on the inside was related to drivers' and riders' accident involvement, in accordance with the results of Warner et al (2011). Results also indicated that this behaviour was related to involvement in what we refer to as "traffic incidents". In accordance with previous research, results also indicated higher risk for motorcycle riders (Bjørnskau et al, 2012; Yannis et al, 2017) and Greek respondents (ETSC, 2019).

5.4 Methodological limitations issues for future research

When concluding about the existence of different national RSCs based on the present study, it is important to remember that the samples from the two countries not are entirely representative. The samples within the countries are based on strategically sampled regions. Results indicate considerable heterogeneity in the Greek sample, with different results from Athens and the island. As noted, the national differences are, however, in accordance with previous research (Özkan et al, 2006; Warner et al, 2011), including research on professional drivers in Greece (Nævestad et al, 2019b). They are likely to travel larger parts of the country, and are

thus, likely to have a more comprehensive experience with national RSC. To compensate for our relatively small and strategic national samples, future studies should apply larger samples to examine national RSC further. It should also be mentioned that respondents from the island were somewhat younger, and their level of education was somewhat lower, and they had a larger share of males than in the other studied regions. We controlled, however, for these variables in our regression analyses, which still indicated that the island variable was important.

The present study measures community RSC as descriptive norms, assuming that it influences behaviours through perceptions of what is normal road safety behaviour in the country. A potential critique that can be raised against identification of the descriptive norms mechanism, is that it also may influence behaviour through the false consensus bias, which involves that people overestimate the prevalence of risky behaviour among others to justify their own behavior (Cialdini et al, 1991). However, the fact that we find that both car drivers and motorcycle riders independently of each other attribute approximately the same level of violations to other road users in their respective countries (and within the five studied regions) indicates that our results to some extent reflect differences in national RSCs. Moreover, the national RSC scores do not follow directly the road safety behaviour scores: although motorcyclists from the island score higher than car drivers from the island on aggressive violations and race away from green traffic light, they score somewhat lower on community RSC.

6 Conclusion

The present study indicates that road users' membership in different sociocultural groups is important for road safety, as it influences the road safety behaviours of both drivers and riders, which in turn is related to accident involvement. We have found that geographical variables like country and region seem to be important for RSC, presumably as interaction between road users is a key process in which RSC is (re)created. Membership in such sociocultural groups seem to influence road safety behaviours through road users' perceptions about the behaviours that are "normal" and expected in their country and on their local roads. Future research should examine how these important social impacts on behaviour can be influenced in manners that lead to increased road safety.

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