Road Safety Culture Among Car Drivers and Motorcycle Riders in Greece: Examining Influencing Factors

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Abstract

The aims of this study are to: 1) Compare road safety behaviours among car drivers and motorcyclists in Rhodes and Athens, 2) Examine the factors influencing road safety behaviours, focusing on community road safety culture (RSC), 3) Examine the factors influencing RSC among the two modes of transport in the two geographical areas. The study is based on a questionnaire survey, focusing on three types of road safety behaviours: aggressive driving, over speeding and driving under the influence of alcohol. Although previous research has found important differences between motorcyclists and car drivers on the two former behaviours, drivers' and riders' behaviours were shared within the geographical communities and significantly different across communities. The study concludes that this to a large extent can be attributed to different community RSCs, in the two areas, which was found primarily to be influenced by the perceived level of police enforcement.

Keywords: *Community road safety culture, car drivers, motorcycle riders, aggressive driving, over speeding, driving under the influence of alcohol*

Περίληψη

Στόχοι της παρούσας εργασίας είναι: 1) η σύγκριση της συμπεριφοράς οδικής ασφάλειας των οδηγών επιβατικών αυτοκινήτων και των μοτοσικλετιστών στη Ρόδο και την Αθήνα 2) η εξέταση παραγόντων που επηρεάζουν τις συμπεριφορές οδικής ασφάλειας εστιάζοντας στην κουλτούρα οδικής ασφάλειας 3) η κουλτούρα οδικής ασφάλειας των οδηγών των δύο μέσων στις δύο γεωγραφικές περιοχές. Η μελέτη βασίζεται σε μια έρευνα ερωτηματολογίου, η οποία επικεντρώνεται σε τρεις τύπους συμπεριφορών οδικής ασφάλειας: επιθετική οδήγηση, υπερβολική ταχύτητα και οδήγηση υπό την επήρεια αλκοόλ. Παρόλο που προηγούμενες έρευνες βρήκαν σημαντικές διαφορές μεταξύ των μοτοσικλετιστών και των οδηγών αυτοκινήτων όσον αφορά στις δύο τελευταίες συμπεριφορές, στην παρούσα εργασία οι συμπεριφορές των οδηγών και των μοτοσυκλετιστών ήταν παρόμοιες σε κάθε γεωγραφική κοινότητα και διαφέρουν σημαντικά μεταξύ των κοινοτήτων. Η μελέτη καταλήγει στο συμπέρασμα ότι αυτό μπορεί σε μεγάλο βαθμό να αποδοθεί σε διαφορετική κουλτούρα οδικής ασφάλειας κοινότητας για τις δύο ομάδες οδηγών, η οποία βρέθηκε κυρίως να επηρεάζεται από το αντιληπτό επίπεδο αστυνόμευσης.

Λέξεις κλειδιά: *Κουλτούρα οδικής ασφάλειας κοινότητας, οδηγοί επιβατικών αυτοκινήτων, μοτοσυκλετιστές, επιθετική οδήγηση, υπερβολική ταχύτητα, οδήγηση υπό την επήρρεια αλκοόλ*

1. Introduction

1.1 Background and aims

Road safety remains a health issue of international interest, as it is still ranked among the ten leading causes of death 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 (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 (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 2019). 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 2019).

At the current stage, little is, however, known about how RSC comes about in the sociocultural contexts that are not work organisations. One important way of developing such knowledge is to examine sociocultural units with different RSCs, and discuss influencing factors. A previous study comparing RSC in Norway and Greece, also included private car drivers from the Greek capital, Athens, and the Greek island of Rhodes (Nævestad et al, 2019). Although the primary focus of the study was the comparison of Norway and Greece, the study also indicated different road safety behaviours among drivers from Athens and Rhodes.

The sampling of these two areas 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. Results from Nævestad et al's (2019) study supported this hypothesis: car drivers from Rhodes reported higher incidences of aggressive driving, over speeding, driving under the influence and driving without a seat belt. This could indicate a different RSC in Rhodes. In this paper, we examine this further by comparing both car drivers and motorcycle riders from Rhodes and Athens.

The aims of the study are to: 1) Compare road safety behaviours among car drivers and motorcyclists in Rhodes and Athens, 2) Examine the factors influencing road safety behaviours, focusing especially on community RSC and 3) Examine the factors influencing RSC among drivers of the two modes of transport in the two geographical areas.

It is not unreasonable to expect the existence of a common motorcycle RSC, extending across 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). However, based on the above-mentioned research (Nævestad et al, 2019), it is neither unreasonable to expect a unique RSC in Rhodes, shared among both car drivers and motorcycle riders. Thus, the present study examines the relative strength of a (possible) unique community RSC in Rhodes versus a universal motorcycle rider culture.

1.2 Previous research

1.2.1 Road safety behaviours among car drivers and motorcyclists and influencing factors

Behaviours. The present study compares three types of road safety behaviour among car drivers and motorcycle riders: over speeding, aggressive violations and driving under the influence of alcohol. 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 is, however, important to note that several risk factors are involved and that results to some extent are mixed, based on country. 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. Previous studies have also 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, but based on previous research on car drivers (Nævestad et al, 2019), we expect this to vary according to geographical community.

Influencing factors. Studies of car drivers indicate that violations 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). Additionally, research on car drivers has found lower levels of dangerous violations and dangerous errors with increasing levels of education (Sucha et al, 2014). Additionally, research has also found the road safety behaviours of car drivers to be influenced by geographical community and that community safety culture may influence road user behaviour (Luria et al, 2014; Nævestad et al, 2019). Few studies have so far been devoted to studying RSC among non-professional road users, and there are no commonly accepted definitions of the concept (Edwards et al, 2014). We may hypothesize that community RSC is the primary mechanism explaining the relationship between community and road safety behaviour. We measure community RSC as descriptive norms, which refers to individuals' perceptions of what other people actually do (Cialdini et al, 1990), in this case other drivers/riders in the geographical community. Descriptive norms may influence behaviour by providing information about what is normal in certain groups (Cialdini et al., 1990). Based on Nævestad et al (2019), we may hypothesize that the mechanism explaining the relationship between community RSC and road safety behaviours is subtle social pressure to behave in accordance with "what is normal" in your primary reference group. This group could also be other motorcycle riders, or other car drivers. It could also be other drivers

in your community. We expand on this below. Finally, research indicates that drivers' perceived level of police enforcement also influences their behaviours (Elvik et al, 2009).

1.2.2 Road safety culture among car drivers and motorcyclists and influencing factors

First, it is not unreasonable to expect the existence of a common motorcycle RSC, extending across communities. 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). Second, we may also expect that different community RSCs may be created based on the unique factors influencing road safety behaviours in geographical communities. 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). 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, drivers' lack of respect for rules and problems with enforcement in a geographical area are also mentioned as factors potentially influencing RSC (Özkan et al, 2006). Fourth, certain road safety behaviours, and thus, expectations to other road users can to some extent be "normalized" in formal driver training (Nævestad et al, 2019). A fifth influencing factor that should be mentioned is the composition of road users who interact in a geographical area (e.g., gender, age, level of education) (Nævestad et al, 2019). An important issue in this respect is the large proportion of tourists in Rhodes in the summer season. This is an issue which is explored further in Nævestad et al (in preparation).

1.3 Hypotheses

We will examine ten hypotheses, which are based on previous research. H1-H3 refer to the first aim, H4-H7 to the second aim and H8-H10 refer to the third aim. First, there will be less aggressive violations among motorcyclists (H1) across regions. Second, there will be more over speeding among motorcyclists (H2) across regions. Third, we expect driving/riding under the influence of alcohol to vary according to geographical community (H3). Fourth, respondents' violations will be related to demographic variables (e.g. age, gender) (H4). Fifth, respondents' violations will decrease with increasing levels of education (H5). Sixth, we hypothesize that the mechanism mediating between driver/rider behaviours that are related to geographical regions (driving/riding under the influence of alcohol) will be community RSC, specified as descriptive norms. Seventh, we expect perceived police enforcement to influence drivers'/riders' violations (H7). Eight, we also expect perceived police enforcement to influence community RSC. Ninth, we expect geographical community to influence community RSC. Tenth, we expect community RSC to be influenced by road user interaction and the road user composition, focusing especially on tourists in Rhodes (H10).

2. Method

2.1 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).

2.2 Recruitment of Respondents

The respondents (N = 479) were recruited through a Greek marketing research company, which was under the scientific supervision of researchers from the NTUA. The respondents were sampled from the capital Athens and the Greek island of Rhodes. The respondents from Rhodes were recruited in the town of Rhodes, and in urban areas close to the town of Rhodes. The respondents in Athens were recruited in central areas were many people could be approached (e.g. central squares, metro stations, public service buildings etc.). All of the respondents included in the present study are Greek nationals.

2.3 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 five 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: .693). Two 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”. These were combined into an index (Cronbach’s Alpha: .850). We originally included a third aggressive driving item, which was removed after a “scale if item deleted” analysis. We also included the following item “Drive when you suspect you might be over the legal blood alcohol limit”. These five 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.

Community road safety culture. In addition to drawing inferences about community RSC based on shared patterns of behaviour in communities, we also measure community RSC by means of seven questions measuring descriptive norms. Respondents were asked: “When driving in my municipality, 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 motorwayroad”, 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 community RSC index (Cronbach's Alpha: .911).

Perceived enforcement. We also asked respondents questions about police enforcement, e.g. "In the course of the two last years, approximately how often have you seen a police inspection along the road? " Answer alternatives: 1) Never, 2) Hardly ever, 3) 5 times or fewer, 4) 10 times or fewer, 5) 20 times or fewer, 6) More than 20 times.

The influence of tourists. We asked the motorcycle riders in Rhodes questions about the driving of foreign tourists, and the impact on their own driving in the tourist season, e.g. "In your experience, do car drivers who are foreign tourists drive differently than the car drivers from Rhodes?", "Do you ride your motorbike differently in the tourist season (April-September) than the rest of the year?" Answer alternatives: 1) "Much slower", 2) "A bit slower", 3) "no difference", 4) "A bit faster", 5) "Much faster".

3. Results

3.1 Description of the sample

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

Table 1: *Distribution of drivers/riders in Athens and Rhodes, proportion of males and age groups.*

Groups	Number	Proportion	Males	<26	26-35	36-45	46-55	56+
MC Rhodes	74	15%	91%	20%	41%	28%	10%	1%
Car Rhodes	87	25%	62%	9%	21%	46%	21%	3%
MC Athens	119	18%	82%	10%	24%	25%	25%	15%
Car Athens	199	42%	65%	3%	24%	23%	32%	19%

Table 1 indicates that the share of males is higher for motorcycle riders, especially in Rhodes. The table also indicates that respondents from Athens generally are older than the respondents from Rhodes. Differences between the age groups are statistically significant at the 1%-level. The differences in riders'/drivers' experience are in accordance with the age differences. Comparing the groups with at least 16 years of experience as a rider/driver, motorcyclists in Rhodes had a share of 22%, car drivers in Rhodes had 47%, motorcyclists in Athens had 47% and car drivers in Athens 62%. Comparing motorcycle types, a total of 55% were scooters, 21% were classic motorcycles (MC), 5% racing, 4% touring, 3% off-road, 3% chopper and 8% other. In Rhodes, 12% of the motorcycles were racing type, and there were fewer classical motorcycles (half) and more scooters than in Athens. Comparing car types, 90% were passenger cars, 4% were SUVs, 3% were vans and the remaining 3% were equally distributed on station wagon and pick-up. Results on respondents' highest level of education indicate the following differences: 1) Primary school (Rhodes 0%, Athens: 3%), (2) High school (Rhodes 52%, Athens: 44%), (3) 3–4 years university/college (Rhodes 33%, Athens: 25%), (4) >5 years university (Rhodes 16%, Athens: 28%). 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 19% had been involved in an accident (at least property damage). This

applies to 22% of the motorcyclists and 20% of the car drivers in Rhodes, and 24% of the motorcyclists and 16% of the car drivers in Athens. Differences were not statistically significant.

3.2 Road safety behaviours

Table 2 shows mean scores for four road safety behaviour variables in the four groups.

Table 2: *Mean scores for four road safety behaviour variables in the four groups: Aggressive violations (min: 2, max: 14), Over speeding (min: 2, max: 14), Driving under the influence (DUI) (min: 1, max: 7)*

Group	Aggressive violations	Over speeding	Driving under the influence of alcohol	Community road safety culture
MC Rhodes	6.4	6.2	1.7	20
Car Rhodes	5.1	7	1.6	22.5
MC Athens	3.4	4.3	1.3	15.4
Car Athens	3.7	4.3	1.3	15.7
Correlation with community RSC	.311**	.328**	.221**	-

We conducted post-hoc tests (Tukey) to examine whether the differences between the mean scores were significantly different, using one-way ANOVA (based on a variable with one value for each of the four groups). Looking at aggressive violations, differences between car drivers and motorcycle riders in Athens were not statistically significant. The scores of riders and drivers in Rhodes were statistically significantly different from all the other groups. This is not in accordance with Hypothesis 1, which suggested less aggression among motorcyclists.

Comparing means for the over speeding index, differences between car drivers and motorcycle riders in Rhodes were not statistically significant. The same applies to motorcycle riders and car drivers in Athens. The scores of driver and riders were statistically significantly different across geographical communities. This is not in accordance with hypothesis 2, which assumed more over speeding among motorcyclists across communities. On the contrary, it indicates common behaviours related to this among different groups within the geographical communities.

Comparing means for driving under the influence, differences between car drivers and motorcycle riders in Rhodes were not statistically significant. The same applies to motorcycle riders and car drivers in Athens. The scores of driver and riders were statistically significantly different across geographical communities. This is in accordance with hypothesis 3, assuming that this behaviour would vary according to the geographical communities.

To sum up, results from comparisons of means indicate that geographical region is a more important variable when it comes to explaining road safety behaviours, than the car driver versus motorcycle rider dimension.

3.3 Factors influencing road safety behaviours

In Table 3, we show results from a hierarchical, linear regression analysis, where independent variables are included in successive steps to examine the variables predicting respondents' road safety behaviours. The table presents the standardized beta coefficients. The contributions of the different independent variables on the dependent variables within each model can, therefore, be compared directly. Model 1 examines the variables predicting respondents' aggressive violations (min=2, max=14). Model 2 examines the variables predicting respondents' over speeding (min=2, max=14). Model 3 examines the variables predicting riding/driving under the influence of alcohol (min=1, max=7).

Table 3: *Linear regressions. Model 1: Dependent variable: aggressive violations index. Model 2: Dependent variable: over speeding index, Model 3: Dependent variable: riding/driving under the influence of alcohol. Standardized beta coefficients.*

Model 1: Dependent variable: aggressive violations	**Step 1**	**Step 2**	**Step 3**	**Step 4**	**Step 5**	**Step 6**	**Step 7**
Gender (Male: 1, Female: 2)	**-.110****	**-.131*****	**-.101****	**-.098****	**-.086***	**-.086****	**-.086***
Age group		**-.217*****	**-.256*****	**-.253*****	**-.155*****	**-.137*****	**-.138*****
Education			**-.158*****	**-.157*****	**-.109****	**-.137*****	**-.141*****
MC/Car				-.014	-.011	-.029	-.038
Rhodes/Athens					**-.311*****	**-.223*****	**-.217*****
Community Road Safety Culture						**.206*****	**.189*****
Perceived Police Enforcement							-.056
Adjusted R^2	.010	.055	.075	.074	.160	.192	.192
Model 2: Dependent variable: Over speeding	**Step 1**	**Step 2**	**Step 3**	**Step 4**	**Step 5**	**Step 6**	**Step 7**
Gender (Male: 1, Female: 2)	**-.111****	**-.125****	**-.118****	**-.136*****	**-.108****	**-.123*****	**-.123*****
Age group		**-.142*****	**-.151*****	**-.168*****	-.060	-.040	-.040
Education			-.037	-.040	.005	-.014	-.016
MC/Car				.076	.074	.061	.057
Rhodes/Athens					**-.336*****	**-.262*****	**-.259*****
Community Road Safety Culture						**.210*****	**.202*****
Perceived Police Enforcement							-.023
Adjusted R^2	.010	.028	.028	.031	.141	.174	.172
Model 3: Dependent variable: Driving under the influence	**Step 1**	**Step 2**	**Step 3**	**Step 4**	**Step 5**	**Step 6**	**Step 7**
Gender (Male: 1, Female: 2)	**-.142*****	**-.157*****	**-.152*****	**-.161*****	**-.155*****	**-.155*****	**-.155*****
Age group		**-.150*****	**-.156*****	**-.164*****	**-.108****	**-.094***	**-.093***
Education			-.024	-.026	.002	-.019	-.017
MC/Car				.038	.040	.026	.031
Rhodes/Athens					**-.180*****	**-.113****	**-.117****
Community Safety Culture						**.159*****	**.170*****
Perceived Police Enforcement							.036
Adjusted R^2	.018	.038	.037	.036	.064	.082	.081

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

3.3.1 Factors influencing aggressive violations (Model 1)

First, Model 1 in Table 3 indicates that gender, age group and level of education contributes negatively and significantly, indicating less aggressive violations for female drivers/riders, less aggressive violations with increasing age and with increasing level of education. Second, in accordance with results from Table 2, and contrary to hypothesis 1, we see that the variable MC/car does not contribute significantly.

Third, we see that the variable Rhodes/Athens contributes significantly and negatively, indicating less aggressive violations among drivers/riders in Athens than in Rhodes, controlled for the other variables. This is the variable with the strongest contribution in the model, followed by the variable community RSC. This variable contributes significantly and positively, indicating that a higher perceived level of violations in the community is related to respondents' higher self-reported aggressive violations. Interestingly, we see that the contribution of Rhodes/Athens is reduced somewhat from Step 5 to 6, indicating that some of the initially observed relationship was due to community RSC, but not all, as the Rhodes/Athens variable still contributes significantly in Step 6. This means that there are more factors than community RSC explaining the observed differences between Rhodes and Athens. One such possible explaining factor could have been respondents' perception of police enforcement in the two areas, but this variable does not contribute significantly in Step 7. The adjusted R2 value in Step 7 is 0.192, indicating that the model explained 19% of the variation in respondents' aggressive violations.

3.3.2 Factors influencing over speeding (Model 2)

First, Model 2 in Table 3 indicates that gender contributes negatively and significantly to over speeding. This means that female drivers/riders in general over speed less than men, controlled for the other variables in the analyses. Age and education level do not contribute significantly.

Second, we see that the variable MC/car does not contribute significantly. This indicates, in accordance with Table 2 and contrary to hypothesis 2, that there is no significant difference between motorcycle riders and car drivers when it comes to over speeding.

Third, the variable Rhodes/Athens contributes significantly and negatively, indicating less over speeding among car drivers and motorcycle riders in Athens than in Rhodes, controlled for the other variables. This is the variable with the strongest contribution in the model, followed by community RSC, which contributes significantly and positively. This indicates that a higher perceived level of over speeding in the geographical community is related to more over speeding. The adjusted R^2 value in Step 7 is 0.199, indicating that the model explained 20% of the variation in respondents' over speeding.

3.3.3 Factors influencing driving under the influence of alcohol (Model 3)

First, Model 3 in Table 3 indicates that gender and age contribute negatively and significantly (although with different levels of statistical significance) to driving under the influence of alcohol. Female drivers/riders and drivers/riders with increasing age are less inclined to drive/ride under the influence. Second, the variable MC/car does not contribute significantly,

indicating that there is no significant difference between motorcycle riders and car drivers when it comes to driving under the influence of alcohol.

Third, in Step 6, the variable Rhodes/Athens contributes significantly and negatively, indicating less driving under the influence of alcohol in Athens. Fourth, community RSC contributes significantly and positively, indicating that respondents' self-reported driving under the influence of alcohol is related to higher perceived level of road violations in their community. This is the variable with the strongest contribution in the model, followed by gender. The adjusted R^2 value in Step 7 is 0.081, indicating that the model explained 8% of the variation in respondents' driving under the influence. This is low compared to the analyses in Model 1 and 2, indicating a lower explanatory power in Model 3.

3.3.4 Factors influencing community safety culture

In Table 4 we show results from a hierarchical, linear regression analysis, examining the variables predicting community RSC.

Table 4: *Linear regression. Dependent variable: Community road safety culture. Standardized beta coefficients.*

Variables	Step 1	Step 2	Step 3	Step 4	Step 5	Step 6
Gender (Male: 1, Female: 2)	.039	.018	.004	-.017	.000	.001
Age group		**-.220*** **	**-.202*** **	**-.221*** **	**-.088***	**-.085***
Education			.071	.068	**.133*** **	**.101** **
MC/Car				**.087***	**.091** **	.040
Perceived Police Enforcement					**-.426*** **	**-.360*** **
Rhodes/Athens						**-.270*** **
Adjusted R^2	-.001	.045	.048	.053	.216	.281

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

First, age group contributes positively, indicating a lower perceived level of violations among other drivers in the community with increasing age. Second, education contributes positively and significantly, indicating that drivers'/riders' perceptions of traffic violations in their community increases with increasing levels of education, controlled for the other variables in the analyses.

Third, as expected, respondents' perceived level of police enforcement (how often they have seen a police control along the road in the course of the last two years) negatively influences their perceptions of the level of road violations in their community, i.e. community RSC. This is the variable with the strongest contribution to community road safety culture in the analysis.

Fourth, the variable Rhodes/Athens contributes significantly and negatively, indicating lower perceived levels of violations among other drivers in the community in Athens than in Rhodes. This is in accordance with what we saw in our comparisons of means, but now we see that the difference persists, when controlling for other relevant variables, e.g. perceived level of

enforcement. Thus, the differences in community RSC in the two studied areas must also be due to other factors than perceived enforcement.

4. Concluding discussion

4.1 Road safety behaviours among car drivers and motorcyclists in Rhodes and Athens

The first aim of the study was to compare the road safety behaviours among car drivers and motorcyclists in Rhodes and Athens. Based on Rowden et al (2014), it was hypothesized that there would be less aggressive violations among motorcyclists (H1), presumably as they feel more vulnerable. Results did not support this hypothesis. On the contrary, it was found that motorcycle riders in Rhodes was the group with the highest level of aggressive violations. Second, based on previous research (Bjørnskau et al, 2012; Dacota, 2012), it was hypothesized that there would be more over speeding among motorcyclists (H2). Results did not support this contention. On the contrary, patterns of over speeding were similar among drivers/riders within communities and different across communities. Third, it was hypothesized, in accordance with Nævestad et al (2019), that driving under the influence of alcohol would vary according to geographical region (H3). Results supported this hypothesis. Generally, our comparisons of means indicate that geographical region is a more important variable when it comes to explaining road safety behaviours, than the car drivers versus motorcycle rider dimension. Generally, we found significant differences in road safety behaviour across geographical communities, and relatively similar behaviours between car drivers and motorcyclists within communities. There was one exception to this: car drivers and motorcycle riders in Rhodes scored significantly different on aggressive violations.

4.2 Factors influencing road safety behaviours

The second aim of the study was to examine the factors influencing road safety behaviours, focusing especially on community RSC. In accordance with hypothesis 4, which was based on previous research (Parker et al, 1998; Dacota, 2012; Bjørnskau et al, 2012), relationships between driver/rider behaviour and demographic variables (H4) were found. Results indicate that female rider/drivers are less aggressive in traffic, they over speed less and they drive less under the influence. Increasing age is related to less aggressive violations and less driving under the influence. In accordance with the fifth hypothesis (H5), drivers' (and riders') increasing levels of education were found to be related to decreasing aggressive violations. This is in accordance with previous research (Sucha et al, 2014). Over speeding and driving under the influence of alcohol were not related to level of education. This is somewhat unexpected, as Sucha et al (2014) generally found lower incidence of dangerous violations with increasing levels of education.

The main result of the study is that the studied road safety behaviours varied according to geographical region rather than the motorcycle/car dimension. These results are in contrast to previous studies indicating that the road safety behaviours of motorcycle riders and car drivers differ when it comes to over speeding (Dacota, 2012) and aggressive violations (Rowden et al, 2014). On the contrary, results indicate the importance of geographical communities and as a factor influencing road safety behaviours. Geographical community (Rhodes/Athens) was the most important variable contributing to aggressive violations and over speeding. Community RSC was the most important predictor of driving/riding under the influence of alcohol, and the

second most important predictor of aggressive violations and over speeding. The importance of road safety culture is in accordance with Luria et al (2014), which is one of the few studies devoted to this issue. It is, therefore, important to examine the factors influencing community RSC.

4.3 Factors influencing road safety culture in the two geographical areas

The third aim of the study was to examine the factors influencing RSC among the two different modes in the two geographical areas. In accordance with hypothesis 8 and previous research (Özkan et al, 2006; Elvik et al, 2009), our regression analysis indicated that community RSC was influenced by respondents' perceived level of enforcement. This was the most important predictor of community RSC. We also found a relationship between geographical region and community RSC, indicating lower perceived levels of violations among other drivers in the community in Athens than in Rhodes. This is in accordance with hypothesis 9 and previous research (cf. Luria et al, 2014).

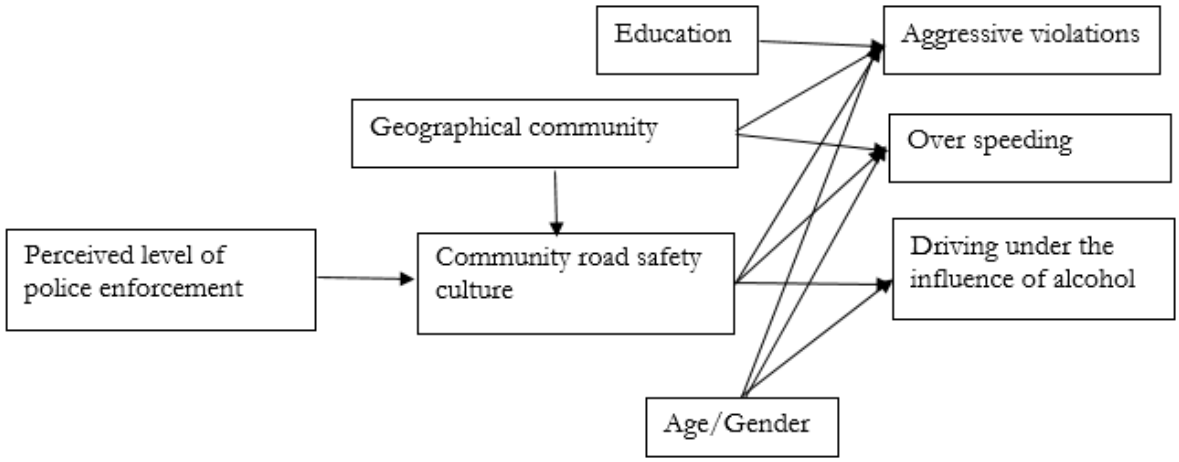

Figure 1: *Illustration of relationships indicated in the regression analyses*

The fact that Rhodes/Athens contributed significantly to community RSC when we controlled for perceived police enforcement indicates that there are more (unmeasured) differences between the two geographical communities that may shed light on their different community RSCs. Previous research has suggested that factors like interaction, infrastructure, driver training, economic conditions and road user composition may explain how different RSC come about (Özkan et al, 2006; Nævestad et al, 2019). We have been unable to discuss the four former factors in the present study (cf. H10), but we have noted that the high prevalence of tourists in Rhodes in the summer season is an important factor that should be taken into account. As noted, motorcycle riders in Rhodes were asked about foreign car driver tourists' behaviours in traffic, with answer alternative focusing on slower versus faster. A share of 45% answered "no difference", while 45% answered "much slower" or a bit slower. When asked whether they drive differently in the tourist season, 34% answered "much slower" or a bit slower, while 8% answered faster. Thus, it seems that the foreign tourists cannot explain the higher level of violations in Rhodes, on the contrary it seems that they make a third of the riders drive slower in the summer season. However, this could potentially lead to irritation and aggression, which

the riders/drivers from Rhodes score higher on. It is important to note that these results should be interpreted with caution, as numbers are low. Nævestad et al (in preparation) discuss this issue further.

4.4 Methodological limitations and issues for future research

When concluding about the existence of different community RSCs based on the present study, it is important to remember that the samples from the two geographical communities not are entirely representative and that they are small. They are for instance recruited from a limited area of Rhodes, and from some areas in Athens. Thus, future studies should apply larger samples to examine this issue further. Moreover, respondents from Rhodes were somewhat younger, and their level of education were somewhat lower than that of the respondents from Athens. We controlled, however, for these variables in our regression analyses, and found significant contributions of geographical region and community RSC.

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 community. 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 communities indicates that our results to some extent reflect differences in community RSCs. Moreover, the community RSC scores do not follow directly from the road safety behaviour scores: although motorcyclists from Rhodes score higher than car drivers from Rhodes on aggressive violations, they score somewhat lower on community RSC.

Future research should also examine the relationship between community RSC, behaviours and accidents. It should also examine the influence of motorcycle type on behaviour (racing type), as research has found that this is related to higher levels of risk taking behaviours (cf. Bjørnskau et al, 2012). Future research should also examine the importance of the additional above-mentioned factors that are hypothesized to influence RSC. Finally, with more knowledge on the factors contributing to community RSC, future studies should also discuss how this knowledge can be employed to develop preventative measures.

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