

Abstract

This paper aims to investigate the impact of traffic safety culture elements on the probability of road crash involvement, focusing on traffic enforcement aspects. Focus is on car drivers and motorcyclists in touristic and non-touristic areas in Greece. A questionnaire survey was conducted among car drivers and motorcycle riders in Athens and the on island of Rhodes on national and local traffic safety culture, paternalism, experience of road safety enforcement, road risk attribution and previous involvement in road crashes. Binary logistic regression was applied in an effort to find differentiations and common road safety culture elements between car drivers and motorcycle riders, but also drivers in Athens and Rhodes, in relation to road crash risk. Results indicate that drivers probably understand the importance of more intensive traffic enforcement as a means of traffic crash reduction; the development of a common traffic safety culture in the island of Rhodes in contrast to Athens and the importance of factors such as driving frequency, age and experience on crash probability.

Keywords: road safety, crash involvement, safety culture, enforcement

Introduction

The importance of traffic safety culture studies as a means of improving road safety level has been highlighted in the international literature. Moreover, it has been found that the enforcement level declared by drivers themselves is adversely proportional to traffic violations. Drivers' opinions on traffic enforcement, as well as the opinions about their or other drivers' risky behaviors, could be an important predictor of traffic violation probability. The relationship of the level of enforcement and road crash number varies significantly from region to region in Greece.

The main objective of the paper is to investigate the **impact of traffic safety culture elements on the probability of road crash involvement**, focusing on traffic enforcement aspects. Focus is on **car drivers and motorcyclists in touristic and non-touristic areas in Greece**.



Data

Data used in this paper were collected through:

- a questionnaire survey in Greece
 - conducted among private car drivers and motorcycle riders
 - sampled in Athens (N=321) and the island of Rhodes (N=182)
- Analyzed questions and the respective, alternative answers were:

CATEGORY	QUESTION	ALTERNATIVE ANSWERS
General	Gender	male, female
	Age	<26, 26-35, 36-45, 46-55, 56+ y.o.
	Period of valid driver license	0-5, 6-10, 11-15, 16-20, 20+ years
	Highest education	primary school, high school, lyceum, professional school / technological university, university
Expected driving behaviour (country/municipality level)	When driving in my country /municipality, I expect from other drivers to respect and follow traffic rules	none/very few, less than half, about half, more than half, nearly all/all
	Expected driving behaviour (peers)	How many of your friends who regularly drive a car do you think they respect and follow traffic rules?
Acceptance of traffic enforcement	The fact that crashes still happen in traffic, shows that the authorities should control road users' behaviour to a greater extent than they do today	totally disagree, disagree somewhat, neither agree or disagree, agree somewhat, totally agree
	The authorities should make it more difficult for people to engage in risky behaviour in traffic	
Traffic enforcement experience	In the course of the two last years, approximately how often have you seen a police inspection along the road?	never, hardly ever, 5 times or fewer, 10 times or fewer, 20 times or fewer, more than 20 times
Road risk attribution	In your opinion, is lacking police enforcement of traffic rules an important cause of traffic crashes in Greece?	unimportant, of little importance, neither important /nor unimportant, somewhat important, very important
Involvement in road crashes	During the last 2 years, have you been involved in a traffic crash while driving?	no, yes

- Over 2/3 of the sample comprises men, 26-45 years old.
- The majority (69%) have had their driving license for >10 years.
- Almost 90% of the drivers, drive every day.
- 33 to 42% of the drivers expect other drivers to follow traffic rules.
- More than 55% of the drivers have seen less than 5 police checks over the period of the last 2 years.
- Most drivers deem the lack of enforcement as an important cause of traffic crashes.

Statistical analysis

Analysis resulted in **five binary logistic regression models** in which the dependent variable was the **involvement in a traffic crash**.

Statistical checks require an independent value significance level of less than 0.05, a Hosmer-Lemeshow value significance greater than 5% and an R² value as close to 1 as possible.

Results

Model 1: Drivers of private cars and motorcycles in Athens and Rhodes

- Those who expect less than half of their friends to **follow traffic rules** are 39,3% less probable to being involved in a crash. This, maybe, shows that they consider others' behavior dangerous for themselves too and, as such, they make safer decisions.
- Those who declare that the **lack of enforcement** is not an important cause of traffic crashes are 2,5 times more probable to being involved in a traffic crash. This could be attributed to the fact that these drivers do not prefer stricter enforcement, because they obtain risky behaviors.
- Frequent drivers** are more probable to crash involvement, due to their greater exposure to everyday risk.
- Drivers **over 55 years old** are also at greater risk compared to younger drivers.

INDEPENDENT VARIABLES	B	S.E.	Wald	df	Sig.	Exp(B)	95% C.I. for EXP(B)	
							Lower	Upper
Number of friends following traffic rules (Reference category: More than half up to almost all / all)								
None / very few to almost half	-.500	,235	4,525	1	,033	,607	,383	,962
Considering the lack of traffic enforcement an important cause of accidents (Reference category: somewhat important to very important)								
Not important to neither important nor unimportant	,953	,306	9,725	1	,002	2,594	1,425	4,722
Driving frequency (Reference category: Every day to 5-6 days per week)								
3-4 days / week to few times a month	-1,165	,377	9,558	1	,002	,312	,149	,653
Age group (Reference category: 56+)								
<26	-1,778	,486	13,413	1	,000	,169	,065	,438
26-35	-1,225	,279	19,264	1	,000	,294	,170	,508
36-45	-1,103	,257	18,423	1	,000	,332	,200	,549
46-55	-1,698	,292	33,847	1	,000	,183	,103	,324
Area (Reference category: Athens)								
Rhodes	,545	,275	3,940	1	,047	1,725	1,007	2,956

Model 2: Drivers of private cars and motorcycles in Athens

- In Athens, drivers' **behavior in the municipality** plays a statistically significant role when it comes to traffic crash involvement. In particular, those who expect less than half of the drivers in their municipality to follow traffic rules, are 64% less probable to being involved in a crash.
- Women** are less probable to being involved in a crash by 42,9% compared to men.

INDEPENDENT VARIABLES	B	S.E.	Wald	df	Sig.	Exp(B)	95% C.I. for EXP(B)	
							Lower	Upper
Following traffic rules at national level (Reference category: More than half up to almost all / all)								
None / very few to almost half	,642	,409	2,461	1	,117	1,900	,852	4,237
Following traffic rules at municipality level (Reference category: More than half up to almost all / all)								
None / very few to almost half	-1,022	,400	6,521	1	,011	,360	,164	,789
Need to increase police checks (Reference category: Agree somewhat to totally agree)								
Totally disagree to neither agree or disagree	-,583	,441	1,745	1	,187	,558	,235	1,326
Considering the lack of traffic enforcement an important cause of accidents (Reference category: Somewhat important to very important)								
Not important to neither important nor unimportant	1,180	,427	7,653	1	,006	3,256	1,411	7,515
Driving frequency (Reference category: Every day to 5-6 days per week)								
3-4 days / week to few times a month	-1,431	,568	6,338	1	,012	,239	,078	,728
Gender (Reference category: Woman)								
Man	-,560	,269	4,328	1	,037	,571	,337	,968
Age group (Reference category: 56+)								
<26	-1,437	,701	4,207	1	,040	,238	,060	,938
26-35	-1,049	,391	7,189	1	,007	,350	,163	,754
36-45	-,947	,366	6,715	1	,010	,388	,189	,794
46-55	-1,484	,387	14,708	1	,000	,227	,106	,484
Vehicle type (Reference category: Car)								
Motorcycle	,536	,317	2,854	1	,091	1,709	,918	3,182

Model 3: Drivers of private cars and motorcycles in Rhodes

- Contrary to the drivers in Athens, those who expect less than half of the drivers in their municipality to follow traffic rules are 6,5 times more likely to being involved in a crash. This is likely attributed to the fact that in a small and secluded society, like the island of Rhodes, **local social circle has a strong influence on behavior**, causing drivers to follow social trends (in this case not following traffic rules) in order to avoid standing out or being considered irregular.

INDEPENDENT VARIABLES	B	S.E.	Wald	df	Sig.	Exp(B)	95% C.I. for EXP(B)	
							Lower	Upper
Following traffic rules at municipality level (Reference category: More than half up to almost all / all)								
None / very few to almost half	1,870	,650	8,278	1	,004	6,489	1,815	23,201
Number of friends following traffic rules (Reference category: More than half up to almost all / all)								
None / very few to almost half	-1,871	,551	11,543	1	,001	,154	,052	,453
Need to increase police checks (Reference category: Agree somewhat to totally agree)								
Totally disagree to neither agree or disagree	,136	,502	,073	1	,786	1,146	,429	3,062
Need to increase traffic enforcement (Reference category: Agree somewhat to totally agree)								
Totally disagree to neither agree or disagree	,831	,520	2,554	1	,110	2,296	,829	6,363
Considering the lack of traffic enforcement an important cause of accidents (Reference category: somewhat important to very important)								
Not important to neither important nor unimportant	1,247	,630	3,913	1	,048	3,479	1,011	11,965
Driving frequency (Reference category: Every day to 5-6 days per week)								
3-4 days / week to few times a month	-1,235	,554	4,971	1	,026	,291	,098	,861
Age group (Reference category: 56+)								
<26	-2,357	,862	7,480	1	,006	,095	,017	,513
26-35	-1,243	,656	3,589	1	,058	,289	,080	1,044
36-45	-1,113	,625	3,171	1	,075	,328	,096	1,119
46-55	-1,711	,742	5,324	1	,021	,181	,042	,773

Results

Model 4: Drivers of private cars in Athens and Rhodes

- Declared police **enforcement frequency** is statistically important among car drivers, as those who have reported infrequent checks are 49,2% less probable to being involved in a crash. A likely explanation is that lack of enforcement forces drivers to adopt safer behaviors, as they feel exposed in a low-level enforced driving environment.

INDEPENDENT VARIABLES	B	S.E.	Wald	df	Sig.	Exp(B)	95% C.I. for EXP(B)	
							Lower	Upper
Following traffic rules at municipality level (Reference category: More than half up to almost all / all)								
None / very few to almost half	,353	,351	1,010	1	,315	1,423	,715	2,831
Number of friends following traffic rules (Reference category: More than half up to almost all / all)								
None / very few to almost half	-,344	,354	,948	1	,330	,709	,354	1,417
Perceivable frequency of police checks (Reference category: 10 times or less up to over 20 times)								
Never up to 5 times or less	-,678	,326	4,337	1	,037	,508	,268	,961
Considering the lack of traffic enforcement an important cause of accidents (Reference category: somewhat important to very important)								
Not important to neither important nor unimportant	1,169	,396	8,700	1	,003	3,220	1,480	7,005
Driving frequency (Reference category: Every day to 5-6 days per week)								
3-4 days / week to few times a month	-1,566	,627	6,232	1	,013	,209	,061	,714
Age group (Reference category: 56+)								
<26	-2,463	1,094	5,069	1	,024	,085	,010	,727
26-35	-1,141	,391	8,529	1	,003	,320	,149	,687
36-45	-1,338	,370	13,103	1	,000	,262	,127	,541
46-55	-2,299	,450	26,114	1	,000	,100	,042	,242
Area (Reference category: Athens)								
Rhodes	,786	,379	4,294	1	,038	2,194	1,043	4,613

Model 5: Drivers of motorcycles in Athens and Rhodes

- Experience** – and not age group – is a statistically significant variable among motorcycle riders. That been said, it is observed that riders with less than 5 years of experience are the least likely to being involved in a traffic crash. A possible contributing factor could be that motorcycle riding requires more skill than car driving and, thus, less experienced riders tend to be more careful on the road.

INDEPENDENT VARIABLES	B	S.E.	Wald	df	Sig.	Exp(B)	95% C.I. for EXP(B)	
							Lower	Upper
Following traffic rules at national level (Reference category: More than half up to almost all / all)								
None / very few to almost half	,471	,451	1,094	1	,296	1,602	,662	3,875
Number of friends following traffic rules (Reference category: More than half up to almost all / all)								
None / very few to almost half	-1,072	,449	5,708	1	,017	,342	,142	,825
Considering the lack of traffic enforcement an important cause of accidents (Reference category: Somewhat important to very important)								
Not important to neither important nor unimportant	1,066	,559	3,631	1	,057	2,903	,970	8,686
Driving frequency (Reference category: Every day to 5-6 days per week)								
3-4 days / week to few times a month	-1,238	,517	5,739	1	,017	,290	,105	,798
Period of valid driver license (Reference category: > 20 years)								
0-5 years	-1,077	,536	4,033	1	,045	,341	,119	,974
6-10 years	-1,335	,477	7,824	1	,005	,263	,103	,671
11-15 years	-1,099	,479	5,264	1	,022	,333	,130	,852
16-20 years	-1,726	,588	8,621	1	,003	,178	,056	,563
Area (Reference category: Athens)								
Rhodes	,507	,450	1,270	1	,260	1,660	,688	4,007

Conclusion

- Driving frequency and lack of enforcement being considered an important cause of crashes are two common statistically significant variables across all models. The latter shows that **drivers who perceive that there is a lack of enforcement adopt less dangerous behaviors** due to insecurity. They also understand that traffic enforcement is a key factor towards making roads safer, demanding its intensification.
- Older drivers and more experienced motorcycle riders are more prone to being involved in a crash, compared to all the other groups. This might show that **age or experience comes at the cost of obtaining riskier driving habits**.
- Friends' behavior is statistically significant when it comes to smaller social groups**, like in Rhodes and among motorcyclists.
- The perceived behaviour of other drivers at municipality level, has a positive impact on drivers in Athens, yet a negative one on drivers in Rhodes. Thus, **a common safety culture among drivers in a secluded touristic area is likely developed**.
- Driver-declared enforcement frequency is only significant when it comes to car drivers, indicating that they are worried about **low enforcement level** and, because of that, they take **fewer risks**.

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