Attitudes of Greek Drivers with Focus on Mobile Phone Use While Driving

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Received 23 May 2014, Accepted 15 March 2015

Objective: This article investigates the attitudes and behavior of Greek drivers with specific focus on mobile phone use while driving.

Methods: The research is based on the data of the pan-European SARTRE 4 survey, which was conducted on a representative sample of Greek drivers in 2011. Analysis of the drivers’ behavior was carried out by the statistical methods of factor and cluster analysis.

Results: According to the results of factor analysis, Greek drivers’ responses in the selected questions were summarized into 4 factors, describing road behavior and accident involvement probability as well as their views on issues concerning other drivers’ road behaviors, fatigued driving, enforcement of road safety, and mobile phone use while driving. The results of cluster analysis indicated 5 different groups of Greek drivers—the moderate, the optimistic, the conservative, the risky, and the reasonably cautious—and the characteristics of each group were identified.

Conclusions: These results may be useful for the appropriate design of targeted road safety campaigns and other countermeasures.

Keywords: mobile phone, driving, driver behavior, drivers’ attitudes, road safety, factor analysis, cluster analysis

Introduction

Road accidents are a burden to society, despite the efforts made. Annually, there are 1.3 million fatalities and almost 50 million injuries (World Health Organization 2013). Internationally, driver distraction is considered to be a significant risk factor because the driver has to perform multiple tasks simultaneously. For example, driver distraction was responsible for almost 10% of all fatal crashes in the United States in 2012 (NHTSA 2014). Beanland et al. (2013) performed in-depth investigation of 856 crashes in Australia and suggest that driver inattention, including driver distraction, contributed to a substantial number of serious injury crashes. The introduction of new intelligent technologies and in-vehicle devices as well as the wide use of mobile phones raise the need for further investigating their effects on driver distraction and consequently on road safety.

Mobile phone use is considered to be a demanding cognitive and operational task and it may compromise decision making while driving (McKnight and McKnight 1993). According to the literature (Dragutinovic and Twisk 2005; Young et al. 2003), distraction caused by mobile phone use consists of 4 different types (visual, audio, physical, and mental). Laberge-Nadeau et al. (2003) linked the use of mobile phones with increased risk of road accidents due to driver distraction. The respective risk of road accident injuries to 25- to 29-year-old drivers is almost 2.5 higher than those who drive without distraction (Lam 2002). A recent naturalistic study (Fitch et al. 2013) showed that visual and manual subtasks performed on handheld cell phones affect driver performance and increase the risk of critical events.

Rosenbloom (2006) investigated the effect of a hands-free cell phone while driving on speed and safe gap keeping. It is interesting that the effect of the cell phone conversation while driving is not perceived to be distracting by many drivers. Moreover, those drivers who had short conversations did not change their speed, whereas drivers who talked for more than 16 min were observed to drive faster. Fitch et al. (2014) stated that drivers simplified the driving demands while using a cell phone. Texting while driving has also gained considerable attention (Rudin-Brown et al. 2013; Young et al. 2014).

Today, the use of a mobile phone while driving is prohibited by road traffic regulations in most European countries. However, few European Union countries conduct systematic surveys to investigate car telephone use by drivers. According to the European Road Safety Observatory (2009), some observational studies in Europe, the United States, and Australia indicate that mobile phone use while driving ranges from 1 to 6% of drivers, but many report occasional use.

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Consequently, the aim of the study is to investigate the attitudes and behaviors of Greek drivers with a focus toward mobile phone use while driving, using the SARTRE 4 pan-European survey data. For that purpose, drivers’ responses to selected questions on the SARTRE 4 questionnaire are analyzed.

Data

The SARTRE 4 survey focuses on road users’ attitudes and perceptions toward road traffic risk in Europe (SARTRE 4 2011). The survey involved a personal interview for the completion of an extensive questionnaire. More information about the SARTRE 4 project can be found at the project website at http://www.attitudes-roadsafety.eu/. A total of 21,289 questionnaires were collected between November 2010 and February 2011 from 19 European countries. In Greece, a sample of 602 drivers was collected, which is analyzed in this study. The questions selected for the analysis were those that adequately describe the attitudes of drivers toward mobile phone use while driving. It is noted that cell phone use while driving was illegal at the time of data collection. Moreover, other questions related to speeding and driving behavior as well personal attributes such as age, gender, and driving experience were selected.

Analysis Methods

Factor Analysis

Firstly it was aimed to identify meaningful groups of variables reflecting drivers’ attitudes and behaviors with a specific focus on those concerning mobile phone and driving. For that purpose, factor analysis was performed. This technique aims to understand the structure of a large set of variables and to reduce the data set to a more manageable size while at the same time retaining as much of the original information as possible. It allows the identification of a limited number of factors that reflect the initial large number of questions. It is also crucial that the size of the sample is adequate. The Kaiser-Meyer-Olkin measure of sampling adequacy was also used in which values above 0.7 are considered to be satisfactory. Orthogonal rotation (Varimax method) was performed. It should be noted that the main procedure to define the optimal number of factors that was used was the parallel analysis method (Horn 1965) because it is suggested to be one of the most appropriate methods.

Cluster Analysis

Next, a 2-step cluster analysis was performed in order to group car drivers into meaningful groups. This method of clustering is most appropriate for very large data files and it can produce solutions based on both continuous and categorical variables. The first step of the 2-step procedure is the formation of preclusters. The goal of preclustering is to reduce the size of the matrix that contains distances between all possible pairs of cases. In the second step, the standard hierarchical clustering algorithm is applied on the preclusters. The 2-step cluster algorithm requires that all continuous variables are standardized; in this case, all of the factor scores were standardized with a mean value of 0 and a standard deviation of 1. Each cluster has a centroid, which is the mean factor score for this cluster. More details are provided in Papadimitriou et al. (2013).

Results

Factor Analysis

The factor analysis revealed 4 factors. The Kaiser-Meyer-Olkin value was 0.76. These factors describe road behavior, accident involvement probability, as well as drivers’ views on issues concerning other drivers’ road behavior, fatigued driving, enforcement of road safety, and mobile phone use while driving.

The factors are summarized as follows:

- Factor 1: Perceptions of other drivers and safety levels: Involves questions CD02a, CD02b, CD02c, CD02d, CO03, and CD24d. It is associated with Greek drivers’ opinions about the level of safety of roads in Greece and their perceptions of other drivers’ behaviors regarding speeding above the limits. Moreover, it involves the risk of accidents when a handheld phone is used while driving.
- Factor 2: Fatigue, speeding, and mobile phone use: Involves questions CD04, CD16e, CD23c, CD23d, CD17, CD06, and CD05. It is associated with drivers’ mobile phone use but also with some general behavioral aspects such as fatigued driving, driving above the speed limit, probability of speed check, and driving through amber traffic lights.
- Factor 3: Attitudes towards penalties and enforcement: Consists of the following questions: CO07b, CO08a, CO08b, and CD23b. This factor is associated with drivers’ attitudes toward road safety measures such as speeding surveillance, penalties for handheld phone use, and penalties for speeding offenses. It also consists of giving way to pedestrians.
- Factor 4: Risky behavior, perception of speed check, and accidents: This factor groups together questions CD05, CD19, CD23a, CO02c, and CD24d (probability of speed check, past accident involvement with injuries, following the vehicle in front too closely, awareness about road accident, and the risk of accidents when handheld phone is used while driving, respectively).

Table A1 (see online supplement) provides an overview of the factors showing the factor loadings; that is, the shared variance of the variables involved in each factor. A loading of 1 means perfect positive correlation (100% positive shared variance), a value of −1 means perfect negative correlation (100% negative shared variance), and a value of 0 means no shared variance.
Cluster Analysis

The clustering of the factor scores resulted in 5 clusters or groups of drivers. More specifically:

- Cluster 1: Moderate drivers: 18% of the sample are assigned to this cluster. Statistically significant factors for this cluster are factor 2 (positive mean score) and factor 4 (negative mean score). Drivers in cluster 1 neither agree nor disagree that other drivers break the speed limit or that the level of safety of roads is adequate, and they are indifferent toward more severe penalties and enforcement. However, they often show certain aspects of risky behavior such as excessive speeding, mobile phone use while driving, and fatigued driving. It is interesting that these drivers generally have not been involved in past accidents, feel that that speed check is very possible, and are concerned about road accidents. They also consider that making/answering a call with handheld phone is a factor causing road accidents.

- Cluster 2: Optimistic drivers: 23% of drivers belong to this cluster. Only factor 1 (negative mean score) is statistically significant in this group. Drivers in cluster 2 are generally positive toward other drivers because they believe that they never break the speed limits and therefore consider traveling a safe activity. Mobile phone use is not considered a critical factor causing road accidents. They have medium scores on the other 4 factors, indicating neither safe nor unsafe behaviors concerning the other aspects (occasional use of mobile phone, etc.).

- Cluster 3: Conservative drivers: 24.5% of drivers belong to this cluster. Statistically significant factors for this cluster are factor 1 (positive mean score), factor 2 (negative mean score), and factor 3 (negative mean score). Concerning factor 1, they have entirely opposite attitudes toward speed limit breaking, mobile phone use, and safety from cluster 2. They show very careful behavior as they give way to pedestrians, never drive when tired, never break the speed limit, and have never been punished. They also feel that they would never be checked for speeding. Concerning mobile phone use, they neither talk on the phone when they feel tired nor make/answer calls, similar to cluster 3. However, they are negative toward penalties and stricter enforcement.

- Cluster 4: Risky drivers: This cluster involves 10.5% of the sample. Factor 1 (negative mean score) and factor 4 (positive mean score) are statistically significant. Similar to cluster 2, this cluster consists of drivers stating that other drivers do not break the speed limits. However, they report high past accident involvement and aggressive behavior. It seems that those drivers believe that they would never be checked and they are also not concerned about the issue of road accidents. Mobile phone use is not considered to be a factor causing road accidents.

- Cluster 5: Reasonably cautious: Cluster 5 involves 24% of the sample. Factor 2 (negative mean score) and factor 3 (positive mean score) are statistically significant. Similar to cluster 3, as they give way to pedestrians, never drive when tired, never break the speed limits, have never been punished, and do not believe they would be checked for speeding. Concerning mobile phone use, they neither talk on the phone when they feel tired nor make/answer calls, similar to cluster 3. However, they are negative toward penalties and stricter enforcement.

Discussion

Thus far, the research on mobile phone use is mainly based on real observations or simulations. However, there are only a few studies regarding the attitudes of drivers toward mobile phone use, especially using a large national and representative sample. This study aimed to investigate the attitudes and behavior of Greek drivers with a specific focus on mobile phone use while driving. It is based on the data of the pan-European SARTRE 4 survey, which was conducted on a representative sample of 600 Greek drivers in 2011. The respondents answered a wide range of questions regarding several road safety issues. Specific questions regarding driver behavior, attitudes toward road safety, and attitudes toward mobile phone use were selected for analysis. Firstly, a factor analysis was performed to identify meaningful groups of variables reflecting drivers' attitudes and behaviors and examine whether mobile phone use is an important component of Greek drivers' attitudes and behaviors. The next step was a 2-step cluster analysis in order to group car drivers into meaningful groups according to their attributes.

The results showed 4 factors and 5 clusters of Greek drivers. The produced factors group variables concerning, for example, driving behavior, past accident involvement, fatigued driving, attitudes toward road safety, and specific attitudes toward mobile phone use. According to the attributes of the drivers, the 5 groups were labeled as moderate, optimistic, conservative, risky, and reasonably cautious. Overall, the results showed that a large proportion of Greek drivers do not frequently use a mobile phone while driving and the majority of respondents consider mobile phone use while driving a risk factor for accidents.

As expected, respondents who are negative toward mobile phone use are less likely to talk on the phone, but they may report occasional mobile phone use. Moreover, those who often use a mobile phone report other risky behaviors as well, such as exceeding the speed limit or aggressive behavior.

The results can assist Greek practitioners in further understanding drivers' accident risk on the basis of their attitudes and perceptions toward mobile phone use, by using a representative sample. Initially, appropriate design of targeted road safety campaigns and other countermeasures should be implemented in order to increase public awareness toward mobile phone use while driving and subsequently lead to fewer accidents. However, drivers identified as risky drivers (10.5%) are characterized by a combination of risky behaviors in addition to mobile phone use. As a consequence, it is suggested that traffic safety officials should not solely focus on distraction caused by mobile phone use but examine this behavior combined with other risky behaviors. The results showed that risky drivers have a general tendency toward risky behavior and have also been involved in more accidents. For example, other risky behaviors such as driving under the influence of alcohol or driving while tired.
alcohol or other drugs, drowsy driving, and excessive speeding should be incorporated in safety programs.

The statistical analysis showed generally robust results, in agreement with international literature. The proposed methodology is a promising tool in order to analyze large questionnaires with a high number of variables. Further research is needed in order to understand this issue more deeply. It would be interesting to perform experiments and observations to test whether the stated behavior of drivers differs from the observed behavior in real situations. The same methodology could also be applied to examine the attitudes and behaviors of other road user groups such as motorcyclists and cyclists or to examine more countries to perform comparisons. Texting while driving is also an important parameter that needs further investigation. As a last remark, it can be mentioned that the technological advances in mobile phones (Bluetooth, hands-free), could offer a chance to group drivers according to their preferences and analyze the behaviors of each group.

Funding

The research leading to these results has received funding from the European Commission under Grant Agreement No. TREN/09/ SUB/E3/229/SI2.544555/SARTRE 4. The opinions expressed in this article are those of the authors and not of the European Commission.

Supplemental Materials

Supplemental data for this article can be accessed on publisher’s website.

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