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An observational study of driving distractions on urban roads in Spain

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ABSTRACT

The present research investigated the prevalence of driver engagement in secondary tasks and whether there were any differences by age and gender, as well as day of the week and time of the day. Two independent researchers observed 6578 drivers at nine randomly selected urban locations in Girona, Spain. Nearly 20% of the drivers observed were engaged in some type of secondary task, with the most common being: conversing with a passenger (11.1%), smoking (3.7%) and talking on a handheld mobile phone (1.3%). Surprisingly there were no differences by gender, but there were age-related differences with younger drivers being more frequently observed engaged in a number of different types of secondary tasks while driving (i.e. drinking, talking on a handheld mobile phone, and texting or keying numbers). Logistic regression showed that younger drivers, and to a lesser extent middle-age drivers, were significantly more likely to be observed engaged in a technological distraction than older drivers. Conversely, non-technological distractions were significantly predicted by day of the week, time of the day and location. A substantial number of the drivers observed in this study were putting themselves at an increased risk of becoming involved in a crash by engaging in non-driving related tasks at the same time as driving. Furthermore, the higher crash rate among young drivers may be partially accounted for by their more frequent engagement in some types of secondary tasks while driving.

1. Introduction

There is an extensive body of evidence, from around the world, which has shown that distracted driving increases the risk of crash involvement (e.g. Horberry et al., 2006; Klauer et al., 2006; McEvoy et al., 2007; Redelmeier and Tibshirani, 1997; Sullman and Baas, 2004; Violanti and Marshall, 1996). The evidence for this increased risk comes from a variety of sources, including: self-report surveys, naturalistic studies, epidemiological studies, hospital interviews and driving simulator research. For example, interviews involving the hospitalised victims of motor vehicle crashes in Australia found that almost one third of drivers reported having been distracted at the time of the crash, with conversing with a passenger being the most frequently reported secondary activity (McEvoy et al., 2007). Furthermore, epidemiological studies have found that using a mobile phone while driving increases the risk of being involved in a crash by somewhere between four and five times (Redelmeier and Tibshirani, 1997; Violanti and Marshall, 1996). Therefore, it is very important that we have a clear understanding of the types of distractions drivers engage in and the types of drivers who are more likely to engage in these distractions.

There are two main approaches to investigating the prevalence of driver distractions in situ, roadside observation and naturalistic studies (McEvoy and Stevenson, 2008). Naturalistic studies have mostly been conducted amongst professional truck drivers (e.g. Hanowski et al., 2005, 2007) or private vehicle drivers (Dingus et al., 2006) in order to look at critical incidents and the distractions which lead up to these critical incidents. Stutts et al., (2005) and McGehee et al., (2007) recorded drivers' engagement in secondary tasks while driving and observed various distracting activities while driving. These activities included mobile phone use (conversation, dialling, answering the phone), eating/drinking, manipulating audio controls, and conversing with passengers.

There are a number of cross-sectional studies which have used roadside observation to investigate the prevalence of driver distraction, but most of these have concentrated solely on the prevalence of handheld mobile phones (e.g. Eby et al., 2006; Horberry et al., 2001; Narine et al., 2010; National Highway Traffic Safety Administration, 2010; Taylor et al., 2007). Several studies have also broadly investigated driver distraction using observational data (Gras et al., 2012; Johnson et al., 2004; Sullman, 2010). In Johnson et al., (2004) still photographs were used of drivers on

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the New Jersey turnpike to identify secondary activities. They showed that mobile phone use was the most frequently conducted activity. Sullman, (2010) used roadside observers and observed, in one city in England, that mobile phone use was also the most commonly conducted activity. However, in a separate study by Sullman (2012) using six urban centres in England, talking to passengers was the most common activity, followed by smoking and mobile phone use. Gras et al., (2012) also used roadside observers in a study in Spain and showed that mobile phone use was only the third most common, with smoking and conversing with a passenger being more common.

The overall level of driver distraction has also been found to vary greatly between studies. Johnson et al., (2004) found that less than 5% of the US drivers they photographed were engaged in a secondary task, while in Spain Gras et al., (2012) reported this figure to be 19%. However, in the UK Sullman, (2010) found that 5.5% of the drivers observed were undertaking a secondary activity, while this figure was 14.4% in the second UK study (Sullman, 2012). The main difference between the first and second UK studies is the fact that talking to a passenger was not measured as a distraction in the first British study (Sullman, 2010). There has been some debate in the literature regarding whether passengers should be included as a distraction (e.g. Charlton, 2009). However, anything that draws the drivers' attention away from the main task of driving can be regarded as a distraction.

The differences between the Johnson et al., (2004) study and the three European studies (Gras et al., 2012; Sullman, 2010) can largely be attributed to differences in methodology (i.e. still photographs vs. roadside observation). However, the differences found between the three European studies were also to be expected, as previous research has even found substantial regional differences within the same country (e.g. Beirness et al., 2002). There are a number of potential reasons for these differences, such as the: type of roads observed, traffic density, weather conditions, legislation and the degree to which any laws are enforced (e.g. Collet et al., 2010; Dirección General de Tráfico, 2003). Regardless of the causes of these differences, these findings clearly highlight the need to investigate the issue of driver distraction in each country and/or each region.

The research conducted in Spain by Gras et al., (2012) does have shortcomings. Observations included only drivers leaving the city area and are therefore not representative of travel within the city. The observations also did not account for day of the week or time of day and there may be differences in driving behaviour and patterns based on these parameters (Astrain et al., 2003; Johnson et al., 2004; Walter, 2010; Young et al., 2010). In summary, the goals of the current study were to investigate:

(1) the prevalence of observable secondary activities while driving,
(2) whether there were differences in the prevalence of secondary activities by gender, age, day of the week (weekdays/weekend), time of the day, and,
(3) to test whether gender, age, day of the week and time of the day were predictors of engagement in secondary activities, controlling for location.

2. Methods

2.1. Design of the study

A cross-sectional observational study was carried out in the city of Girona in the spring of 2011. A total of 63 h of observation were undertaken during daylight hours and during this time 6578 drivers were observed. Two observers independently recorded whether the observed drivers were engaged in any visible type of secondary activity while driving. In all cases the observers recorded data for the same vehicle at the same time.

Only motor vehicles travelling in the lane closest to the curb were observed. Emergency vehicles (e.g. ambulances), driving school cars, marked police vehicles, heavy and light trucks, motorcycles and buses were all excluded. The observed vehicles were selected using the same procedure as Gras et al., (2012), in order to avoid any form of selection bias. As it was not possible to record the behaviour of every driver that drove past the observers, a timing device was used to select which driver to observe. The timing device was set to ring after five seconds and was activated at the start of the observation period and was reset after each individual driver had been observed. When the timer rang both observers recorded the behaviour of the next driver to pass a predetermined point on the road.

2.2. Timing and locations

An exhaustive list of roads was obtained from the Girona City Council. All of the 716 streets were given a number and the nine observational sites were randomly selected using an online random number generator without any a priori constraints.

After the streets had been chosen, random selection was again used to determine the direction of travel (for two-way streets) and the distance along the road (using the house or building numbers) where the observations would take place. Observers placed themselves in approximately the middle of the selected block in order to avoid intersections (particularly controlled intersections).

Locations were excluded when less than five vehicles drove past during the first 15 min. Using this criterion, seven locations had to be substituted for other locations (also randomly selected) and another street was rejected as it was a cul-de-sac with access restricted to residents only. The main features of the nine observation areas are described in Table 1 and in all cases these roads had a legal speed limit of 50 km/h.

Each day was divided into nine one-hour observation periods, from 8 a.m. to 5 p.m. The assignment of observation period to each location was conducted as follows: the first location was observed

Table 1
Description of the main features of the randomly selected locations.

Location	Features	Number of observations
1	One-way traffic, two lanes with parking spaces on both sides	983
2	One-way traffic, single lane, with parking spaces on the left side	611
3	One-way traffic, single lane, with parking spaces on the left side	467
4	Two-way traffic, single lane, with parking spaces on the right side	641
5	One-way traffic, single lane	290
6	One-way traffic, single lane, with parking spaces on both sides	374
7	Two-way traffic, two lanes each way, with a median barrier	1257
8	One-way traffic, single lane, with parking spaces on the left side	1212
9	One-way traffic, single lane, with parking spaces on the right side	743