Victorian Drivers’ Exposure to Technology-Based Distractions: Policy Initiatives Deriving from a Driver Survey

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Abstract

This project aimed to derive fundamental knowledge about driver exposure to technology-based distracting activities and the conditions in which distraction is experienced. An Internet survey of 287 Victorian drivers was conducted to: determine the extent to which drivers reportedly are exposed to technology-based sources of distraction; factors that influence willingness to engage in distracting activities; and strategies used to manage distraction. The survey found that almost 60% of drivers use a mobile phone while driving and over one third of these drivers use the phone in hand-held mode. Young drivers (18-25 yrs) also SMS more frequently than middle-age (26-54 yrs) and older (55+ yrs) drivers, with 88% of young drivers reading SMS and 77% sending SMS while driving. A high proportion of drivers use audio entertainment systems, but few use in-vehicle visual displays such as DVD players. Most drivers (84%) believe they drive in a less safe manner when engaged in distracting tasks and, importantly, take steps to avoid distractions. Based on the survey results, recommendations are offered regarding how to better target distraction policy and countermeasures.

Keywords

Driver Distraction, Driver Exposure, Mobile Phones, In-vehicle Technology

Introduction

There is converging evidence from crash data and laboratory, field and epidemiological research that driver distraction appears to be a significant road safety issue in Australia and overseas. Driver distraction can be defined as a diversion of attention away from activities critical for safe driving towards a competing activity [1]. Early analysis of crash data from the US indicated that about 25 percent of all crashes are a result of inattention [2, 3], with about half of these thought to be attributable to distraction. However, the findings of the more recent ‘100-Car Naturalistic Driving Study’ showed that distraction was a contributing factor in around 23 percent of the 69 crashes included in the study [4]. The role of distraction in crashes has the potential to increase as the number and complexity of in-vehicle technologies grows.

Driver engagement in secondary activities has a number of effects on driving performance and safety. Drivers engaging in competing activities (i.e. distracted drivers) demonstrate poor ability to control their speed and following distance [e.g. 5-7]; maintain lateral position on the road [e.g. 8, 9]; have reduce awareness of surrounding traffic and events [e.g. 10]; miss traffic signals and signs and response slower to hazards occurring in the roadway [e.g. 11, 12].

In order to effectively manage the issue of driver distraction, it is important that we understand the extent and nature of the problem. Consistent with the injury prevention research model, accurate problem definition is paramount to the determination of appropriate countermeasures. Obtaining fundamental knowledge regarding driver exposure to distracting activities is an important first step in further defining the driver distraction problem.

A number of studies have attempted to quantify the amount of time drivers spend engaging in distracting activities. This research is still in its infancy and the majority of studies have focused on mobile phone use; although some data do exist for other distraction sources. Driver engagement in mobile phone use is common and widespread, particularly among drivers who are young, inexperienced, travel in urban areas and have high annual mileage rates. Exposure estimates vary across countries, with up to 40% of Canadian [13, 14] and 30%
of Swedish [15] drivers admitting to using a phone while driving. Usage rates in countries such as the United States, Spain, New Zealand and Australia are higher, with around 60% of drivers reportedly using a mobile phone [16-19]. Other distracting activities which are commonly engaged in include interacting with passengers, adjusting vehicle controls, listening to the radio/CDs, and attending to external objects or events [14, 17, 20, 21].

Very little is currently known about Victorian drivers’ exposure to distracting activities. Which driver populations are most willing to engage in distracting activities? Under what conditions do drivers choose to engage in distracting activities? What strategies, if any, do drivers adopt in order to cope with distraction? Data regarding driver exposure to a wide range of distracting activities can help better inform and target distraction countermeasures and can also be used as a baseline for future surveys to assess the effectiveness of these distraction countermeasures.

This project is one of the first to derive fundamental knowledge about Victorian drivers’ exposure to a range of technology-based distracting activities, not just mobile phones, by: identifying the extent to which drivers reportedly are exposed to these sources of distraction; the factors that influence willingness to engage in these activities; and the strategies used to manage distraction.

**Method**

Data on drivers’ exposure to technology-based distractions were collected using an online survey. A total of 287 completed survey forms were submitted by Victorian drivers aged 18 to 83 years.

The survey sample was recruited from three age groups: young (18-25 years); middle-aged (26-54 years) and older (55 + years). To be eligible to complete the survey, respondents had to be aged 18 years or over, reside in Victoria, hold a valid Victorian car driver’s licence or Learner’s permit and have driven a car within the last 3 months.

The survey was widely advertised around Victoria in newsletters and the RoyalAuto magazine in order to increase the representativeness of the sample. However, because the sample was one of convenience, it was not a true representation of the Victorian driver population.

The demographic profile of survey respondents is contained in Table 1.

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* Percentages in parentheses
^ Standard Deviation in parentheses

The survey contained five sections. Parts A and B of the survey contained items on the demographic and driving patterns of respondents. Part C was the largest section of the survey and contained items regarding engagement in various distracting activities, inside and outside the vehicle, while driving. Part D contained questions regarding the perceived risk of engaging in distracting activities and other risky behaviours (e.g.
speeding, drink driving) while driving. The final section, Part E, contained questions about the strategies used by drivers to manage distraction.

The survey was administered on-line via a link on the MUARC website in late 2007. The entire survey took approximately 15-20 minutes to complete. Ethical approval to conduct the survey was granted by the Monash University Standing Committee on Ethics in Research Involving Humans.

Results

Chi-square ($\chi^2$) analysis was performed and, where the data did not meet the assumptions of the Chi-square test (i.e. cell counts less than 5), these are reported descriptively. For categorical survey items with three or more response categories, the General Loglinear analysis procedure was performed to test for differences in responses across the three age groups, gender, and any age group by gender interactions. Driving exposure (obtained using self-reported kms driven per week) was controlled for by including it as a covariate in the model.

Patterns of Technology Use

Overall, 94% of survey respondents reported that they own a mobile phone and 59% of these use their phone while driving. Phone use is an activity largely engaged in by younger drivers, with around 70% of the young and middle-age drivers who own a phone admitting to using it while driving, compared to only 28% of older drivers. Over one third (35%) of the drivers who use a phone admit to using it in hand-held mode all of the time, while 13% use their phone in both hand-held and hands-free mode. The duration of phone calls while driving is typically short, however, with 61% of drivers reporting that their average phone call lasts for 1 minute or less, and the majority of drivers reported using their phone 'on about half of trips' or 'rarely'. Worryingly, engaging in text messaging is also common among those drivers who use a mobile phone while driving. A total of 88% of young drivers admitted to reading text messages while driving, while 60% of middle-age drivers read SMS when driving, compared to 28% of older drivers. Over one third (35%) of the drivers who use a phone admit to using it in hand-held mode all of the time, while 13% use their phone in both hand-held and hands-free mode. The duration of phone calls while driving is typically short, however, with 61% of drivers reporting that their average phone call lasts for 1 minute or less, and the majority of drivers reported using their phone ‘on about half of trips’ or ‘rarely’.

Respondents were asked to rate how likely they think it is that a driver using a hand-held mobile phone will be caught by police. Respondents answered on a 5-point scale ranging from 1 – ‘Very Likely’ to 5 – ‘Very Unlikely’. The mean response was 3.39; indicating that drivers believe that it is ‘somewhat likely’ to ‘unlikely’ that a driver using a hand-held mobile phone will be caught by police. No significant gender or age differences were found.

Use of audio entertainment systems is also common among drivers. Almost all (94%) of the drivers sampled listen to the radio when driving, and 58% will also change radio stations once or more each trip. Further, around one quarter (24%) of young drivers reported that they listen to CDs while driving, compared to 9% of the middle-aged drivers and 1% of older drivers. Almost 40% of young drivers change CDs once or more per trip, compared to 23% of middle-age drivers.

Use of portable devices, particularly music players, is popular with younger drivers. Around 41% of the drivers who own a portable music player (e.g. iPod) use it while driving. Just over half of these are young drivers (53%), with only 12% of older drivers listening to these devices when driving. Only 4% of the survey respondents reported using ‘other’ portable devices when driving, the most common being a Personal Digital Assistant (PDA).

In terms of visual entertainment systems, only 3 (1%) of the 287 survey respondents reported having a DVD/TV unit equipped to their vehicle, and only one driver reported using it while driving. Use of satellite navigation systems is also relatively rare. Just over 9% of respondents own a satellite navigation system and

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1 “While driving” was defined as any time that the driver was in control of the vehicle. This includes times when the vehicle is stationary and the engine is running (e.g. when stopped at traffic lights).
most of these owners use this system rarely: 89% of owners use it once a week or less, while 8% said that they ‘never’ use the navigation system equipped to their car.

Male and female drivers did not differ significantly in the frequency or duration of in-vehicle technology use, nor type of technology-based activities performed while driving.

**Perceived Effect of Distracting Activities on Driving and Self-Regulation Strategies**

Respondents were asked whether and how they think their driving is affected by performing non-driving activities and what type of behaviours, if any, they engage in to reduce the risks associated with performing these activities.

The majority of drivers (84%) indicated that they believe they drive in a less safe manner when engaged in other tasks, while 6% said that they ‘don’t know’ if their driving is affected. No age or gender differences were found. Drivers believe that when distracted their driving is affected in a number of ways, including responding slower to events, missing hazards, changing following distance from vehicle ahead, slowing down, and swerving in and out of their lane.

Drivers also reported that they may self-regulate their behaviour in terms of the conditions under which they will or will not engage in distracting activities and how they adapt their driving to compensate for being distracted. Drivers reported that they are less likely to perform distracting activities in poor weather, on winding/curved roads, in heavy traffic, at night and around schools. Interestingly, however, young male drivers were significantly less likely than the older or female drivers to report that they avoid distracting activities under these high workload conditions. Finally, driver also reported that they are more likely to engage in distracting activities while stopped (e.g. at traffic lights), where there is little or no traffic, in good weather, and on country roads.

Drivers also reported modify their driving in a number of ways when distracted. The most common of these were: reducing speed (78% of drivers), pulling over to side of road (68%), increasing following distance from the vehicle ahead (48%) and stopping their vehicle (42%). Over 21% of drivers do not change their driving when engaged in distracting activities.

**Discussion**

The current survey was conducted to determine the extent to which a sample of Victorian drivers reportedly expose themselves to technology-based sources of distraction, the factors that influence their willingness to engage in these activities, how they think their driving is affected by these sources of distraction, and what strategies they use to cope with them.

Overall, the number and type of tasks engaged in by drivers differed across the age groups examined. The younger drivers reported that they engage in many more potentially distracting activities than the other two driving groups, particularly the older drivers. Technology-based activities in which younger drivers more frequently engage include: conversing on a mobile phone, reading and sending SMS messages, listening to and changing tracks on CD and portable music players, eating, drinking, and smoking. This is a trend that has been found in other distraction surveys [16, 17, 22], and is worrying given that young drivers are most vulnerable to the negative effects of distraction, given their lack of driving experience and skill and limited spare capacity to deal with additional tasks while driving. Indeed, previous research has shown that young drivers are more likely to have had a crash due to distraction than their older counterparts [20, 22].

Consistent with other distraction surveys conducted overseas [16, 19], a large proportion of Victorian drivers (59%) use mobile phones while driving. Of particular concern is the high number (approx 30%) of young drivers who are regularly (once a day or more) reading and sending text messages while driving. This behaviour seems to be occurring despite drivers rating these activities as highly dangerous. Thus, the issue appears not to be a lack of awareness of the dangers involved in text messaging while driving, but rather a perceived likelihood that drivers will not get caught. Indeed, most of the drivers surveyed believed that the chance of a driver getting caught by police using a hand-held phone was only somewhat likely to unlikely.
Relatively few drivers reported owning or using emerging in-vehicle technologies, such as satellite navigation systems and DVD and TV systems. This is probably due to the relatively small number of vehicles currently fitted with these devices, but driver exposure to these systems is likely to increase as they become more common in vehicles.

Few differences were found between male and female drivers in terms of their exposure to distracting activities. Previous findings on gender differences in exposure to distractions have been mixed. Gras et al. [16] found very few gender differences in mobile phone use, but McEvoy et al. [22] found that males were more likely to report being distracted by outside distractions and mobile phone use than female drivers, while females were more likely to report talking to passengers while driving. It is not clear why some studies have found gender differences and others have not. In the case of the current study, it could be that the small sample size of male drivers did not provide enough power to detect any differences that exist.

The news is not all bad, however. Drivers completing the survey reported using a range of strategies to manage the risks associated with distractions. In order to manage their exposure to risk, participants reported that they will avoid engaging in distracting activities in a range of situations, including poor weather conditions, when driving at night, in heavy traffic, in unfamiliar areas, on winding or curved roads, around schools, when they have passengers (especially children) in the car, and when they are approaching roadwork or an intersection. It is important to note, however, that young male drivers were significantly less likely to report that they avoid distracting activities under these high workload conditions than other drivers groups (i.e. female and older drivers).

The majority of drivers will also modify their driving in a number of ways when they are engaging in other tasks. The most common of these were reducing speed, pulling over to the side of road, increasing following distance from the car ahead, and stopping their vehicle. However, 21 percent of drivers still reported that they do not modify their driving behaviour when engaged in distracting activities.

This survey has revealed a wealth of data that can be used to better target distraction countermeasures and determine the effectiveness of these countermeasures in minimising driver distraction.

Priority Distraction Policy Initiatives

The survey findings highlight a number of gaps in our knowledge of driver distraction and suggest a number of priority areas for distraction countermeasures.

Public Awareness and Education

The results of the survey reveal that hand-held mobile phones, and text messaging in particular, are still a major concern despite legislation banning their use while driving. There is a need to build upon existing public awareness and education campaigns to instil a greater awareness among drivers of the adverse consequences of hand-held phones. In particular, these campaigns should target young drivers and the dangers of text messaging while driving. Further, given that much of the mobile phone research suggests that hands-free phone use is just as risky as hand-held use, a priority for distraction campaigns and education should be to increase public awareness of the dangers of hands-free phone use to de-bunk the myth that this mode of phone operation is safe when driving.

However, it is important to note that public awareness campaigns are needed on the dangers associated with wider range of technology-based distractions, not just mobile phones. These campaigns should be targeted toward young drivers in particular, and also towards specific distractions known from previous research to be a problem [e.g. see 23] - using portable music players is suggested as a priority activity to target.

Educating drivers in how to use of in-vehicle technologies is also likely to be an effective countermeasure. Manufacturers should be encouraged to provide training to new vehicle purchasers regarding how to use onboard equipment in the optimal manner so as to minimise distraction. This training should ideally be conducted prior to drivers driving the vehicle for the first time and could be achieved by providing a dedicated training session, an in-car demonstration by the dealer, or the provision of a DVD-based in-car tutorial.
Enforcement

The survey results suggest that many drivers believe the likelihood of being caught by police using a hand-held phone is low, and this perception may be an important factor in driving the high level of hand-held phone use among drivers. This suggests that strategies to increase deterrence and drivers’ perceived risk of enforcement may be warranted. Indeed, research from a number of countries suggests that legislation banning the use of hand-held phones while driving is not effective in the long-term without strict and vigorous enforcement of the law over an extended period of time [24-26]. Innovative technology-based enforcement practices, such as mobile phone blockers, may play a role in better enforcing mobile phone laws, given the difficulties and resource demands associated with enforcing this legislation, although this needs to be explored further.

Putting in place prohibitions on the use of all mobile phone types for drivers who work under high workload conditions or who carry large numbers of passengers may also help manage mobile phone distraction. For example, Australia- or state-wide bans on all phone use and other distractions should be considered for public transport drivers (including school bus drivers), who, by the nature of their job, are already operating under high workload conditions leaving them more vulnerable to distraction.

Regulation

Stricter regulations should be placed on vehicle manufacturers, requiring them to adhere to human factors design guidelines and standards when designing their in-vehicle devices and to demonstrate the safety impact of these technologies prior to deployment. An incentive scheme could be put in place to encourage vehicle manufacturers to design in-vehicle systems that meet minimum safety criteria. This scheme would encourage manufacturers to make the safety of their interfaces a sales feature through provision of additional or bonus points under the ANCAP safety rating scheme for those vehicles whose on-board systems meet or exceed the specified safety criteria.

The survey also revealed that a large proportion of the satellite navigation systems used by the drivers are aftermarket systems. Many of these aftermarket and portable devices can be placed anywhere in the vehicle and are often poorly secured. This raises the issue of regulating the design, placement, fitment and use of portable and aftermarket devices to meet ergonomic safety criteria. In line with European automotive human machine interaction guidelines (e.g. European Statement of Principles; European Commission, [27]), Australian regulations prohibiting or restricting the use and fitment of “plug-and-play” type portable and aftermarket devices in the vehicle is needed. Further, regardless of whether the device is built-in or portable, access to ‘high-risk’ in-vehicle technologies should be ‘locked-out’ or restricted while the vehicle is moving. Candidate tasks for this type of regulation include accessing emails, typing address details in a navigation system and scrolling long lists of songs or information.

Engineering and Road Design

Finally, it is important to acknowledge that not all distractions are practical to legislate. Similarly it cannot be expected that drivers will not be distracted at least some of the time while driving. In line with the Safe System approach, it is important to design vehicles and the road system to support and be forgiving of distracted drivers. The incidence and severity of distraction-related crashes could be reduced through traditional traffic engineering countermeasures developed for other forms of driver impairment, such as tactile edge linings and rumble strips at high risk locations (e.g. rural intersections and level crossings), high friction road surfaces, pedestrian and cyclist havens, separation of vehicles and median barriers, and sealed road shoulders and roadside barriers. Self-explaining roads, although used mainly as a tool for speed management, may also play a role in managing distraction. Self-explaining roads are designed to increase the likelihood that drivers will automatically adopt appropriate speeds and steering profiles without depending on road signs [28].

Conclusions

This study represents the first attempt at obtaining data from Victorian drivers about their exposure to a range of technology-based distracting activities and the behaviours they engage in to compensate for being
distracted. Moreover, this research has also informed policy discussions to tackle the issue of driver distraction with the ultimate aim of reducing the injury associated with this form of driver impairment. It is important moving forward to implement a means of capturing emerging trends in this area so that distraction research and policy can keep pace with technology development.

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