

The Impact of Mobile Phones Usage on Road Traffic Safety

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Abstract

This paper aims to confirm the thesis on analysis of road traffic safety for mobile phone usage. Mobile phone use on driving can increase crash risk fourfold while texting results in 23 times greater crash risk for heavy vehicle drivers. However, mobile phone use has changed in recent years with the functional capabilities of smart phones to now also include a range of other common behaviours while driving such as using Face book, emailing, the use of 'apps', and GPS. Research continues to show performance decrements for many such behaviours namely; the risks associated with its use in traffic, prevalence or frequency of mobile phone use while driving, characteristics of drivers who make more frequent use of mobile phones, effects on driving performance of using various modes of mobile phones while driving ("hands-free" or "hand-held"), psychological factors influencing driver's decision to use a mobile phone while driving, examining effects of using mobile phone on pedestrians' attention and walking, the impact of mobile devices on human health and life etc. This paper reviews the available literature on the topic and argues that a better understanding of perceptions of mobile phone use while driving and motives for use are required to inform public awareness campaign development for road traffic safety.

Introduction

Road traffic safety from using a mobile phone while driving is difficult to establish from data commonly collated by transport authorities. This is due to the under-reporting of mobile phone use during crash events. Unless a police officer or witness expressly notes that mobile phone use contributed to a crash, it is unlikely that it will be reported. Elvik (2011) noted that there is a lack of firm evidence to accurately quantify the degree of crash involvement from mobile phone use and that most studies suffered from methodological limitations. Hence, while some research estimates that mobile phone use may be implicated in up to 25% of all road crashes in the United States (see review by the Governors Highway Safety Association, 2011), this cannot be asserted with certainty. Research using case-crossover designs to examine driver distraction from mobile phones showed a fourfold increase in crash risk for hand-held phone use, and a similar result for hands free phone use (McEvoy et al., 2005; Redelmeier & Tibshirani, 1997). In a naturalistic study using on-board cameras to observe driver behaviour, Virginia Tech Transportation Institute (2009) found that sending a text represented 23 times greater crash risk for heavy vehicle drivers. More recently, mobile phone use has changed from calling or text messaging to now also include a range of other common behaviours linked to the internet capabilities of smart phones such as using Facebook, emailing, gaming, the use of various 'apps', and the use of Global Positioning Systems (GPS) (NSW Centre for Road Safety, 2012). The various behaviours differ in the type and likely level of distraction posed to the user when engaging in these secondary tasks while also in control of a motor vehicle (NSW Parliamentary Staysafe Committee, 2013), or while walking (Hatfield & Murphy, 2007; Nasar, Hecht & Wener, 2008; SWOV, 2010), or cycling (De Waard, 2010; SWOV, 2010). Texting, emailing, and using Facebook are examples where this may be most prominent.

Additionally, situational demands of the traffic environment may impact on the level of distraction posed by a secondary task. For example, the level of distraction posed by using a particular function of a mobile phone while driving at 110 km/h on a motorway may vary to that posed while using the same function when driving at 50 km/h in heavy traffic. Perceptions of crash risk by individuals across a range of driving

situations need to be established through research, as these perceptions may motivate their decision to use the mobile phone or not. That is, people may self-regulate their behaviour depending on the perceived risk of certain traffic situations or the cognitive demand associated with the traffic situation. For example, do people think that it is dangerous to text while stopped at traffic lights and/or do they know that this constitutes a traffic offence. Decrements in driving performance are well established for using mobile phones while driving.

Naturalistic studies and driving simulator studies have established that poor lane control, poor speed control, increased reaction times (e.g. late braking), and increased headway by way of driver compensation for reaction times, are all linked to distraction caused by mobile phone use while driving (Governors Highway Safety Association, 2011; Haque, Washington & Haines, 2012). Drivers aged 17-29 have been found to more frequently send texts while driving than other age groups (NSW Centre for Road Safety, 2012), and this is arguably one of the most dangerous of all behaviours relating to mobile phone use while driving. Petroulias (2009) reported a declining trend for the percentage of active drivers making phone calls, with 27% found in 2011 compared to 34% in 2009. More than half of the drivers surveyed in 2011 used hands free mode to make calls. It must be kept in mind however that the overall risk for behaviours related to mobile phone use while driving also depends upon how frequently each behaviour is performed and for how long it is performed on each occasion, as well as the driving situation and the road user. In essence, a conundrum for road safety practitioners is that while the vast majority of road users acknowledge that there is some level of increased crash risk from using a mobile phone in some capacity while driving, they continue to do so (Australian Transport Council, 2011; NSW Parliamentary Staysafe Committee, 2013). For instance, Petroulias (2011) found that 86% of drivers surveyed thought that talking on a mobile phone while driving increases their crash risk, yet the majority of these people admitted to recently performing the behaviour. Hence, mobile phone use while driving remains of major concern for road traffic safety in India and internationally. This paper outlines the key issues of concern related to mobile phone use while driving and, more specifically, comments on how the development of public education campaigns on the topic can be informed by research.

Hands free mobile phone and Hand held mobile phone

Hands free mobile phone use has not conclusively been shown to be safer than hand held mobile phone use while driving (AAA Foundation for Traffic Safety, 2013). This is due to the cognitive distraction caused by holding a phone conversation as a secondary task to driving. However there is some conjecture in the literature regarding this issue. Early research (e.g. McEvoy et al., 2005) found little difference in crash risk between hands free and hand held operation of a mobile phone regarding making and receiving calls. However, naturalistic study methods offer more definitive observation of explicit behaviours that are performed concurrently with the driving task. Such research has found that using a hand held mobile phone presents a higher risk (due to the combination of cognitive and manual distraction) than using hands free mode (Klauer et al., 2006). For driver performance, a recent program of experimental studies using a driving simulator and an instrumented vehicle found little difference between hand held and hands free mobile phone use for eye glance, brake reaction time, or following distance (Strayer et al., 2013). Hence, the likely differences in risk between using a hand held or hands free mobile phone remain clouded.

The alternative hands-free mobile phone is also far from the best solution and prevention of accident on the road. According to studies of the Journal of Safety Research, "driving performance while using a hands-free phone was rarely found to be better than using handheld devices". In the full NSC (National Safety Council) report, the effect of driver's mental workload on the cognitive distraction scale was driving and talking on a handheld phone had a 2.45 workload rating, and driving while talking on a

hands-free phone has a 2.27 workload rating, usage of the speech-to-text application while driving had a 3.06 workload rating. The accurate reporting is also affected by the data collected on accidents and fatalities caused by mobile phone use on the road to be “under-reported due to the lack of drivers willing to admit to using their phones”. In response to such challenge and to protect the citizens many states in the United States have made it illegal to use handheld devices while driving. According to the Governors Highway Safety Association, out of the 43 states that have banned texting while driving, all but five have primary enforcement of their laws, meaning an officer may cite a driver for texting without any other traffic violation taking place (2014). New technology from vehicle manufacturers provides the driver with the option of converting speech to text rather than manually texting. On face value this may appear to be a worthwhile initiative for road safety.

Work-related driving may be more likely to require the use of a mobile phone to conduct business. Employers have a responsibility to ensure that mobile phone use only occurs in hands free mode to comply with legislative requirements. However, the aforementioned research findings suggest that laws allowing hands free mobile phone use may be misguided and still place road users at risk. To this end, the legal implications for employers of requiring hands free mobile phone use by staff require further investigation.

Negative Effect of Mobile Phone Use While Driving

The illegality of using a hand held phone while driving may be superseded by the need to fulfil other motives for some people. By examining the various motives for performing specific behaviours while driving such as sending a text, making a phone call, or using the internet on smart phones, we may gain a greater understanding of how to reduce the likelihood of such behaviours being performed. To this end, various road users groups may be motivated in different ways to perform the same behaviour.

For instance, young drivers may feel a social expectation among their peer group to communicate at all times, including while driving (Walsh et al., 2011). That is, for young people, the mobile phone may represent a means by which to feel socially included within their immediate peer group and they will use their mobile phones in bed, in classrooms, or while driving to fulfill their perceived need for social inclusion. Hence, to some degree social acceptability of using a mobile phone while driving may contribute to the behaviour for this group. To some degree it may also perhaps be that individuals have performed the behaviour so often, and the behaviour has been sufficiently reinforced socially, that it has become habitual (White et al., 2012). Young drivers may also be motivated to use other functions of their phones for entertainment (e.g. accessing music play lists) or for information access.

Truck drivers may perhaps call or send a text while driving in order to keep in touch with friends and family as the drivers are often away from home and drive for a substantial portion of their day. Other individuals may use mobile phones while driving to conduct business and feel that they would be at a competitive disadvantage if they couldn't use their phones while driving. The use of mobile phones while driving in general may also be motivated by instrumental needs, for example, to call emergency services, access route information/maps, or to advise someone else that the person is running late for a meeting.

Psychological theory can provide a framework for assessing the underlying motives for using various functions of mobile phones while driving. For example, the Theory of Planned Behaviour (Ajzen, 1991) asserts that an individual's intentions are the greatest influence on behaviour. In turn, attitudes, social norms, and perceived behavioural control are all factors that influence intentions. Perceived behavioural control may also have a direct influence on behaviour within the theory.

Classical deterrence is used to dissuade the performance of illegal behaviours in the broader population by inducing the perception that being apprehended is likely, and that punishment will be swift and severe (Watson, 2004). Specific deterrence targets offenders to ensure that they feel that the consequences of reoffending are sufficiently unattractive in terms of the swiftness and severity of punishment. The following section comments further on how punishment avoidance (not suffering any negative consequences for the action) has been shown to have a greater effect on using a mobile phone while driving than classical deterrence (which is based on an individual's perception that they are likely to be apprehended and punished).

Legislation Enforcement

Enforcement efforts by police continue to regularly detect illegal mobile phone use while driving. It is possible however that some road users are simply ignorant to the laws regarding mobile phone use on the roads. Little research has been conducted to examine public knowledge of these laws, and public education is vital to inform people of the exact nature of the legislation (and any legislative changes). For example, people may believe that it is satisfactory to text at traffic lights as their vehicle is stopped, however this behaviour is illegal.

Where people are aware that their behaviour is illegal, yet still continue to perform the behaviour and are not detected by police, punishment avoidance may be a strong reinforcer for performing the behaviour in the future. Watson (2004) found that punishment avoidance was a stronger predictor of illegal traffic behaviour than classical deterrence. This suggests that deterrence for illegally using a mobile phone while driving is being undermined by a substantive lack of detection and punishment. Hence, more enforcement is required in relation to these behaviours or the development of new methods of enforcement that enhance the perception of being apprehended and punished would be beneficial. The apparent reality that motives for illegally using a mobile phone while driving may outweigh the concern for being punished for some individuals, and also that individuals' behaviour may be reinforced through punishment avoidance, are both issues that require the immediate attention of authorities. Altering perceptions of enforcement and punishment for illegal use of mobile phones while driving would also be useful in a holistic strategy for public education campaigns.

Secondly, using research regarding the target groups' perceptions of the issue and their motives for using mobile phones while driving may be able to best address the underlying factors that influence or reinforce the behaviour. For young drivers in particular this may require ongoing campaigns aimed at addressing the social culture regarding the perceived need for immediate communication, with specific reference to peer influence and the level of acceptability of using a mobile phone while driving. Attitudes to mobile phone use while driving have been shown to be a significant predictor of future intentions to perform the behaviour (White et al., 2012), hence for cultural change to be achieved, such attitudes need to be targeted in countermeasure development along with enforcement measures that aim to directly address the undesirable behaviour. Additionally, providing options for alternate actions is part of many psychological interventions when addressing such behaviours. Displaying these alternate actions as a solution to the undesirable action is also likely to be useful in designing successful public education campaigns for road safety (Lewis, Watson & White, 2013). For example, drivers can be encouraged to turn their mobile phones off before each trip and/or place their phone somewhere that it cannot readily be accessed while driving, such as in the boot of their car. Drivers may then perceive greater control over performing alternate actions and confidence that these actions will be socially reinforced if campaign strategies include such issues.

Lastly, the medium used to convey the message is a key issue of importance. The media used must suit the target group in order for the reach of the message to be maximised. For example, young people are highly targeted in marketing through social media as they are a high user group for media such as Facebook, Twitter, and YouTube. The recent NSW 'Get Your Hand Off It' campaign utilised such media.

Summary and Conclusions

Mobile phone use while driving remains a major issue for driver distraction and road traffic safety in general. While many drivers acknowledge that using a mobile phone while driving is likely to increase their crash risk, efforts to reduce the range of associated behaviours must be increased as current countermeasures do not appear to be reducing the extent of the problem. Strategic approaches to dealing with mobile phone use by a range of road users must be of a multidimensional nature. Public education campaigns are one way of addressing the problem, however they must be complemented with enforcement and technological solutions in order to minimise the potential harm. The design of public education campaigns may be best to consider specific target groups and their underlying perceptions of the issue and motives for mobile phone use. Development of such campaigns can be further informed by research to guide content development and message delivery for the specific target audience.

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