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Smartphone use while driving: What factors predict young drivers' intentions to initiate, read, and respond to social interactive technology?



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ABSTRACT

This study was guided by an extended Theory of Planned Behaviour (TPB) and identified factors that predict young, predominantly university student drivers' intentions to engage in initiating, monitoring/reading, and responding to social interactive technology (e.g., Facebook, email) on a smartphone. Participants ($N = 114$) were aged 17–25 years. The standard TPB constructs of attitude, subjective norm, and perceived behavioural control were assessed in an online survey, as well as the additional predictors of anticipated regret, moral norm, mobile phone involvement, and cognitive capture. The results of hierarchical multiple regression analyses showed the standard constructs accounted for 67%, 56%, and 65% of variance in intentions to initiate, monitor/read, and respond, respectively, with the extended variables contributing additional variance. For initiating behaviour, for example, attitude, subjective norm, PBC, and cognitive capture all had significant, positive relationships with intention, while moral norm had a significant, negative relationship. For responding behaviour, attitude, subjective norm, PBC, and cognitive capture all had significant, positive relationships with intention, while anticipated action regret had a significant, negative relationship. These different combinations of significant predictors of intentions for each of the three behaviours (i.e., initiating, monitoring/reading, and responding) suggest that they may be distinct and require different public education message content to influence young drivers' behaviours.

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1. Introduction

A recent Australian survey found that 75% of mobile phone users now have smartphones; this figure more than doubled between 2011 and 2014 and is expected to reach 91% by 2017 (Telstra, 2014). Social interactive technology accessible on smartphones allows the user to communicate with other people via, for example, social networking sites (e.g., Facebook, Twitter), emails, and also texting and calling. This greater functionality of smartphones (e.g., ability to access the internet and social media), compared to standard mobile phones, means they have a greater potential to distract a driver. Indeed, evidence suggests that 68% of drivers from the Australian state of New South Wales have reported reading emails

and 25% have reported updating their Facebook status or tweeting while driving (NRMA, 2012). These statistics highlight the fact that drivers are utilising the capabilities of their smartphone beyond talking and texting, thereby increasing their crash risk.

Mobile phone conversations and passenger conversations have different effects on driving performance. Specifically, simulator research has found a higher level of driver error associated with having a conversation on a mobile phone (e.g., driver less likely to reduce their speed when approaching hazards) than having a conversation with a passenger (Charlton, 2009). This may be due to drivers experiencing a higher level of cognitive load when engaging in mobile phone conversations than when conversing with a passenger. While passengers are aware of the driving situation and may modify their expectation of the conversation accordingly, the person a driver is conversing with on a mobile phone does not have access to these cues and may, therefore, expect the driver to engage

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in an intense conversation while negotiating difficult traffic situations (e.g., Crundall, Bains, Chapman, & Underwood, 2005; Hunton & Rose, 2005). Mobile phone conversations also tend to have a higher level of cognitive load than other in-vehicle distractions and are, therefore, more distracting (McKnight & McKnight, 1993). Mobile phone conversations are continuous and externally paced (Charlton, 2009) whereas other in-vehicle distraction such as the operation of a satellite navigation system or eating while driving are less distracting as they are usually controlled by the driver.

In all states and territories of Australia, including Queensland where the current study was conducted, using a mobile phone in hand-held mode is illegal for all drivers. Drivers can be fined if their mobile phone is in their hand for any reason, including calling, texting, and any of the additional functions accessible on smartphones (e.g., Facebook, internet). Despite the illegal nature of hand-held mobile phone use for all Australian drivers, the increased functionality of mobile phones may be encouraging drivers to use them in the hand-held mode (Rudin-Brown, Young, & Lenne, 2013). Also, it is possible that drivers are increasingly concealing their use from outside view, making detection (and enforcement) difficult (Gauld, Lewis, & White, 2014; Rudin-Brown et al., 2013). This concealment, in addition to other factors such as tinted car windows and the difficulty detecting a mobile phone at night, heightens the need for measures other than enforcement on its own to raise awareness of the dangers of smartphone use while driving.

Young drivers aged 17–25 years are represented in over 20% of road crash fatalities (Department of Infrastructure and Regional Development, 2014) yet constitute only 12.4% of the population (Australian Bureau of Statistics, [ABS], 2015). Learner drivers (i.e., drivers with an initial licence, aged at least 16 years, who need to be accompanied by a supervising driver at all times) and provisional licence holders (i.e., intermediate licences with specific driving restrictions where the driver can drive alone; the first of which is known as P1 and is followed by P2) under the age of 25 years are not permitted to use a hands-free mobile phone in the Australian state of Queensland, where the current study was conducted. Young drivers aged 18–25 years, however, are more likely than any other age group to use a mobile phone while driving (AAMI, 2012) and a smartphone in particular, suggesting this age group is particularly vulnerable to road trauma.

The current study utilised an extended Theory of Planned Behaviour ([TPB]; Ajzen, 1991) to investigate young, predominantly university student drivers' intentions to initiate, monitor/read and respond to social interactive technology on a smartphone while driving. In addition to the standard predictors of attitude, subjective norm, and perceived behavioural control, the additional predictors of anticipated regret, moral norm, mobile phone involvement, and cognitive capture were assessed. As enforcement of the law regarding smartphone use while driving is challenging, it is proposed that the results of this research could potentially form focal points for public education messages targeting these risky behaviours. The following literature review outlines the problem of young drivers accessing social interactive technology, the importance of investigating the different behaviours of initiating, monitoring/reading, and responding, and the theoretical background (i.e., the TPB). Each of the individual predictors is then discussed along with a justification for its inclusion in this research.

1.1. Literature review

1.1.1. Young drivers

Evidence suggests that young drivers may have an increased risk of being involved in road trauma as a result of using their smartphones. Young drivers aged 18–24 years are more likely to call, text,

and read emails on their smartphones than older drivers with 12% admitted to updating their Facebook status while driving and 14% admitted to taking a selfie and uploading it onto social media while driving (AAMI, 2012, 2015). Smith (2015) found that young people aged 18–29 years were more likely than any other age group to report feeling distracted when they use their smartphone. Simulator studies have shown that such distraction can increase the risk of yellow-light running (Haque, Ohlhauser, Washington, & Boyle, 2013) and substantially prolong reaction times to detect events originating in the driver's peripheral vision, such as a pedestrian entering a crossing (Haque & Washington, 2013).

1.1.2. Initiating, monitoring/reading, and responding to social interactive technology

Currently, only a few studies have investigated the specific behaviours of initiating, monitoring/reading, and responding, which could be applied to the range of social interactive technologies. Waddell and Wiener (2014) found that drivers had greater intentions to engage in, and had reported more actual engagement in, responding behaviours than initiating behaviours and suggested that social pressure to respond may play an important role. Other research supports this conclusion, particularly within the population of young drivers (Atchley, Atwood, & Boulton, 2011; Nemme & White, 2010).

Shi, Xiao, and Atchley (2016) categorised texting behaviours into 'sending', 'reading', and 'replying' and found that drivers perceived replying and sending as more risky than reading. Contrary to these perceptions, recent research has shown that simply hearing a notification can significantly disrupt performance on an attention-demanding task (Stothart, Mitchum, & Yehnert, 2015). Of particular note from the Stothart et al. (2015) study is the magnitude of the observed distraction effects which the authors found were comparable to those found when users actively engaged with their mobile phone for calls or texts. The current study addresses this gap in the literature by investigating the specific behaviours of initiating, monitoring/reading, and responding to social interactive technology on smartphones among young drivers.

1.1.3. Theoretical background

The Theory of Planned Behaviour ([TPB], Ajzen, 1985) posits that attitude, subjective norm, and perceived behavioural control (PBC) together predict intention. Attitude is defined as how positively (or negatively) the behaviour is evaluated, subjective norm is the extent to which important others approve or disapprove of the behaviour, and PBC is the perceived ease or difficulty of performing the behaviour and can reflect past experience as well as consideration of obstacles (Ajzen, 1991). Overall, the relative importance of each of these constructs varies across behaviours and situations (Ajzen, 1991).

In accordance with the tenets of the TPB the current study hypothesised that attitude, subjective norm, and PBC would predict drivers' intentions to initiate, monitor/read, and respond to social interactive technology on a smartphone while driving in the next week. In particular, the more positive their attitude towards this behaviour, the more they believed it would be approved of by important referents, and the more control they perceived having over the behaviour, the more likely young drivers would be to intend to engage in these behaviours.

1.1.4. Additional predictors

Providing their addition is justified on theoretical grounds, extending the TPB to include other predictors may help to explain additional variance in intention and/or behaviour over and above the standard TPB constructs (Ajzen, 1991; Armitage & Conner, 2001; Conner & Armitage, 1998). Past research investigating

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