Can't Text, I'm Driving – Factors Influencing Intentions to Text While Driving in the UK

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Abstract

There is clear research evidence that using a mobile phone while driving is dangerous. However, although drivers generally know this is a risky behaviour, many continue to use a handheld mobile phone while driving. The present research used the Theory of Planned Behaviour (TPB) to explore the psychological reasons underpinning intentions to use a mobile phone while driving in general, as well as to send and read text messages while driving across four different scenarios. Convenience sampling was used to obtain data from 314 participants who held a valid licence to drive in the UK, had driven at least once in the last six months and owned a mobile phone. General intentions to use a mobile phone while driving were predicted by positive Attitudes towards the behaviour and higher Perceived Behavioural Control. Moreover, when predicting intentions to send and read text messages, it was positive Attitudes that was the most consistent and significant predictor. Surprisingly, neither Perceived Behavioural Control nor Subjective Norms were significant predictors of intentions to send or read text messages. Furthermore, perceptions of risk (crashing and being apprehended by the police) were significant predictors of intentions to send and read texts over and above that provided by the TPB variables. The present research highlights the need for interventions to target attitudinal change and to increase risk perceptions in order to reduce the prevalence of these risky behaviours.

Keywords: Mobile phone; Driving; Texting; Theory of Planned Behaviour; Cell phone

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The United Kingdom has one of the lowest road fatality rates in the European region (28/million inhabitants), but the recent increase in the number of drivers killed or injured indicates that more remains to be done (European Commission, 2020). Although driver distraction is only one factor contributing to road crashes, the National Highway Traffic Safety Administration (NHTSA) estimated that in 2018 approximately 8% of all fatal crashes, 15% of all non-fatal crashes and 14% of all police-reported motor vehicle traffic crashes were directly related to distracted driving (NHTSA, 2020). More specifically, the NHTSA estimated that 2,841 people were killed and an additional 400,000 were injured in distraction-affected crashes in the USA (NHTSA, 2020). In the UK, that same year, there were 140 (out of 1,456) distraction-related fatal crashes recorded by the police, 29 of which involved mobile phone use (Department of Transport, 2019).

Despite the substantial body of research that clearly shows the increased risk of using a mobile phone while driving, and the fact that using a handheld mobile phone is illegal in most developed countries, there is an equally large body of research which shows that a substantial proportion of drivers continue to use a mobile phone while driving. This includes self-report, observational and naturalistic studies (e.g., Dingus et al., 2016; Oviedo -Trespalacios, Nandavar, Newton, Demant, & Phillips, 2019; Simmons, Hicks, & Caird, 2016). For example, naturalistic driving research in the USA found that drivers were engaged in a distracting activity in more than half of their trips, with mobile phone use making up about a quarter of the time distracted (Dingus et al., 2016). Furthermore, Dingus and colleagues (2016) reported that observable handheld mobile phone use increased crash risk by approximately 3.6 times in their sample of 3,542 drivers. Research in New Zealand found that about 60.4% of the 1,057 drivers surveyed

reported using their mobile phone for calling during a typical week, about 66.2% read 1–5 text messages and about 52.3% sent 1–5 text messages while driving (Hallett, Lambert, & Regan, 2011; Hallett, Lambert, & Regan, 2012). Slightly lower proportions were found in Netherlands, where 28% used a handheld mobile phone at least "occasionally" to make a call while driving, 39% read text messages and 34% sent text messages while driving (Christoph, Kint, & Wesseling, 2018)

Moreover, a study on text messaging in Australia found that a little under a third of their participants read text messages and less than a fifth sent text messages on a daily basis while driving (White, Hyde, Walsh & Watson, 2010). Another Australian study reported that almost half of young drivers (18 and 24 years old) used a handheld mobile phone to call someone on a daily basis, and nearly 60% of them sent text messages while driving (AAMI, 2012).

Collectively, most of the aforementioned studies, as well as recent systematic reviews and meta-analyses, provide evidence that calling can be considered to be the most prevalent form of mobile phone use while driving (e.g. Caird et al., 2018; Gauld et al., 2013; Gauld et al., 2014). Nonetheless, texting while driving is common and appears to be increasing (Oviedo-Trespalacios et al., 2016), which is concerning as this behaviour is even less compatible with safe driving than conversing on a mobile phone (Caird et al., 2018). The increase in texting behaviours could be related to the increasingly sophisticated functionality of mobile phones, as well as the fast and reliable data connections (such as 4 and 5G mobile Internet), which may encourage drivers to text even more frequently. Given that messaging applications are the most widely used smartphone applications (Chen, 2020), it is possible that texting while driving may continue to increase. With the above in mind, exploring drivers' intentions to text while driving is an important topic worth investigating.

Previous research has investigated whether particular groups are more likely to text while driving. For instance, Tison, Chaudhary and Cosgrove (2011) surveyed 6,002 drivers aged 18 years and older from all 50 states in the US. There were no significant gender differences in accepting phone calls, reading or sending text messages. However, younger drivers aged 18 to 20 years old used a mobile phone more often behind the wheel than older drivers. This finding has also been supported by research from self-report and observational studies (e.g., Horberry, Bubnich, Hartley& Lamble, 2001; Sullman & Baas, 2004; Gras et al., 2007; Sullman, 2012). Worryingly, over half of the respondents (54%) reported that talking on the phone had no impact on their driving, while about 25% also believed sending text messages had no effect on their driving. Furthermore, almost three quarters (72%) of drivers reported that they could take their eyes off the road for two seconds or less while still driving safely. An interesting contrast was the fact that the majority of respondents indicated that as passengers they perceived using mobile phones by a driver to be very dangerous (Tison et al., 2011). A similar finding was also reported by White, Eiser and Harris (2004) who found that participants rated their perceived risk of having a crash due to using a mobile phone while driving was lower for them than for their peers.

In support of self-report studies, observational research has found the prevalence of handheld mobile phone use to be surprisingly high (Prat et al., 2014; Sullman, 2012, Sullman Sullman, Prat, & Kuzu-Tasci, 2015). For example, Sullman (2012) found that 2.2% of the drivers observed in six different cities in England were using a handheld mobile phone. A similar method of direct observation among Irish drivers found that 3.6% of the drivers observed were using a handheld mobile phone while driving (Bedford, O'Farrell, Downey, McKeown & Howell, 2005). Another observational on-road study in the US found that almost 18.7% of 1,280

drivers were using their handheld mobile phone while driving (Wilkinson, Brown, Moussa, & Day, 2015). There is also some evidence to suggest that this proportion is increasing in some areas. For example, a study conducted over a 4-year period in Michigan, using direct observation, found that the number of drivers who were using handheld mobile phones significantly increased from 2.7% to 5.8% (Eby, Vivoda & St. Louis, 2006). However, observational studies cannot reliably identify the use of a hands-free mobile phone or when drivers covertly use a handheld mobile phone and so the proportion of drivers using any type of mobile phone while driving remains unclear.

There is also research which reports that drivers know using a mobile phone while driving is risky, but continue to do so (e.g., Atchley et al., 2011; Gras et al., 2007; Sullman & Baas, 2004). Although research shows a significant relationship between perceptions of risk and mobile phone use (i.e., more risk less use) it is not a strong relationship (Hallett et al., 2011; Gras et al., 2007; Sullman & Baas, 2004). Therefore, the question is why do drivers continue to use a mobile phone while driving, even though they know it is both illegal and dangerous? Although a number of studies have investigated the psychological underpinnings of using a mobile phone while driving, these have mostly not used a psychological framework to investigate this behaviour. However, one model, which attempts to explain why individuals engage in risky behaviours is the Theory of Planned Behaviour (TPB). Developed by Ajzen (1991) the TPB proposes that intentions to perform a given behaviour are the most immediate determinant of actual behaviour. The TPB also suggests that perceived behavioural control (PBC) has a direct influence on actual behaviour, but this relationship is not as strong as the relationship between intentions and actual behaviour. Intentions, in turn, are influenced by subjective norms (an individual's perceived social pressure to engage, or not engage, in a particular behaviour),

attitudes (whether the individual has a positive or negative view on the behaviour) and PBC (whether the individual believes that they can resist the behaviour or carry it out successfully).

The TPB has been successfully applied to many risky driving behaviours, such as speeding intentions (e.g., Horvath, Lewis, & Watson, 2012), willingness to use a handheld mobile phone (e.g., Rozario, Lewis, & White, 2010) and intentions to engage in road violations (e.g., Castanier, Deroche, & Woodman, 2013). The TPB has also been used to design a media campaign aimed at reducing speeding (Stead, Tagg, MacKintosh, & Eadie, 2005), with a four-year study confirming the positive outcomes with regards to changing speeding attitudes and beliefs. The TPB has also been used to predict young drivers' intentions to conceal mobile phone use while driving (Gauld, Lewis, & White, 2014). Gauld et al. found that attitudes, subjective norms, PBC and moral norm all predicted intentions to conceal text messaging while driving, along with the degree of involvement with their mobile phone.

In another study on Australian drivers, White, Hyde, Walsh, and Watson (2010) showed the need for an educational campaign aimed at changing drivers' perceptions regarding using hands-free and handheld mobile phones while driving. Drivers perceived many more benefits to using these devices behind the wheel and fewer barriers that would reduce their use. Research has also found that drivers engage more often, in what Waddell and Wiener (2014) described as responding behaviour, rather than initiating behaviour. Responding behaviour includes answering calls and reading text messages, while initiating behaviour includes making calls and sending text messages. Their study, conducted on 181 Australian drivers, found that intentions to engage in these two categories of behaviours were predicted by the TPB constructs of attitude, subjective norm, PBC and descriptive norms. These studies all highlight the motivational and personal factors that should be considered when designing interventions to reduce mobile phone use while

driving. In another Australian study, Walsh et al. (2008) used the TPB to investigate the psychosocial factors related to sending text messages while driving. They studied the intentions to send a text message (and make a phone call) while driving across four different scenarios, which varied according to whether they were driving or stopped at the traffic lights and also whether they were in a hurry or not. Using hierarchical regressions, they found that the intentions to send a text message were predicted by the descriptive variables (age, gender and driving purpose), but it was only age that made a significant contribution in all four scenarios. Once the contribution of the descriptive variables had been partialled out the addition of the TPB variables made a significant contribution to predicting drivers' intentions to send a text message while driving. However, in all four scenarios it was only the attitude variable which was a significant predictor. Finally, once the contribution of the TPB variables had been partialled out the addition of the perceptions of risk items (crash and apprehension risk) resulted in a modest yet significant improvement in the prediction of intentions to send a text in scenario 2 (Driving at 100km/h in no hurry) and scenario 3 (Stopped at traffic lights and late). However, Walsh et al. did not report intentions to read a text message, which is more common than sending a text message (e.g., Nemme & White, 2010; Waddell & Wiener, 2014). Furthermore, as this research was conducted in one Australia city these findings may not generalise to different samples within Australia, let alone different countries and cultures. A study conducted in Poland, which partially replicated the methodology used by Walsh et al. (2008), also explored the psychosocial factors influencing intentions to send and read text messages using the TPB in four different scenarios (Przepiorka, Blachnio, & Sullman, 2018). Their findings showed that drivers' intentions to send and read messages differed significantly, depending on whether the drivers were waiting at the traffic lights (scenarios 3 and 4), travelling at 100 km/h (scenarios 1 and 2) and whether or not they

were under time pressure. Consistent with the finding of Walsh et al. (2008), attitudes were the only construct that predicted intentions to send and read text messages across the four scenarios. Lastly, a recent study from the US also utilised the TPB to explore the intention to text while driving among a sample of 524 young drivers (McBride, Carter, & Phillips, 2020). The results suggest that the TPB constructs of attitudes, subjective norms, and PBC significantly predicted the intention to send text messages while driving.

The present study

The present study investigated the psychosocial factors influencing the decision to use a mobile phone in general, as well as to send and read text messages while driving using the TPB. The study also investigated whether perceived risk would predict sending and reading text messages while driving over and above that predicted by the TPB variables in four different scenarios.

Method

Participants and Procedure

Firstly, an application was made to the University's ethics committee, which granted approval for the study. Data were collected over a three-month period using convenience sampling. The study was advertised on an internal university website asking undergraduate psychology students to complete the survey. These students received course credit for taking part. They were also asked to pass the link onto anyone else they knew who held a UK driving licence and owned a mobile phone. In addition, an article was run in a local newspaper which mentioned that a study was taking place to investigate the reasons why people use a mobile phone while driving. The article also contained a link to the survey, which was hosted by Bristol

Online Survey (BOS). Thirdly, online advertisements were placed on www.gumtree.co.uk in all regions of the UK asking for participants to complete the survey.

In total, 314 people completed the survey, with an average age of 29.4 (*SD* = 12.3; range 17-73 years old). The majority of the participants were female (64%), 35.7% were full time students, 15.3% were in part time employment (not all of these were also students), 40.1% were in full time employment, 1.3% were retired and the remainder answered that they were either unemployed or not in the workforce. With regards to their highest educational qualification, 4.5% reported none, 10.2% had GCSCs, 43.9% had A-Levels, 7.6% had passed a foundation course, with the remainder (33.7%) having at least a Bachelor's degree. Almost a third were single, 36.9% were dating, 27.4% were married (or in a de-facto relationship), with the remainder being separated, divorced or widowed.

Questionnaire

Firstly, the survey asked questions about a number of demographic variables (e.g., age, gender, marital status, educational attainment, driving purpose). Secondly, the study utilised the same questions as used by Walsh et al. (2008) to measure: attitude, subjective norm, PBC and intention to use a mobile phone while driving in general, as well as to send and read text messages while driving (as per Ajzen, 1991). These standard TPB measures, with the addition of risk perceptions, assessed text messaging while driving across four different scenarios which varied according to vehicle speed and time pressure.

TPB measures of general intentions to use a mobile phone while driving. General intentions to use a mobile phone in the next week were investigated by asking the participants to answer the following question root "If you were driving in the next week, do you agree that?" which was followed with a question to measure each of the TPB variables: Intention (*It is likely*

that I will use my mobile phone while driving), Attitude (*Using my mobile phone while driving would be good*), Subjective Norm (*Those people who are important to me would want me to use my mobile phone while driving*) and PBC (*I have complete control over whether I use my mobile phone while driving*). These questions were answered on a 7-point Likert scale, which ranged from 1 (Strongly disagree) to 7 (Strongly agree).

Scenario descriptions. Text messaging while driving was measured in each of the four different scenarios described by Walsh and colleagues (2008) in which only the speed and time pressure were varied. Each scenario started using the following description: "You are driving alone during the day in dry weather. The road is a straight, multiple-lane road that you travel frequently. You are in medium density traffic. For the following questions, imagine that you are driving in the above conditions in the next week and...". The above description was presented four separate times with the last part of each scenario differing in terms of speed and time pressure, as shown below:

Scenario 1: "You are driving at 60 mph and are running late"

Scenario 2: "You are driving at 60 mph and are not in a hurry"

Scenario 3: "You are waiting at traffic lights and are running late"

Scenario 4: "You are waiting at traffic lights and are not in a hurry".

Measures of intentions to send and read text messages while driving. The target behaviour under investigation was defined as "using a mobile phone to send or read text messages while driving in the next week". As suggested by Fishbein and Ajzen (1975) the target behaviour was framed in terms of the action, time and context.

Following each of the four scenario descriptions participants were asked "In this situation, to what extent do you agree that it is likely you would….." to measure each of the

following: Intention to use a mobile phone in general (*Use your mobile phone*), Attitude (*Think using your mobile phone would be good*), Subjective norm (*Think that those people who are important to you would want you to use your mobile phone*), PBC (*Have complete control over whether you use your mobile phone*), Intention to read a text (*Read a text*), Intention to send a text (*Send a text*), perceived risk of a having a crash (*Have a crash if you use your mobile phone*) and perceived risk of being apprehended by the police (*Be caught and fined by the police if you use your mobile phone*). All TPB and risk perception items were answered on a 7-point Likert scale, which ranged from 1 (Strongly disagree) to 7 (Strongly agree).

Data analysis

Pearson's correlations were used to investigate the relationships between the TPB and the descriptive variables. The traditional interpretation of correlations was used, which is < .10 small; < .30 medium; and > .50 large (Cohen, 2013). Hierarchical linear regressions were used to investigate the predictors of intentions to use a mobile phone while driving in general, as well as predictors of intentions to send and read a text while driving for each of the four scenarios. In order to partial out the effects of age, gender, and driving purpose (scaled from 1 = all business to 7 = all personal) these three variables were entered together in the first block. The second block consisted of the standard TPB variables (attitude, subjective norm and PBC). As the TPB requires that any addition to the model must explain a significant proportion of the variance in intentions over and above that of the standard TPB variables, the risk perception variables (perceived crash risk and perceived risk of apprehension) were entered at the third step.

Results

General intentions to use a mobile phone while driving

Table 1 shows the correlations between the TPB variables (general phone use), age, gender, and driving purpose. All three TPB variables had significant correlations with intentions, and these correlations were from moderate to strong (*r*s ranging from .235 to .569) with attitudes having the largest correlation. Gender was moderately negatively correlated with attitude and subjective norms (*r*s ranged from -.230 to -.248), meaning that male drivers had more positive attitudes towards the use of mobile phones while driving, and they also reported that their significant others would approve of them engaging in this behaviour. Age was negatively related to both driving purpose and intentions (*r*s ranged from -.159 to -.172), meaning that younger drivers were more likely to use their mobile phones for personal purposes and overall had higher intentions to use their mobile phones while driving.

[Insert Table 1]

Table 2 shows the results of a hierarchical linear regression to predict general intentions to use a mobile phone while driving. In step 1 of the regression analysis, age, gender, and driving purpose accounted for 4.6% of the variance (F (3, 310) = 5.00, $p < .01$), with only age being a significant predictor of intention to use a mobile phone. Younger drivers were more likely, than older drivers, to intend to use their mobile phone while driving. An additional significant proportion of variance (32%) in intentions to use a mobile phone while driving was explained with the addition of the TPB variables (F (6, 307) = 29.79, $p < .001$). Therefore, once the contributions of the descriptive variables had been partialled out, the three TPB variables made a significant contribution to predicting general intentions to use a mobile phone while driving. Attitude and PBC were both significant predictors of intentions to use a mobile phone while driving, but subjective norm was not. This means that those drivers who had positive attitudes

towards using a mobile phone while driving, and believed that they had complete control over this behaviour, were more likely to intend to use a mobile phone while driving.

[Insert Table 2]

Predicting intentions to text (read or send) across the four scenarios

Table 3 shows the means and standard deviations for the TPB and risk items for writing and reading a text message across the four scenarios. A series of one-way repeated measures Analysis of Variance (ANOVA) with post hoc tests, using Bonferroni adjustments, were conducted to compare the means. Across scenarios, intentions to read a text message were stronger than for writing a text message (Wilks's $\Lambda = .77$, $F\ (1, 311) = 96.41$, $p < .000$, $\eta_p^2 = .28$), and the intentions to read (Wilks's $\Lambda = .72$, $F\ (3, 311) = 41.09$, $p < .000$, $\eta_p^2 = .28$) and send a text message (Wilks's $\Lambda = .69$, $F\ (3, 310) = 46.74$, $p < .000$, $\eta_p^2 = .31$) were the highest for scenarios 3 & 4. Participants reported the lowest intentions to send and read a text message in scenario 1, which also had the least positive attitude towards texting, Wilks's $\Lambda = .75$, $F\ (3, 311) = 35.27$, $p < .000$, $\eta_p^2 = .25$, subjective norms, Wilks's $\Lambda = .85$, $F\ (3, 311) = 18.45$, $p < .000$, $\eta_p^2 = .15$, and PBC, Wilks's $\Lambda = .88$, $F\ (3, 311) = 13.15$, $p < .000$, $\eta_p^2 = .11$. Participants also reported the greatest risk of crashing (Wilks's $\Lambda = .78$, $F\ (3, 311) = 29.36$, $p < .000$, $\eta_p^2 = .22$) in scenario 1.

[Insert table 3]

Table 4 presents the results of regression analyses predicting intentions to text (read and write) while driving across the four scenarios. Predicting intentions to read and send a text produced relatively consistent findings, with the first block containing the descriptive variables resulting in a small but significant improvement in the R^2, with age being the only significant variable in all cases. The addition of the TPB variables also resulted in a significant improvement

in the variance explained and, in all cases, it was only the attitude variable that was significant. However, once the contribution of the descriptive variables and the TPB variables had been partialled out, the addition of the perceived risk variables resulted in a significant improvement in predicting intentions to read a text in all cases, with the perceived risk of having a crash being significant in all cases and the perceived risk of being apprehended by police being significant for all but scenario 1. However, the main difference between predicting intentions to send and read a text message was that the risk perceptions to send a text only resulted in a significant improvement in scenarios 2 and 3, with crash risk being significant in both but the apprehension risk was only significant for scenario 2.

[Insert Tables 4]

Discussion

The main aim of our study was to explore the psychological reasons underpinning intentions to use a mobile phone while driving in general, as well as to send and read text messages in a sample of UK drivers. The present study investigated the factors predicting intentions to send and read text messages while driving across four different scenarios. This was the first study to use the TPB to separately investigate sending and reading text messages while driving in the UK. Although there were a number of differences in the findings with the previous Australian research, there were also similarities.

In terms of predicting general intentions to use a mobile phone while driving, age was a significant predictor. This result reflects the general trend found in a number of studies showing that younger age is associated with risky behaviour in general (Shulman & Cauffman, 2014), but also with risky driving (e.g., Rhodes, Pivik, & Sutton, 2015). This phenomenon may stem from their inexperience or a different perception of risk. Shulman and Cauffman (2014) claim that

single young adults, in particular, undertake risky behaviours because they feel that they do not have anything to lose. What is more, engaging in risky behaviour also entail some benefits, in the form of exciting experiences. Additionally, this finding may also indicate that younger drivers have less knowledge of road safety rules than older drivers (e.g., Alonso, Esteban, Useche, & Colomer, 2018; Dong et al., 2011). This could also be related to the fact that young drivers have lower perceptions of legal and moral norms, which have been previously recognised as protective factors for risky driving among younger drivers (Kim, 2018). Future research should further explore the impact of additional constructs, such as these, on the intention to use a mobile phone while driving in general.

In the current study, gender did not predict general intentions to use a mobile phone while driving. This finding is in agreement with several previous studies, which have found gender to be unrelated to mobile phone use while driving (e.g., Przepiorka et al., 2018; Sullman, 2012; Sullman, Hill, & Stephens, 2018; Walsh et al., 2008). In contrast, a number of other studies have reported males to be more likely to use a mobile phone while driving (e.g., Hallet et al., 2011; Zhou, Wu, Rau, & Zhang, 2009). Despite several studies reporting gender differences in mobile phone use, the majority of the findings appear to indicate that these differences are insignificant.

Attitude and PBC increased the probability of using a mobile phone in general. These findings are partially in agreement with previous Australian research (Walsh et al., 2008), which found that attitudes and subjective norms were the only significant predictors of intentions to use a mobile phone while driving. In total the TPB variables accounted for 32% of the variability in intentions to use a mobile phone while driving in the UK (over and above that predicted by the descriptive variables), which is exactly the same as was found in the Australian research. Perhaps this similarity is related to the fact that the UK and Australia share a common cultural heritage.

However, that still leaves a substantial proportion of the variance unexplained. Future research is needed in order to better account for the variance in intentions to use a mobile phone while driving. Personality would appear to be one avenue for future research, with Type A behaviour pattern (TABP), which has yet to be examined in this context, being one obvious omission. Previous studies have found that TABP is associated with the tendency to multitask (Perry, 1986), which is essentially what using a mobile phone while driving is. Moreover, TABP has previously been found to increase the risk of road traffic accidents (e.g., Nabi et al., 2005; Perry & Baldwin, 2000; West, Elander, & French, 1993). Additionally, whether using a mobile phone while driving is an important part of a driver's self-esteem also seems to be a promising direction for future research. For example, previous research has found that the use of mobile phones in daily life can be highly gratifying and produces rewards for people with low self-esteem and social deficiencies (e.g., Oh & Syn, 2015). This means that drivers with low self-esteem may continue to use their mobile phone due to the perceived psychological benefits of this behaviour.

One of the advantages of the present study is that it distinguished behaviours according to the driving context, in terms of vehicle speed and time pressure. Thus, the study presents the different relationships between intentions and specific on-road scenarios. The results show that the intentions to read and send text messages were higher when waiting at traffic lights. This is consistent with previous research, which found that drivers were more likely to use a mobile phone when the driving demands were low (e.g., Oviedo -Trespalacios, Hague, King, & Washington, 2019). In addition, in the current study, the drivers were less likely to read and send text messages when driving at 100 km/h (scenarios 1 and 2). Similarly, the perceived risk of a crash was higher in these two scenarios. Furthermore, all of the TPB variables were also the lowest in scenario 1. These findings provide further support for the finding that drivers make

decisions to engage with their mobile phone when driving demands are low, which is considered as tactical self-regulation (Oviedo-Trespalacious et al., 2019).

Interestingly, it was consistently the same part of the TPB (Attitudes) which predicted intentions to use a mobile phone while driving. As well as being the strongest predictor of general intentions to use a mobile phone while driving, attitudes also emerged as the strongest predictor of the intention to send and read a text message in all four scenarios. These findings provide support for previous Australian research, which also found that attitude was the strongest predictor of intention to send a text in all four scenarios (Nemme & White, 2010; Walsh et al., 2008). Furthermore, this finding is supported by more general research which has found that a positive attitude towards other types of risky behaviour was a good predictor of speeding and rule violations (Sarma, Carey, Kervick, & Bimpeh, 2013). Also, in line with the Australian research, subjective norms and PBC were not significant predictors of intentions. Therefore, it would appear that interventions aiming to reduce texting while driving need to concentrate on changing attitudes towards this very risky behaviour.

Although the TPB theory does allow the inclusion of additional explanatory variables, one of the requirements is that the variable must account for a significant proportion of the variance in the behaviour of interest over and above that explained by the core TPB variables. The addition of the two risk variables resulted in a significant contribution to the variance explained in intentions to read a text across all four scenarios and for sending a text in scenarios 2 and 3. Furthermore, in most cases the crash risk was more significant than the risk of being caught by the police. Therefore, it appears that the perceived risk of a crash and being caught by the police are significant predictors of intentions to read a text while driving in the UK (risk of being apprehended by the police was significant for all but scenario 1). Therefore, increasing

drivers' perceived risk (of being caught by police or crashing) may be another avenue to pursue in order to reduce engagement in this risky behaviour. Previous research indicates that education (knowledge) is negatively related to some forms of risky behaviour, such as financial risk (Xiao, Serido, & Shim, 2012), but not to risky sexual behaviour (Norbu, Mukhia, & Tshokey, 2013).

The use of mobile phones is also greater among young people and being connected to others via technological devices is a natural part of their life. This generation is known as the Y Generation in the literature (Noble, Haytko, & Phillips, 2009) or Millennials (Myers & Sadaghiani, 2010), who have extensive contact with technology from a very early age. Young drivers may also be overly optimistic when assessing their driving skills (Matthews & Moran, 1986) and therefore decide to use mobile phones while driving more often. This research also found that young drivers had stronger general intentions to use a mobile phone while driving. This finding supports previous questionnaire-based research where age has been found to be the most important factor in explaining intention to answer phone while driving (Zhou, Rau, Zhang, & Zhuang, 2012), as well as findings from roadside observational research (e.g., Prat et al., 2014; Sullman, 2012; Sullman et al., 2015).

Applications of the results

In light of these findings, several suggestions can be made to improve road safety and to reduce the prevalence of this hazardous behaviour. The results show that it is crucial to change public perceptions about traffic safety. Generally, the results confirm that although people know these types of behaviours that are dangerous, they do not use this knowledge to improve their own behaviour. Interestingly, although drivers claim these risky behaviours are unacceptable from other drivers, this opinion does not stop them from engaging in these behaviours themselves (Atchley et al., 2011; Traffic Safety Culture Index, 2014). However, there is some

evidence which indicates that road safety knowledge and avoiding risky behaviours can decrease road traffic injuries (Dong et al., 2011).

The results may be useful for road safety interventions in preparing educational campaigns aimed at reducing illegal and unsafe practices while driving. The phenomenon of permanently using mobiles (including together with other activities, such as driving) is relatively new, but these results indicate that educating drivers to turn off their mobile phones when getting into the driver's seat should begin at an early stage in the driver training process and this should also be included in social campaigns. The present findings appear to suggest that the law banning mobile phone use while driving has not been entirely effective in the UK, as drivers still reported using a handheld mobile phone (for texting) in the present study. This finding is also backed up by observational studies which have been conducted in the UK (Sullman, 2012; Sullman et al., 2015). Perhaps one of the reasons text messaging remains relatively common is that campaigns to reduce mobile phone use while driving in the UK have not taken into consideration the ever increasing functionality of mobile phones (e.g.,Ehsani, Bingham, Ionides, & Childers, 2014; Goodwin, O'Brien, & Fross, 2012; McCartt, Hellinga, Strouse, & Farmer, 2010). The growing number of smartphone text messaging applications has increased the ways in which mobile phones can attract our attention and future research is needed to identify methods to deter this risky behaviour.

Finally, the present research highlights the need to target attitudinal change in order to reduce the prevalence of mobile phone use while driving in general, and in particular for sending and reading text messages. Campaigns should also highlight the potential gains from not engaging in mobile phone use while driving, which outweigh the potential losses inherent in this risky behaviour. Improving perceptions of PBC should also help to reduce general mobile phone

use while driving, but not specifically for texting. It would also appear that perceptions of risk (crash and apprehension) need to be increased to dissuade drivers from engaging in these risky behaviours.

Strengths and limitations of the present study

There are some limitations of the study that should be outlined. Firstly, mobile phone use was based on self-report measures and so the results may be affected by social desirability bias. In other words, drivers may under-report the frequency of their use in order to present themselves in a more positive light. To avoid this problem perhaps study designs that would include more objective methods of reporting mobile phone use could be used, such as a diary approach or in-vehicle data monitoring. However, as the participants were assured of confidentiality and anonymity and no names were included, this effect is likely to be small. In future research it would be useful to focus on young drivers, since they are the group most likely to text while driving. However, the current study allowed us to compare mobile phone use across different age groups.

One of the strengths of this research is that it investigated the ability of the TPB to predict sending and reading text messages in a European country. Most previous research in the field has come from Australia and has only reported findings with regards to one city in Australia. Therefore, their results may not generalise to different parts of Australia, let alone the UK where the traffic and cultural environments may differ substantially. Nevertheless, the present study has shown that a number of the findings made in Australia were also replicated here, in the UK sample. Furthermore, the previous research has only applied the TPB to sending text messages, which is not as frequent a behaviour as reading a text (e.g., Gras et al., 2007; Waddell & Wiener, 2014). It is important to separate sending and reading text messages as sending text messages

takes longer than reading them and sending also imposes higher mental demand (Owens, McLaughlin, & Sudweeks, 2011). Moreover, sending text messages has been reported to be perceived as more dangerous, while reading text messages is the more prevalent behaviour (Hallet et al., 2012; Prat et al., 2015; Young & Lenné, 2010).

Future studies should also include a cross-cultural aspect, as we would expect that the tendency to use mobile phones while driving would differ depending on the country's laws, level of enforcement and customs.

Conclusions

The present study concerns an important social phenomenon, namely mobile phone use while driving. Despite this practice being illegal in the UK, and the increased risk of having a crashm many drivers still continue to use mobile phones while driving. The present study used the TPB to more thoroughly investigate this dangerous driving behaviour. The TPB components of Attitude and PBC were identified as the most important predictors of mobile phone use in general. Similar to previous research, this study found the TPB to be useful in predicting texting among this sample of UK drivers. Furthermore, it was having positive attitudes to these risky behaviours that consistently predicted intentions to read and write text messages while driving. However, surprisingly neither PBC nor social norms had a part to play in predicting intentions. Finally, this research highlights the importance of further understanding the personal beliefs and their relationships with mobile phone use while driving.

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Table 1

Means, Standard Deviations, and Correlations between the TPB Variables and the Descriptive Variables (General Phone Use)

	M	*SD*	1	2	3	4	5	6
1. Gender	-		-	-				
2. Age	29.36	12.28	-.143*					
3. Driving purpose	4.73	1.73	.154**	-.159**	-			
4. Attitude	2.58	1.71	-.230***	-.075	-.162**			
5. Subjective norm	2.15	1.60	-.248***	.015	-.135*	.610***	-	
6. PBC	5.21	2.13	.011	.004	.008	.180***	.091	
7. Intention	3.61	2.22	-.062	-.172**	-.076	.569***	.398***	.235***

Notes: *** Significant at $p < .001$; ** $p < .01$; * $p < .05$. For gender, 1 = male, 2 = female.

Table 2

Regression Predicting Intention to Use a Mobile Phone while Driving in General

Variable	B	*β*	R^2	ΔR^2
Step 1				
Gender	-.348	-.075	0.046	0.046**
Age	-.036	-.198***		
Purpose	-.123	-.096		
Step 2				
Attitude	.621	.478***	0.368	0.322***
Subjective norm	.150	.108		
PBC	.145	.138**		

Note: *** Significant at $p < .001$; ** $p < .01$; * $p < .05$.

Table 3

Means and Standard Deviations for TPB Variables and Risk Items by Scenario

	Scenario 1 *M* (*SD*)	Scenario 2 *M* (*SD*)	Scenario 3 *M* (*SD*)	Scenario 4 *M* (*SD*)
Intention to send a text message while driving[a,c]	2.31 (1.70)	2.51 (1.90)	3.39 (2.04)	3.50 (2.14)
Intention to read text message while driving[b,c]	2.81 (1.91)	3.02 (2.01)	3.92 (2.09)	4.07 (2.16)
Attitude[d]	2.36 (1.61)	2.40 (1.63)	3.14 (1.72)	3.10 (1.81)
Subjective norm[e]	2.04 (1.44)	2.21 (1.57)	2.53 (1.61)	2.56 (1.68)
PBC[f]	4.82 (2.10)	4.98 (2.05)	5.18 (1.82)	5.38 (1.78)
Likelihood of having a crash[g]	4.30 (1.91)	4.08 (1.94)	3.34 (1.87)	3.28 (1.85)
Likelihood of being caught and fined	4.33 (1.95)	4.19 (1.94)	4.17 (1.89)	4.10 (1.95)

Notes: Scales ranged from (1) extremely unlikely to (7) extremely likely.

[a] For sending a text message, five of the six pairwise comparisons were significant and differences were revealed between scenarios 1 and 2 ($p = 0.014$), 1 and 3 ($p = 0.000$), 1 and 4 ($p = 0.000$), 2 and 3 ($p = 0.000$), 2 and 4 ($p = 0.000$).

[b] For reading a text message, five of the six pairwise comparisons were significant and differences were revealed between scenarios 1 and 2 ($p = 0.047$), 1 and 3 ($p = 0.000$), 1 and 4 ($p = 0.000$), 2 and 3 ($p = 0.000$), 2 and 4 ($p = 0.000$).

[c] All four pairwise comparisons across each of the four scenarios (e.g., scenario 1 send a text message versus scenario 1 read a text message) were significant ($p = 0.000$).

[d] For attitudes towards texting while driving, four of the six pairwise comparisons with a were significant and differences were revealed between scenarios 1 and 3 ($p = 0.000$), 1 and 4 ($p = 0.000$), 2 and 3 ($p = 0.000$), 2 and 4 ($p = 0.000$).

[e] For subjective norms, all six pairwise comparisons across each of the four scenarios were significant ($p = 0.000$).

[f] For PBC, three of the six pairwise comparisons were significant and differences were revealed between scenarios 1 and 3 ($p = 0.002$), 1 and 4 ($p = 0.000$), 2 and 4 ($p = 0.000$), 2 and 4 ($p = 0.000$).

[g] For perceived risk of having a crash, five of the six pairwise comparisons were significant and differences were revealed between scenarios 1 and 2 ($p = 0.039$), 1 and 3 ($p = 0.000$), 1 and 4 ($p = 0.000$), 2 and 3 ($p = 0.000$), 2 and 4 ($p = 0.000$).

Table 4

Regression Analyses Predicting Intention to Send and Read Text Messages while Driving, by Scenario

		Scenario 1 - 60mph, Late				Scenario 2 - Not in Hurry, 60mph				Scenario 3 - Traffic Lights, Late				Scenario 4 - Traffic lights, Not in Hurry			
	Variable	B	β	R^2	ΔR^2	B	β	R^2	ΔR^2	B	β	R^2	ΔR^2	B	β	R^2	ΔR^2
Intention to read a text																	
Step 1	Gender	-.419	-.105	.061	.061***	-.454	-.109	.070	.000**	.047	.011	.067	.067***	.246	.055	.078	.078***
	Age	-.037	-.240***			-.042	-.256***			-.044	-.258***			-.047	-.268***		
	Purpose	-.020	-.018			-.061	-.052			-.002	-.002			-.018	-.014		
		F(3, 310)=6.28				F(3, 310)=7.72				F(3, 310)=7.48				F(3, 310)=8.71			
Step 2	Attitude	.508	.428***	.218	.157***	.608	.494***	.244	.174***	.447	.368***	.196	.129***	.546	.459***	.252	.174***
	Subjective norm	-.044	-.033			-.118	-.092			-.034	-.027			-.097	-.076		
	PBC	-.035	-.038			-.054	-.055			.065	.056			.096	.079		
		F(6, 307)=14.26				F(3, 310)=16.50				F(6, 307)=12.48				F(6, 307)=17.23			
Step 3	Apprehension risk	.123	.125	.240	.022**	.229	.221***	.277	.033***	.216	.195**	.263	.067***	.136	.124*	.290	.038***
	Crash risk	-.215	-.215**			-.267	-.258***			-.356	-.317***			-.277	-.237***		
		F(8, 305)=12.05				F(3, 305)=14.58				F(8, 305)=13.58				F(8, 305)=15.58			
Intention to send a text																	
Step 1	Gender	-.320	-.090	.066	.066***	-.414	-.104	.087	.087***	.124	.029	.081	.081***	.144	.032	.123	.123***
	Age	-.035	-.252***			-.044	-.285***			-.047	-.283***			-.061	-.350***		
	Purpose	-.064	-.065			-.104	-.094			-.071	-.060			-.060	-.049		
		F(3, 310)=7.27				F(3, 310)=9.84				F(3, 309)=9.10				F(3, 310)=14.54			
Step 2	Attitude	.4407	.384***	.233	0.168***	.586	.503***	.345	.258***	.399	.337***	.200	.119***	.425	.360***	.259	.136***
	Subjective norm	.067	.057			.056	.046			.027	.021			.033	.026		
	PBC	-.041	-.050			-.074	-.079			-.004	-.003			-.015	-.013		
		F(6, 307)=15.57				F(6, 307)=26.91				F(6, 306)=12.73				F(6, 307)=17.91			

Step 3	Apprehension risk	.095	.109	.246	0.012	.156	.158*	0.358	0.013*	.119	.110	.236	.036**	.002	.002	.269	.010
	Crash risk	-.142	-.159*			-.132	-.135*			-.257	-.234***			-.120	-.104		
		F(8, 305)=12.41					F(8, 305)=21.22				F(8, 304)=11.73				F(8, 305)=14.06		

Note: *** Significant at $p < .001$; ** $p < .01$; * $p < .05$.