RUNNING HEAD: Mobile phone use while driving

Dialling and Driving: Factors Influencing Intentions to Use a Mobile Phone While Driving

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Abstract

Despite being identified as an unsafe (and, in some jurisdictions, illegal) driving practice, the psychological factors underlying people's decision to use their mobile phone while driving have received little attention. The present study utilised the theory of planned behaviour (TPB) to examine the role of attitudes, norms, control factors, and risk perceptions, in predicting people's intentions to use their mobile phone while driving. We examined the predictors of intentions to use a mobile phone while driving in general, and for calling and text messaging in 4 scenarios differing in descriptions of vehicle speed and time pressure. There was some support for the TPB given that attitudes consistently predicted intentions to drive while using a mobile phone and that pressure from significant others (norms) determined some phone use while driving intentions, although less support was found for the role of perceptions of control. Risk was not generally predictive of safer driving intentions. These findings indicate that different factors influence each form of mobile phone use while driving and, hence, a multi-strategy approach is likely to be required to address the issue.

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1 Introduction

Despite increasing evidence that mobile phone use while driving presents a risk to driver safety, many international (e.g., Törnros & Bolling, 2005) and Australian (e.g., Pennay, 2006) drivers engage in this behaviour (McCartt et al., 2006; Svenson & Patten, 2005; Wiesenthal & Singhal, 2005). A large scale self-report study in Australia found that 43% of mobile phone owners used their mobile phone while driving to answer calls, followed by making calls (24%), reading (16%), and sending (7%) text messages. Approximately a third of these drivers used hands-free units (Pennay, 2006) indicating that most Australian drivers use hand-held mobile phones.

Using a hand-held mobile phone while driving is illegal throughout Australia, yet observational studies reveal that, at any one time, approximately 2% of Australian drivers are engaging in this behaviour (Glendon & Sutton, 2005; McEvoy et al., 2005; Taylor et al., 2003). This figure is likely to be higher in jurisdictions where hand-held mobile phone use is not illegal. Observational studies, however, cannot detect use of a hands-free mobile phone and, thus, the number of drivers using any type of mobile phone at any time remains unclear. Although drivers consider hands-free mobile phone use as safer than hand-held (White et al., 2004), it has been found that using a hands-free mobile phone is not significantly safer than using a hand-held mobile phone while driving (McEvoy et al., 2005; Svenson & Patten, 2005). Thus, mobile phone use while driving, irrespective of type of handset, is an unsafe driving practice.

To combat this unsafe driving practice, Australian road safety interventions have typically used a deterrence-based approach comprising the combined use of enforcement

and educational campaigns (e.g., Australian Mobile Telecommunications Association, 2005; Queensland Transport, 2007). These methods, however, may not account for the numerous psychological and social factors motivating driver behaviour (Watson et al., 1996). In the case of mobile phone use while driving, these factors include benefits such as: feeling safe (Carroll et al., 2002), using the vehicle as a 'mobile office' (Eost & Flyte, 1998), improved social networking, use of otherwise unprofitable time, and ease of contact with emergency services reducing accident response times (Lissy et al., 2000). Given the practical, social, and psychological benefits of using a mobile phone, it is not surprising that mobile phone users, in general, perceive that the benefits outweigh the risks (Lissy et al, 2000; Walsh & White, 2006). It is, therefore, reasonable to expect that positive attitudes toward mobile phone use would influence the decision to use a mobile phone while driving.

While a large body of research reports the prevalence and risks of using a mobile phone while driving, fewer studies have focussed on the psychological underpinnings of this behaviour. The small number of studies examining the factors influencing mobile phone use while driving (e.g., Brusque & Alauzet, 2008; Lissy et al., 2000) have not employed a theoretical decision making framework to understand the complexity of people's decision making in this context. As observational studies indicate that the level of mobile phone use while driving is increasing each year (Eby et al., 2006), there is a necessity to determine the psychological factors influencing this behaviour. The present research, then, uses a well known decision making model, the Theory of Planned Behaviour, as a theoretical framework to investigate the psychosocial factors influencing mobile phone use while driving in an Australian context so that strategies to counteract this common, yet unsafe, driving practice may be more effectively designed and targeted.

1.1 The Theory of Planned Behaviour

The Theory of Planned Behaviour (TPB; Ajzen, 1991) maintains that intentions (i.e., readiness to act) are the most proximal determinant of behaviour. Intentions are influenced by attitudes (positive or negative evaluations of performing a behaviour), subjective norms (perceived social pressure to perform or not perform a behaviour), and perceived behavioural control (PBC; perceived ease or difficulty of performing a behaviour, also believed to be a direct predictor of behaviour itself). Attitudes, subjective norms and PBC are determined by underlying behavioural, normative and control beliefs, respectively.

A meta-analysis of 185 tests of the TPB provided support for the efficacy of the model in predicting intention and behaviour across a variety of contexts (Armitage & Conner, 2001). Intentions were a strong predictor of subsequent behaviour explaining, on average, 27% of the variance in behaviour with a further 2% of variance attributable to PBC. Attitude, subjective norm, and PBC explained 39% of the variance in intention. More recently, the TPB has been used successfully as a theoretical framework to explain high level mobile phone use (Walsh & White, 2007). Within the road safety domain, the TPB has examined a number of behaviours including: pedestrians' road crossing intentions (Evans & Norman, 1998; Holland & Hill, 2007); traffic violations (Parker et al., 1992); and compliance with speed limits (Elliot et al., 2003; Newman et al., 2004). Overall, these studies suggest that the TPB should be an effective framework to understand the decision to use a mobile phone while driving,

1.2 Risk Perceptions

The TPB allows for the possibility of modifying the model to incorporate additional factors that may impact on decision making (Ajzen, 1991). One factor relevant to unsafe

driving practices in general is an individual's awareness and perception of risk (Stradling & Parker, 1997). When deciding to perform a behaviour, individuals engage in a consideration of the perceived risks that may result from behavioural performance (Bagozzi, 1981; Fishbein & Ajzen, 1975). Two major risks of using a mobile phone while driving are an increased risk of crashing (Lamble et al., 1999, 2002) and the risk of apprehension (due to the illegal nature of the behaviour) if using a hand-held mobile while driving (Queensland Transport, 2007). Although Australian drivers appear to be aware of the risks of using a mobile phone while driving, an underestimation of these risks may result in a greater likelihood that drivers will engage in unsafe driving practices (Kannellaidis et al., 1995; McEvoy et al., 2006; Wogalter & Mayhorn, 2005).

Given the risky nature of using a mobile phone while driving and the prevalence of this behaviour, we assessed the impact of an individual's risk perceptions (perceived crash risk and perceived risk of apprehension) on their decision to use a mobile phone while driving. Specifically, we examined the distinct mobile phone use behaviours of calling and text messaging while driving as each behaviour requires slightly different attentional resources (Hosking et al., 2005; Lamble et al., 1999, 2002). Calling involves more auditory processing whereas text messaging requires manual manipulation of the phone and uses more visual processing. Therefore, drivers may evaluate the risks differently. We examined intentions to call and text message while driving across four different scenarios to achieve this aim. Scenario-based measures within a TPB framework have been used in other road safety research (e.g., Conner et al., 2003; Evans & Norman, 1998, 2003; Holland & Hill, 2007; Parker et al., 1992) and have the advantage of measuring on-road performance in a

consistent and safe manner by ensuring that risks to road users are minimised whilst avoiding problems with recall of behavioural performance.

1.3 The Current Study

The aims of the current study were two-fold. First we aimed to investigate the psychosocial factors influencing the decision to use a mobile phone while driving in an Australian context. Using the TPB we examined the role of attitudes, subjective norm, and PBC in the prediction of intentions to use a mobile phone while driving. A second aim was to use an extended TPB model to examine the impact of perceived crash risk and perceived risk of apprehension on intentions to engage in the specific mobile phone behaviours of calling and text messaging while driving in four different scenarios when vehicle speed and time pressure were varied.

In the case of general mobile phone use while driving, it was hypothesised that:

Hypothesis 1: Intention to use a mobile phone while driving would be influenced by respondents' attitudes, perceived social pressure, and perceived ease or difficulty of using a mobile phone while driving.

In the case of calling and text messaging, while driving in four different scenarios (for a description of scenarios see Section 2.2.3), it was hypothesised that:

Hypothesis 2: Intentions to call and text message while driving in four different scenarios would be influenced by respondents' attitudes, perceived social pressure, and perceived ease or difficulty of calling/text messaging while driving.

In relation to the role of risk perceptions in the prediction of intention to call and text message while driving in four different scenarios, it was hypothesised that:

Hypothesis 3: A greater risk of crashing and/or being apprehended for using a mobile phone while driving would influence intentions to call and text message across the four different scenarios.

2 Method

2.1 Participants and Procedure

Prior to conducting the study, ethical clearance was applied for and granted from the university's ethical body. Data were collected over a period of 4 days in early December 2006 at large petrol (gas/filling) stations on major highways north and south of Brisbane, Queensland. The sites were chosen as their location near urban areas on the outskirts of the city makes them regularly used by commuters and, also, they are on the major travel routes used by people on holidays or travelling long distances. Participants were recruited in eating areas located inside the petrol stations during both morning and afternoon time periods. All persons entering the eating area were approached. Potential participants were screened to determine if they held a provisional or open driver's licence and if they used a mobile phone at least once a day. In all, 1250 people met the criteria for the study. Of these, 801 (a response rate of 64.1%) completed a 10 minute questionnaire and were compensated AUD$10 cash for their time. The primary reason for non-participation was lack of time.

Five cases were excluded (3 participants owned a mobile phone but did not use it, 2 participants held a licence but did not drive), leaving 796 participants (443 male, 351 female, 2 unknown) aged 17 to 76 years (M = 36.80 years, SD = 14.33 years). Most participants (83.5%) held open licences, and drove an average of 17.8 hours per week (SD = 14.20 hours; range 1-90 hours). Approximately 38% of participants reported driving mainly for personal purposes; 24% equal personal and business; and 38% drove mainly for

business (i.e., work-related) purposes. Almost all participants used their mobile phone to make or receive calls; however, some participants reported that they did not use their phone for sending (n = 143) or receiving (n = 90) text messages on a daily basis. On average, participants reported a higher level of making and receiving calls compared to sending and receiving text messages.

The questionnaire comprised standard TPB items (see Ajzen, 1991) assessing attitude, subjective norm, PBC and intention to use a mobile phone while driving. These standard TPB measures, with the addition of risk perceptions, also assessed calling and text messaging while driving across four different scenarios. The scenarios varied on vehicle speed and time pressure, with presentation of the scenarios counterbalanced across conditions (see Section 2.2.3 for a description of the scenarios). Background information of participants was also assessed (e.g., gender, age, driving purpose).

2.2 Measures

The target behaviour of general mobile phone use was defined as "using a mobile phone to make or answer calls, send or read text messages while driving in the next week". For calling and text messaging only, these behaviours were defined as making or answering a call (*calling*) and sending or reading a text message (*text messaging*) respectively. The target behaviour was framed in terms of the target, action, time, and context, as stipulated by Fishbein and Ajzen (1975).

All TPB and risk perception items were measured on 7-point Likert scales, with the question stem "If you were driving in the next week, do you agree that...?", unless otherwise stated. The predictors of attitude, subjective norm, PBC, intention were assessed for mobile phone use while driving in general and specifically for calling, and text

messaging in the four different scenarios. Risk perceptions were assessed for calling and text messaging while driving in the four scenarios.

2.2.1 Intention

General intention to use a mobile phone while driving in the next week was assessed using one item, "It is likely that I will use my mobile phone while driving", scored (1) *extremely unlikely* to (7) *extremely likely*. Intention to call or text message was assessed using one item for each behaviour in the four scenarios, "[Scenario description]...In this situation, to what extent do you agree that it is likely you would [make/answer a call]?", scored (1) *strongly disagree* to (7) *strongly agree*.

2.2.2 Attitude

Attitude toward using a mobile phone while driving was assessed overall with one item, "Using my mobile phone while driving would be good", scored (1) *extremely unlikely* to (7) *extremely likely*, and separately using one item for each of the four scenarios, "[Scenario description]...In this situation, to what extent do you agree that it is likely you would think using your mobile phone would be good?", scored (1) *strongly disagree* to (7) *strongly agree*.

2.2.3 Subjective norm

One item measured subjective norm overall, "Those people who are important to me would want me to use my mobile phone while driving", scored (1) *extremely unlikely* to (7) *extremely likely*, and separate one item measures were also included for each of the four scenarios, "[Scenario description]...In this situation, to what extent do you agree that it is likely you would think that those people who are important to you would want you to use your mobile phone?", scored (1) *strongly disagree* to (7) *strongly agree*.

2.2.4 PBC

PBC was assessed overall with one item, "I have complete control over whether I use my mobile phone while driving", scored (1) *extremely unlikely* to (7) *extremely likely*, and separately using one item for each of the four scenarios, "[Scenario description]...In this situation, to what extent do you agree that it is likely you would have complete control over whether you use your mobile phone?", scored (1) *strongly disagree* to (7) *strongly agree*.

2.2.5 Risk Perception

Risk of apprehension and crash risk were assessed using one item each in the four scenarios. Risk of apprehension was assessed by the item "[Scenario description]...In this situation, to what extent do you agree that it is likely you would be caught and fined by the police if you use your mobile phone?". Crash risk was assessed by the item "[Scenario description]...In this situation, to what extent do you agree that it is likely you would have a crash if you use your mobile phone?". Both items were scored as (1) *strongly disagree* to (7) *strongly agree*.

2.3 Scenario Descriptions

Calling and text messaging while driving were assessed in four different scenarios in which vehicle speed and time pressure were varied. Key elements of each scenario were held constant 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 four scenarios were:

Scenario 1: "You are driving at 100km per hour and are running late"

Scenario 2: "You are driving at 100km per hour 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".

2.4 Data Analysis

To determine the predictors of intention to use a mobile phone while driving, and intentions to call and text message while driving in the four scenarios, we employed hierarchical regression analyses. The effects of age, gender, and driving purpose (scaled from 1 *all business* to 7 *all personal*) were controlled for in the first step of the regression analyses. The standard TPB variables (attitude, subjective norm, PBC) were entered in the second step. For the analyses examining the role of risk perception, the perceived crash risk and perceived risk of apprehension items were entered in the third step. Given the large sample size, we controlled for Type 1 error rate by adopting a stringent alpha level of .001 to interpret significant results.

3 Results

3.1 Prediction of Intention to Use a Mobile Phone While Driving

Using bi-variate correlations, the relationship between age, gender, and driving purpose and the TPB variables was examined (Table 1), with attitude and subjective norm emerging as the strongest correlates of intention. Additionally, attitude and subjective norm were highly correlated. However, our examination of collinearity statistics suggested that neither variable exceeded the parameters for inclusions as IVs (attitude tolerance = .831, subjective norm tolerance = .840) (Hair, 1998). There were no reports of any problems due to singularity or other problems related to multicollinearity in any regressions performed.

In step 1 of the regression analysis, gender, age, and driving purpose significantly accounted for 17% of the variance, $F(3, 752) = 52.66$, $p < .001$ with age and driving purpose being significant predictors of intention at this step. Younger drivers and business drivers were more likely to intend to use their mobile phone while driving than older drivers and personal drivers. An additional significant proportion of variance (32%) in intentions to use a mobile phone while driving was explained by the entry of the Step 2 theory of planned behaviour predictors, $F(6, 749) = 121.23$, $p < .001$. At the final step, the significant predictors of intentions to use a mobile phone while driving in general were age (younger), driving purpose (business), attitude, and subjective norm (see Table 2).

Insert Tables 1 and 2 about here

3.2 Prediction of Intentions to Call and Text Message while Driving in Four Different Scenarios

To confirm that calling and text messaging were viewed as different behaviours by participants, the correlations amongst mobile phone use, calling and text messaging were examined. Calling was highly correlated with mobile phone use in general ($r = .84$) whereas text messaging was only moderately correlated ($r = .63$). Additionally, calling and text messaging were moderately correlated ($r = .61$). These results suggest that, while calling can be considered similarly to the concept of mobile phone use in general, text messaging may be viewed as a separate behaviour. All TPB items had low to moderate correlations with each other, with intentions, and with risk items (ranging from $r = .21$ to r

= .76), with attitude demonstrating the highest correlations with intention across the four scenarios. The means and standard deviations are presented in Table 3 for the TPB and risk items for calling and text messaging while driving in each of the four scenarios. Across scenarios, participants were more likely to report using a mobile phone for calling, Wilks's $\Lambda = .87$, $F(3, 782) = 39.11$, $p < .001$, $\eta^2 = .13$, or text messaging, Wilks's $\Lambda = .86$, $F(3, 783) = 44.02$, $p < .001$, $\eta^2 = .14$, when waiting at traffic lights (Scenarios 3 and 4; see Section 2.2.3 for scenario descriptions) and to report a higher likelihood of using a mobile phone for calling than text messaging across scenarios, Wilks's $\Lambda = .63$, $F(7, 778) = 65.15$, $p < .001$, $\eta^2 = .37$. Table 4 presents the results of regression analyses predicting intentions to call and text message while driving across the four scenarios.

Insert Tables 3 and 4 about here

3.2.1 Intention to Call while Driving Across Scenarios

Gender, age and driving purpose significantly accounted for between 10 and 16% of the variance in intention to call while driving, in the first step with younger drivers, male drivers, and business drivers being significantly more likely to intend to engage in this behaviour in most scenarios. In the second step, the addition of the TPB variables accounted for increases in explained variance ranging from 38 to 42% (see Table 4). Perceived risk of crashing and apprehension did not increase the explained variance in intention to call while driving in any of the four scenarios. At the final step, driving purpose (business) was a significant predictor for Scenarios 1, and 4, whilst age (younger drivers)

predicted intentions to call in Scenarios 1 and 3. Attitude was the only significant predictor of intentions to call while driving in all four scenarios, with subjective norm emerging as a significant predictor in Scenarios 1 and 3, and PBC significantly predicting calling intentions in Scenarios 2 to 4.

3.2.2 Intention to Text Message while Driving Across Scenarios

Gender, age, and driving purpose in the first step of analyses accounted for between 14 and 17% of the variance in intentions to text message while driving with age (younger) being the only significant predictor of intention at this step. In the second step, the addition of the TPB variables accounted for increases in explained variance 11 to 14%. In Scenarios 2 and 3, the addition of the risk items in the third step of analyses explained an additional 2% of the variance. At the final step of analyses, age and attitude were the only significant predictors of intentions to text message while driving in all four scenarios. Perceived risk of being caught and fined by the police (apprehension), but not perceived risk of having a crash, significantly predicted intention to text message while driving in Scenarios 2 and 3. Unexpectedly, apprehension risk emerged as a significant negative, rather than positive, predictor of intentions in these two scenarios.

4 Discussion

The aim of the current study was to examine the efficacy of the TPB in predicting intentions to use a mobile phone while driving amongst a cohort of Australian drivers. A secondary aim was to explore the influence of the TPB model, incorporating perceived risk, on intentions to call and text message in four different scenarios. These scenarios were varied according to vehicle speed (driving at 100km/hr, waiting at traffic lights) and time pressure (running late, not in a hurry).

Overall, drivers reported stronger intentions to use their mobile phone for calling rather than text messaging while driving. This trend was consistent across the four scenarios; however, participants were more likely to intend to use their mobile phone when they were stationary (at traffic lights) than when driving at 100km/hour. Age predicted intentions to use a mobile phone while driving in most analyses, with younger drivers more likely to intend to use their mobile phone. This finding is consistent with previous research, in Australia and overseas, which has found younger drivers engage in this behaviour more frequently than older drivers (Brusque & Alauzet, 2008; Pennay, 2006). Driving purpose (business) predicted intentions to use a mobile phone while driving in general and also intention to call, but not text message, in two scenarios (100km/hr, running late and waiting at traffic lights, running late). This finding is not surprising given that mobile phones have become a highly valued business tool enabling contact with clients while on the move (Eost & Flyte, 1998). As younger drivers (Catchpole et al., 1994) and business people (Hijar et al., 2002) are more likely to be involved in an accident than the general population, the increased likelihood of using a mobile phone while driving presents an additional safety risk for these drivers.

4.1 Efficacy of the TPB

Results of the study provide qualified support for utility of the TPB in predicting mobile phone use intentions while driving (Hypothesis 1), and intentions to call and text message while driving in four scenarios (Hypothesis 2). In support of Hypothesis 1, after controlling for the effects of participant characteristics (gender, age, driving purpose), the TPB accounted for a significant proportion (32%) of the variability in intentions to use a mobile phone while driving in general. Attitude and subjective norm were significant

predictors of intention. These results suggest that having a more positive attitude toward mobile phone use while driving and greater perceptions of normative pressure to use a mobile phone while driving will increase the strength of intentions to do so. In contrast to predictions, however, PBC did not influence intentions to use a mobile phone while driving.

In a similar manner, the results provide only partial support for the second hypothesis that the TPB would be an effective predictive model for intentions to call and text message while driving across each of the four scenarios. Across scenarios, after participant characteristics were controlled for, the TPB accounted for additional variance of 39-42% in intentions to call, and 11-13% in intentions to text message, while driving. In one scenario (waiting at traffic lights, running late), the full TPB model predicted calling intentions while driving; however, attitude was the only significant TPB predictor across all scenarios. The effects of subjective norm and PBC varied across the remaining scenarios and for calling and text messaging intentions.

Together, the combined results of these analyses highlight several important findings. One key finding relates to the importance of attitude in drivers' decisions to use a mobile phone regardless of the type of mobile phone use or driving scenario. Future interventions, then, should discourage positive attitudes toward mobile phone use while driving and challenge drivers to consider whether the advantages arising from using a mobile while driving (e.g., using time effectively) outweigh the increased risk of crashing.

Subjective norm also impacted upon intentions to use a mobile phone while driving and intentions to call while driving across some scenarios. These findings indicate that people who perceive more approval from others to use their phone while driving are more

likely to plan to do so. Interestingly, subjective norm was a significant influence in the scenarios where the individual was time pressured (running late) suggesting individuals may be more susceptible to normative pressures when other people or time commitments are involved. Previous research has revealed that one of the advantages of using a mobile phone is remaining in contact with other people at all times (Walsh & White, 2006) and that drivers feel they drive more safely if they can use their phone to let other people know they are delayed (Lissy et al., 2000). Future interventions or campaigns should seek to foster approval for *not* using a mobile phone while driving by reinforcing the idea that people do not expect their call to be answered or their message to be read when people are driving.

In contrast to expectations, PBC did not emerge as a significant predictor of intentions to use a mobile phone while driving and the role of PBC varied according to the specific mobile phone behaviour and driving scenario. As PBC is most effective in the prediction of non-volitional behaviours (Ajzen, 1991), the lack of predictive ability of PBC suggests that people actively choose when and how they will use a mobile phone while driving. This finding is consistent with previous research suggesting that most mobile phone users consider mobile phone use to be a highly volitional behaviour (Walsh & White, 2007).

In the present study, the TPB factors accounted for a relatively low amount of variance for text messaging while driving, indicating that other factors influence this behaviour. As younger participants were more likely to report they intended to text message while driving, cohort specific factors may influence this behaviour. Young people's mobile phone use is strongly related to social influences (Ling, 2004; Walsh & White, 2007; Wei

& Lo, 2006), suggesting that inclusion of additional social factors in future research may assist in increasing understanding of why young people, in particular, text message while driving. Furthermore, given the differences in the predictors of intentions to engage in each type of mobile phone use behaviour, future research and interventions designed to address mobile phone use while driving should focus on the distinct behaviours of calling and text messaging while driving.

4.2 Risk Perceptions

In partial support of Hypothesis 3, risk perceptions significantly explained additional variance in the prediction of intentions to text message (but not call) while driving in different scenarios. The perceived risk of being caught and fined by police in two scenarios (100km/hr, not in a hurry and waiting at traffic lights, running late) influenced intentions to text message while driving. Unexpectedly, however, it was drivers with an increased awareness of the risk of apprehension reporting that they were more, rather than less, likely to intend to text message while driving. This finding suggests that drivers who intend to text message are more aware of the risk of apprehension than drivers who do not intend to text message while driving. It may be that drivers who intend to text message while driving perceive the risk of apprehension is minimal in comparison to the benefits of this behaviour. Further research should investigate reasons for this counter-intuitive finding.

The influence of apprehension risk for text messaging in some scenarios only, coupled with the lack of influence of the perceived risk of crashing, however, suggests that risks related to mobile phone use intentions while driving are not particularly salient and play a minor role in the decision to perform this behaviour. These findings are somewhat surprising as use of a hand-held mobile phone while driving is illegal in Australia. It may

be that calling or text messaging while not in a hurry or while waiting at traffic lights is perceived to be a safe and effective use of time outweighing the risks of crashing and being apprehended for hand-held mobile phone use. Moreover, the lack of efficacy of risk apprehension may reflect the inherent difficulties associated with enforcing restrictions on mobile phone use while driving. Thus, there is a need to develop methods to detect drivers' mobile phone use, perhaps by enhancing camera technology.

4.3 Strengths and Limitations of the Research

In its investigation of the psychosocial factors influencing intentions to use a mobile phone while driving amongst a sample of Australian drivers, the current study attempts to bridge the gap in our understanding about why people engage in this unsafe driving practice. The use of a well-validated theoretical framework, the TPB, incorporating an examination of risk perceptions in this context, further improves our knowledge of the factors influencing the decision to use a mobile phone while driving. Examination of intentions to call and text message while driving in specific scenarios highlighted important variations in the predictors of each type of mobile phone use in differing scenarios. Results suggest the need to adopt a multi-faceted approach when designing strategies to reduce calling or text messaging while driving. Finally, the large sample size resulted in a good representation of each gender, a wide age range of drivers, and a mixture of both personal and business drivers.

The findings of the current research, however, should be interpreted in light of the limitations of the study. First, data were collected at petrol stations located on major highways. It was necessary for the questionnaire to be able to be completed in approximately 10 minutes to avoid interference with site operations. Consequently, one

item measures were used for all TPB constructs. Additionally, demographic data, such as length and type of trip, were unable to be collected. This information could assist in ensuring that the sample characteristics were not biased and determine whether factors such as type of trip (commuting versus travelling) are related to frequency and type of mobile phone use while driving. Second, there was a reliance on self-report data. Although self-report measures provide a reasonable indication of people's behaviour (Podsakoff & Organ, 1986), it has been found that people over or under-estimate their level of mobile phone use when compared to their actual calling records (Cohen & Lemish, 2003). Additionally, the illegal nature of hand-held mobile phone use in Australia may have impacted on the accuracy of self-reporting by people who engage in this behaviour. The lack of efficacy of risk of crashing may also arise from measurement issues. Future research could include a direct measure of whether drivers perceive that using a mobile phone while driving reduces their control over their safe driving to gauge the awareness of safety, rather than accident, risks associated with the behaviour. Finally, the study predicted intention to use a mobile phone while driving rather than actual behaviour. Although intention is thought to be the immediate antecedent of behaviour (Ajzen, 1991), other factors may influence behavioural performance. Future research should employ a prospective design to examine the expected link between people's mobile phone use while driving intentions and their subsequent behaviour.

5 Conclusion

Overall, attitude was found to be the most consistent predictor of intention to use a mobile phone while driving, indicating that drivers with a positive attitude towards using a mobile phone while driving are most likely to intend to engage in this behaviour.

Additionally, drivers who perceived that others approved of them using their mobile phone while driving were more likely to intend to use their mobile phone for calls, but not text messages, while driving. Perceptions of control over factors preventing mobile phone use while driving were not highly influential and only predicted intention to use a mobile phone while driving for calls in some of the scenarios. Perceived risk of apprehension and perceived risk of crashing did not influence drivers' intentions to use their mobile phone while driving for calling; however, apprehension risk predicted intentions to use a mobile phone for text messaging in two of the scenarios where drivers with an increased awareness of the risk of apprehension reported that they were more, rather than less, likely to intend to text message while driving. The overall pattern of results for risk in the present study suggest, however, that in general, consideration of the risks of using a mobile phone while driving does not prevent drivers from planning to engage in this behaviour. Strategies to reduce mobile phone use while driving should focus on changing people's attitudes to become less supportive of using a phone while driving and highlight that the significant others in our lives would not approve of compromising safety to enable communication. In addition, emphasising the apprehension risks inherent in text messaging while driving may assist in road safety interventions designed to reduce the prevalence of this unsafe driving practice.

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Table 1

Means, Standard Deviations, and Bivariate Correlations of Gender, Age, Driving Purpose and TPB Measures for Mobile Phone Use While Driving in General

Variable	M	SD	1	2	3	4	5	6	7
1. Gender	-	-							
2. Age	36.80	14.33	-.03						
3. Driving purpose	4.22	1.86	.33***	-.01					
4. Attitude	2.90	2.04	-.22***	-.19***	-.32***				
5. Subjective norm	2.60	1.94	-.21***	-.07	-.30***	.68***			
6. PBC	4.85	2.34	-.10	-.07	-.16***	.27***	.34***		
7. Intention	4.07	2.43	-.21***	-.21***	-.34***	.67***	.54***	.29***	

*** $p < .001$

Table 2

Regression Analysis Predicting Intention to Use a Mobile Phone While Driving in General

Variable		B	β	R^2	ΔR^2
Step 1	Gender	-.58	-.12	.17	.17***
	Age	-.04	-.21***		
	Driving purpose	-.40	-.31***		
Step 2	Gender	-.14	-.03	.49	.32***
	Age	-.02	-.11***		
	Driving purpose	-.17	-.13***		
	Attitude	.58	.49***		
	Subjective norm	.17	.13***		
	PBC	.08	.08		

*** $p < .001$

Table 3

Means and Standard Deviations for TPB and Risk Items According to Scenario

	Scenario 1		Scenario 2		Scenario 3		Scenario 4	
	M	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*
Intention to call while driving[a,c]	3.58	2.11	3.69	2.07	4.13	2.11	4.08	2.07
Intention to text message while driving[b,c]	2.60	1.91	2.70	1.93	3.10	2.05	3.20	2.07
Attitude	2.74	1.94	2.78	1.91	3.40	2.03	3.31	1.99
Subjective norm	2.70	1.90	2.63	1.82	3.04	1.92	2.96	1.87
Perceived behavioural control	4.84	2.27	5.02	2.19	5.11	2.05	5.24	2.01
Likelihood of having a crash	3.86	2.10	3.65	2.05	3.46	2.05	3.36	2.03
Likelihood of being caught and fined	4.00	2.17	3.92	2.13	3.98	2.13	3.98	2.15

Note. Scales ranged from (1) *extremely unlikely* to (7) *extremely likely*

[a.] For calling, four of the six pairwise comparisons were significant after a Bonferonni adjustment was applied. Differences were revealed between scenarios 1 and 3, $t(788) = -10.07$, $p < .001$; 1 and 4, $t(786) = -9.04$, $p < .001$; 2 and 3, $t(786) = -7.55$, $p < .001$; 2 and 4, $t(785) = -7.83$, $p < .001$.

[b.] For text messaging, four of the six pairwise comparisons were significant after a Bonferonni adjustment was applied. Differences were revealed between scenarios 1 and 3, $t(788) = -9.69$, $p < .001$; 1 and 4, $t(787) = -11.04$, $p < .001$; 2 and 3, $t(786) = -7.55$, $p < .001$; 2 and 4, $t(786) = -9.83$, $p < .001$.

[c.] All four pairwise comparisons across each of the four scenarios (e.g., scenario 1 calling vs. scenario 1 text messaging) were significant after a Bonferroni adjustment was applied, suggesting that participants were more likely to call in each scenario than text message: scenarios 1 and 1, $t(789) = 15.47$, $p < .001$; 2 and 2, $t(788) = 14.85$, $p < .001$; 3 and 3, $t(791) = 14.45$, $p < .001$; 4 and 4, $t(789) = 12.70$, $p < .001$.

Table 4

Regression Analyses Predicting Intention to Use a Mobile Phone to Call and Text Message while Driving According to Scenario

	Predictor	Scenario 1 *100km/hr, late*			Scenario 2 *100km/hr, no hurry*			Scenario 3 *Traffic lights, late*			Scenario 4 *Traffic lights, no hurry*		
		β	R^2	ΔR^2	β	R^2	ΔR^2	β	R^2	ΔR^2	β	R^2	ΔR^2
Intention to Call													
1	Gender	-.13***	.14	.14***	-.14***	.16	.16***	-.11	.10	.10***	-.13	.12	.12***
	Age	-.20***			-.21***			-.19***			-.20***		
	Driving purpose	-.26***			-.27***			-.20***			-.22***		
		$F(3,746) = 41.60$***			$F(3,742) = 46.71$***			$F(3,747) = 26.02$***			$F(3,740) = 33.56$***		
2	Gender	-.01	.53	.39***	-.03	.55	.39***	-.03	.51	.42***	-.02	.50	.38***
	Age	-.10***			-.07			-.10***			-.07		
	Driving purpose	-.13***			-.09			-.08			-.12***		
	Attitude	.53***			.56***			.47***			.50***		
	Subjective norm	.15***			.11			.21***			.15		

	PBC	.06			.13***			.10***			.11***			
		$F(6,743) = 139.44$***			$F(6,739) = 148.87$***			$F(6,744) = 130.52$***			$F(6,737) = 122.68$***			
3	Gender	-.01	.53	.00	-.03	.55	.00	-.03	.51	.00	-.02	.50	.00	
	Age	-.11***			-.07			-.11***			-.06			
	Driving purpose	-.12***			-.09			-.08			-.12***			
	Attitude	.52***			.56***			.47***			.49***			
	Subjective norm	.15***			.11			.20***			.14			
	PBC	.06			.13***			.10***			.12***			
	Crash risk	-.08			-.07			-.05			-.04			
	Apprehension risk	.06			.06			.04			.00			
		$F(8,741) = 105.77$***			$F(8,737) = 112.65$***			$F(8,742) = 98.06$***			$F(8,735) = 92.24$***			
Intention to Text Message														
1	Gender	-.07	.14	.14***	-.09	.15	.15***	-.01	.15	.15***	-.03	.17	.17***	
	Age	-.37***			-.38***			-.39***			-.41***			
	Driving purpose	-.03			-.02			.04			.01			

		$F(3,746) = 39.58^{***}$			$F(3,742) = 43.02^{***}$			$F(3,747) = 45.18^{***}$			$F(3,741) = 51.15^{***}$
2	Gender	-.01	.28	.14***	-.01	.29	.14***	.03	.27	.11***	.02	.30	.13***
	Age	-.30***			-.29***			-.34***			-.33***		
	Driving purpose	.05			.08			.09			.07		
	Attitude	.30***			.39***			.30***			.41***		
	Subjective norm	.13			.03			.06			-.06		
	PBC	-.02			-.01			.01			.05		
		$F(6,743) = 47.30^{***}$			$F(6,739) = 50.75^{***}$			$F(6,744) = 44.75^{***}$			$F(6,738) = 52.38^{***}$		
3	Gender	-.00	.29	.01	-.02	.31	.02***	.01	.29	.02***	.01	.31	.01
	Age	-.31***			-.29***			-.35***			-.34***		
	Driving purpose	.04			.07			.08			.06		
	Attitude	.32***			.42***			.32***			.42***		
	Subjective norm	.13			.03			.06			-.05		
	PBC	-.04			-.02			-.00			.03		
	Crash risk	-.02			-.02			-.03			.04		
	Apprehension risk	.13			.16***			.17***			.09		

	$F(8,741) = 37.68$***	$F(8,737) = 41.55$***	$F(8,742) = 37.28$***	$F(8,736) = 41.59$***

*** $p < .001$