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Psychosocial factors influencing mobile phone use while driving

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Abstract

This study aims to improve our understanding of why drivers use their mobile phones while driving and to inform campaigns designed to address this behaviour. The theory of planned behaviour was used to investigate factors relating to mobile phone use while driving. Study 1 ($N = 47$) elicited behavioural, normative, and control beliefs towards mobile phone use while driving and assessed situational factors affecting this behaviour. Study 2 ($N = 801$) examined how attitudes, normative pressures, and control factors influenced intention to use a mobile phone while driving in general, and in four scenarios manipulating driving condition (moving versus stationary) and driver motivation (in a hurry versus not in a hurry). In addition, the research explored the effects of age, gender, driving purpose, perceived risk of apprehension, perceived risk of crashing, and addictive tendencies towards mobile phone use.

Differences in the underlying beliefs held by participants with strong and weak intentions to use a mobile phone while driving were also assessed. Participants' attitudes towards mobile phone use while driving were the only consistent predictors of the intention to engage in this behaviour in the future. Drivers with strong intentions to use a mobile phone while driving perceived that this behaviour had more advantages and greater approval from others, and were less affected by factors deterring them from using a mobile phone while driving, than drivers with weak intentions. The perceived risk of apprehension or crashing did not have much impact on participants' intention to engage in this behaviour. People with addictive tendencies towards mobile phone use were more likely to use their mobile phone while driving. Drivers were more likely to use their phone when waiting at traffic lights than when driving at 100 km/h. Results of the study improve our understanding of why drivers use their mobile phones while driving by highlighting factors which influence drivers' decisions to engage in this behaviour. The findings from this study can inform campaigns designed to reduce this unsafe driving practice.

Keywords Mobile phone, driving, theory of planned behaviour, risk perception, addiction.

Notes

(1) ATSB grant reports are disseminated in the interest of information exchange.
(2) The views expressed are those of the author(s) and do not necessarily represent those of the Australian Government or the ATSB.

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EXECUTIVE SUMMARY

Background to the research

There is a significant body of research indicating that mobile phone use while driving presents a risk to driver safety. Road safety interventions have traditionally utilised a deterrence approach comprising educational campaigns and enforcement with penalties and fines imposed as punishment for illegal behaviour such as hand-held mobile phone use. Despite legislation banning the use of hand-held mobile phones in cars, many Australian drivers regularly perform this behaviour. In addition, there is evidence that hands-free mobile phone use does not represent a significantly safer option than hand-held mobile phone use while driving. Both types of mobile phone use increase driver distraction. Thus, mobile phone use while driving, irrespective of the type of handset, presents a significant safety risk to Australian drivers.

Education has been recommended as a strategy to encourage responsible use of mobile phones while driving; however, as yet there is limited understanding of the personal and social factors motivating this behaviour. It is important to understand the reasons why drivers use their phones so that safety campaigns can be better designed and targeted. The present research used the theory of planned behaviour (TPB) as a theoretical framework for the study. The TPB is a well-validated behavioural prediction model which is widely used in the road safety domain. Use of the TPB allowed for attitudinal, normative, and control factors influencing drivers' intentions to use a mobile phone while driving to be assessed. Additionally, the effects of factors such as risk perceptions, driving conditions and driver motivation on mobile phone use while driving were explored. The study also included a preliminary investigation of the relationship between addictive tendencies toward mobile phone use and mobile phone use while driving. The information gained in the study will allow for the more effective design of strategies to counteract this increasingly prevalent behaviour.

Research methodology

This research program consisted of two studies. In Study 1 a questionnaire ($N = 47$) containing open-ended questions was used to identify drivers' behavioural (favourable and unfavourable outcomes), normative (approval from other people) and control (barriers that may impede performance) beliefs relating to using a mobile phone while driving. The most commonly reported beliefs formed the belief-based measures used in Study 2. The study also explored drivers' mobile phone use in various situations so that scenario measures could be developed for Study 2.

Study 2 was a quantitative study ($N = 801$) based on the TPB. A questionnaire assessed drivers' intentions to use a mobile phone while driving in general, for calls and for text messages specifically. Four scenarios varying driving condition and driver motivation were included in the study. Regression analyses assessed how attitude, subjective norm, perceived behavioural control, perceived risk of apprehension and perceived risk of crashing influenced drivers' intentions to use their mobile phone while driving in general, and in the four scenarios (varying on driving conditions and driver motivation). Additionally, the predictors of intention to call, and text message, while driving were assessed in the four scenarios to determine if different factors influenced these behaviours. Gender, age, and driving purpose, were included in all regression analyses. Differences in the behavioural, normative, and control beliefs of participants with strong and weak intentions to use a mobile phone while driving (in general) were also explored. In addition, a series of ANOVAs were conducted to assess the effect of driving conditions and motivational factors on

drivers' intentions to use their mobile phone. Finally, the relationship between addictive tendencies towards mobile phone use and mobile phone use while driving was explored.

Summary of findings

Study 1

Key findings from Study 1 include:

- The most commonly listed advantages of using a mobile phone for calls while driving were using time effectively, followed by continuing to do business, and convenience.
- Drivers reported most frequently that using a mobile phone while driving would result in distraction from driving, reduced concentration, and increased risk of crashing and injury.
- Drivers most commonly reported that employers and friends would approve of mobile phone use while driving. The police were most commonly listed as the group of people who would disapprove this behaviour.
- Risk of fines/punishment and risk of crashing/injury were most commonly cited as preventing mobile phone use while driving for both calling and text messaging behaviours.
- Participants reported they were least likely to use their mobile phone in complex driving conditions (e.g., changing lanes or when driving through a school zone) and most likely in relatively slow traffic (e.g., such as when waiting at traffic lights or in a traffic jam).
- Participants were also more likely to use their mobile phone while driving alone than when with passengers; in dry weather rather than wet weather; and on familiar rather than unfamiliar roads.
- In general, participants were most likely to answer a call while driving, except for when they were running late for an appointment. When running late, participants were more likely to use their mobile phone to contact other people.

Study 2

Key findings from Study 2 include:

Self-reported mobile phone use while driving

- Forty percent of drivers who owned a mobile phone reported using it while driving at least once per day. The most frequently reported behaviour performed daily or more often was answering a mobile phone call (43%), followed by making a mobile phone call (36%), reading a text message (36%), and sending a text message (18%) while driving.
- The majority of drivers did not have a hands-free mobile phone kit (64%). Of those drivers who had a hands-free mobile phone kit, approximately half used it all the time (49%). Thus, the majority of drivers used a hand-held mobile phone while driving.
- Drivers aged 17-25 years were more likely to use their mobile phone while driving on a daily basis, than drivers aged 26 years and over.
- Business drivers used their mobile phone while driving more often than personal drivers.

- Drivers viewed calling and text messaging while driving as separate behaviours. Younger drivers were more likely, than older drivers, to send and read text messages while driving.

Prediction of intention to use a mobile phone while driving

Demographic factors

- Younger drivers were significantly more likely than older drivers to intend to use their mobile phone while driving.
- Business drivers were significantly more likely than personal drivers to report they intended to use their mobile phone while driving.

TPB variables

- Attitude was the only factor of those examined that influenced drivers' intention to use their mobile phone in all analyses. Drivers who have a positive attitude towards using a mobile phone while driving are most likely to use their mobile phone in general, and specifically for calls, and text messages, irrespective of driving conditions.
- The effect of perceived pressure from others to use a mobile phone while driving differed across the situations examined. Drivers who reported other people would want them to use their mobile phone while driving were more likely to intend to use their phone in general, and for calls in most situations. However, pressure from others did not affect whether drivers intended to text while driving.
- Drivers' perceptions of how much control they had over whether they used their mobile phone while driving varied according to the type of behaviour and driving situation. Drivers believed they controlled their mobile phone use in general and also, specifically, for text messages. In contrast, drivers did not believe they had full control over whether they used their mobile phone for calls while driving.

Belief differences between drivers with strong and weak intentions to use a mobile phone while driving

- Drivers with strong intentions believed that using their mobile phone while driving resulted in them using time effectively and being able to receive information. They also reported that being distracted from driving was a disadvantage.
- Drivers with strong intentions to use their mobile while driving reported higher levels of approval from all reference groups (friends, family members, partners, work colleagues, other drivers, and police) for this behaviour than drivers with weak intentions.
- Strong intending drivers were less likely, than weak intending drivers, to report that the risk of an accident, lack of a hands-free kit, or heavy traffic would prevent them from using a mobile phone while driving.

Risk perceptions

- Overall, risk perceptions did not influence whether drivers intended to use their mobile phone. Specifically, the risk of crashing did not deter drivers from using their mobile phone for any purpose in any situation. However, perceived risk of apprehension affected whether drivers intended to use their mobile phone for text messaging while driving at 100 km/h when not in a hurry, and while waiting at traffic lights when running late. This indicates that, in some

situations, drivers who believe they are likely to be booked are less likely to use their mobile phone.

Driving condition and motivation

- Drivers were more likely to intend to use their mobile phone when they were stationary (waiting at traffic lights) than when they were moving (driving at 100 km/h).
- There was no difference in whether drivers intended to use their mobile phone when they were running late versus not in a hurry.

Addictive tendencies toward mobile phone use

- Intention to use a mobile phone while driving increased as addictive tendencies (such as anxiety when unable to use a mobile phone) towards mobile phone use increased.
- Drivers aged 25 and under were more likely to report addictive tendencies towards mobile phone use than any other group.

Future research

- As the TPB was found to account for a relatively small percentage of variance in intention to text message while driving and young people were found to be more likely to text message while driving, including factors such as self and social identity in future research may improve understanding of the reasons why younger drivers, in particular, text message while driving.
- As there was minimal effect of motivational factors on drivers' intention to use their mobile phone while driving, indicating that drivers use their mobile phone while driving for a variety of reasons, future research should investigate the range of motivational factors influencing mobile phone use while driving.
- As the scenarios used in this study only assessed stationary versus driving at 100 km/h, there is limited knowledge of whether drivers change their level and type of mobile phone use while driving at various speeds. Although preliminary analyses in Study 1 indicated that drivers adjust the level and type of mobile phone use according to the driving situation, the sample size was too small to draw a firm conclusion. Future research could build on this preliminary research in a larger scale study.
- Future research could use the findings in this study to develop and test the effectiveness of theory-based interventions designed to reduce the amount of mobile phone use while driving. Given that attitude was found to be the most consistent predictor of intention to use a mobile phone while driving, including attitudinal components may be effective.

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ABBREVIATIONS

ANOVA	Analysis of variance
ATSB	Australian Transport Safety Bureau
IIHS	Insurance Institute for Highway Safety
M	Mean
MANOVA	Multivariate analysis of variance
N	Total number of participants in the sample
OH&S	Occupational health and safety
PBC	Perceived behavioural control
QUT	Queensland University of Technology
SD	Standard deviation
SMS	Short Messaging Service
TPB	Theory of planned behaviour

1 INTRODUCTION

1.1 Background

Mobile phones are used by approximately 96% of the Australian population with the level of use rising quickly in recent years (Allen Consulting Group, 2005). Although there is a significant body of research indicating that mobile phone use while driving presents a risk to driver safety (see McCartt, Hellinga, & Bratiman, 2006; Svenson & Patten, 2005; Wiesenthal & Singhal, 2005 for reviews), many Australian drivers engage in this behaviour (Pennay, 2006).

The 2005 Community Attitudes to Road Safety (Wave 18) survey conducted on behalf of the Australian Transport Safety Bureau (ATSB) investigated the extent to which Australian drivers use a mobile phone while driving (Pennay, 2006). Of the 1,490 drivers surveyed, approximately 84% had a mobile phone, with 47% reporting they used a mobile phone while driving at some time. Forty-three percent of drivers answered calls and 24% made calls while driving. As only 29% of drivers reported using a hands-free mobile, most mobile phone use while driving involves hand-held mobiles. Additionally, 16% of drivers read text messages and 7% sent text messages (Pennay, 2006), an activity which requires drivers to hold their mobile phone and manipulate the keypad while driving.

Restrictions banning the use of hand-held mobile phones in cars were first introduced in Australia in Victoria in 1988 and were progressively implemented by other states thereafter. Hand-held mobile phone use while driving, however, is regularly performed (McEvoy, Stevenson, & Woodward, 2006; Pennay, 2006). Whilst observational studies indicate that approximately 2% of Australian drivers are using a hand-held mobile phone at any given time (Glendon & Sutton, 2005; Taylor, Bennett, Carter, Garewal, & Barnstone, 2003), self-report studies have found that between 39% (McEvoy et al., 2006) and 73% (Pennay, 2006) of drivers in Australia used a hand-held mobile phone at some time. Road safety interventions have traditionally utilised a deterrence approach comprising educational campaigns and enforcement with penalties and fines being imposed as punishment for illegal behaviours, such as hand-held mobile phone use. For example, in Queensland, the fine for using a hand-held mobile phone while driving is $225 and 3 demerit points (Queensland Transport, 2007). However, the continued use of hand-held mobiles, in spite of legislation, supports previous research indicating such approaches may not effectively prevent problematic driving behaviours (Watson, Fresta, Whan, McDonald, Bauermann, & Churchwood, 1996). Alternatively, drivers may believe that police enforcement levels are low reducing the effectiveness of fines as a deterrent.

Although it is commonly believed that using a hands-free mobile kit provides drivers with a safe option to use a phone while driving, research has revealed that there is little or no improvement in safety when using a hands-free mobile phone compared to a hand-held mobile (Brown, Horberry, Anderson, Regan, & Triggs, 2003; McEvoy et al., 2005; Svenson & Patten, 2005). Although hand-held mobile phones are more time consuming to use and involve holding or manipulating the handset (Haigney, Taylor, & Westerman, 2000; Matthews, Legg, & Charlton, 2003), it is the distracting effect of the conversation with another person not present in the vehicle that is believed to have most impact on driver safety (Brown et al., 2003; McEvoy et al., 2005; Svenson & Patten, 2005). Thus, mobile phone use while driving, irrespective of type of handset, is a risk to Australian drivers.

A number of reports have recommended that education will encourage responsible use of mobile phones while driving (see Australian Mobile Telecommunications Association [AMTA], 2005, for a review). However, as mobile phone use while driving is increasing, education campaigns alone

may not be effective. There are numerous personal and social factors motivating different driver behaviours (Watson et al., 1996) and it is important to understand the reasons people use their phones while driving so that safety campaigns can be better targeted. The present research aims to provide critical information regarding factors influencing mobile phone use while driving so that effective strategies to counteract this relatively prevalent behaviour may be developed.

1.2 Dangers of using a phone while driving

There is an increasing body of research indicating that using a mobile phone while driving presents a significant safety risk (see McCartt et al., 2006; Svenson & Patten, 2005; Wiesenthal & Singhal, 2005 for reviews). Driving safely requires substantial attentional resources; however, using a mobile phone while driving competes for the driver's attention subsequently reducing the amount of mental resources available to safely drive the vehicle (Svenson & Patten, 2005). Noted problems are lapses in concentration when following other drivers, drifting towards lane boundaries, failing to observe traffic signs, significant lowering of speed (Lamble, Rajalin, & Summala, 2002) and increased braking time (Lamble, Kauranen, Laasko, & Summala, 1999). Auditory perception, essential for estimating vehicle speed and non-visual driving cues, is reduced (Kawano, Iwaki, Azuma, Moriwaki, & Hamada, 2005); dual-tasking increases drivers' reaction times, particularly as driving tasks increase in complexity (Hancock, Lesch, & Simmons, 2003); and the inability of the person on the other end of the phone to adjust their conversation to driving conditions increases the driver's task load (Amado & Ulupinar, 2005). Although the majority of these findings are based on simulator studies, which may not accurately reflect on-road behaviour, the results demonstrate how using a mobile phone while driving negatively impacts on driver performance.

Short Messaging Service (SMS; commonly known as text messaging) use while driving is particularly problematic. The process of receiving, reading and sending a text message requires drivers to direct their field of vision towards the mobile screen, rather than on the road, and to remove their hands from the steering wheel to write the message (Hosking, Young, & Regan, 2005). It has been found that drivers spend up to 400 percent more time looking away from the road when text messaging than when not messaging. Additionally, text messaging while driving requires manipulation of the mobile phone. Text messaging while driving results in decreased detection of road signs and poorer response to changing driving conditions, impairing overall driving performance and increasing accident risk (Hosking et al., 2005). Thus, sending or reading text messages while driving is an unsafe driving practice.

Generally it has been assumed that using a hands-free mobile for calls while driving is a safer option than using a hand-held mobile. However, Australian research investigating mobile phone use amongst drivers admitted to hospital after a vehicle crash found that use of a hands-free mobile did not reduce the risk of an accident (McEvoy et al., 2005). Additionally, in a review of relevant research, Svenson and Pattern (2005) concluded that using a hands-free mobile phone does not provide significant safety benefits over the use of a hand-held mobile while driving. It is believed that it is the distracting effect of the conversation, rather than the type of handset, which is most problematic (Brown et al., 2003; McEvoy et al., 2005; Svenson & Patten, 2005). Although the role of distraction in Australian crashes remains unclear (Regan & Young, 2003), it has been estimated that approximately one quarter of all accidents in the United States result from driver distraction (Ellis & Glaze, 2003). As the primary source of distraction in five percent of accidents in the United States was a mobile phone, using a mobile phone while driving, irrespective of type of handset, presents a risk to driver safety (Ellis & Glaze, 2003).

The reduction in driving performance when using a mobile phone has been compared to driving with a blood alcohol content of over 0.08 (Burns, Parkes, Burton, Smith, & Burch, 2002). Additionally, simulator studies have found that using a mobile phone impairs driving performance

in both simple (e.g., single lane, minimal distractions) and complex (e.g., multiple lanes, many distractions such as stop/start traffic or pedestrians) driving conditions (Horberry, Anderson, Regan, Triggs, & Brown, 2006; Tornros & Bolling, 2006). Finally, in their study of drivers admitted to hospital following a crash, McEvoy et al. (2005) compared drivers' mobile phone records before the crash with times the drivers used their mobile phone and did not crash. They concluded that a driver is four times more likely to have an accident resulting in hospital attendance in the 10 minutes after using their mobile phone, irrespective of type of handset. These results support previous research which found that mobile phone use while driving significantly increases the risk of crashing (Insurance Institute for Highway Safety [IIHS], 2005; Redelmeier & Tibsharini, 1997). Thus, the risks of using a mobile phone while driving are considerable.

1.2.1 At risk driver groups

Older adolescents and young adults engage in the highest level of mobile phone use, particularly test messaging, in Australia (Galaxy Research, 2004) and are also more likely to use a mobile phone while driving than older drivers (Pennay, 2006). Text messaging while driving is also more common amongst younger drivers, than older drivers, with 74% of young Australian drivers reporting that they send and receive text messages while driving (Thompson, 2005). Young drivers, in particular, are at an increased accident risk when using a mobile phone while driving (IIHS, 2006) as they are less able to overcome the negative effects of distraction than more experienced drivers (Whelan, Senserrick, Groeger, Triggs, & Hosking, 2004). Thus, mobile phone use while driving presents an increased safety risk for this cohort, which is already over-represented in crash statistics (Catchpole, Cairney, & Macdonald, 1994).

Another at risk group is people drive for work-related purposes. When examining highway crashes in Mexico, it was found that people who drove for business purposes were at a greater risk of crashing than people driving for personal purposes (Hijar, Carrillo, Flores, Anaya, & Lopez, 2000). In contrast, examination of insurance records in Finland revealed that drivers were most likely to have an accident when driving for work-related purposes in a city (Salminen, 2000). This study also found that white collar workers were most likely to have a work-related accident followed by self-employed workers. One of the primary advantages of using a mobile phone is the ability to be contactable at all times (Walsh & White, 2006), and, as such, mobile phones are valued for enabling cars to be used as mobile offices (Eost & Flyte, 1998). This availability may create an additional pressure for people who need to remain in contact with clients or staff to use their mobile phone while driving. As the risk of an accident is significantly increased when using a mobile phone while driving (IIHS, 2005; McEvoy et al., 2005; Redelmeier & Tibsharini, 1997) and an Australian observational study has revealed that drivers of commercial vehicles are more likely to be using a mobile phone than drivers of private vehicles (Glendon & Sutton, 2005), this behaviour arguably represents an additional risk factor for many workers who drive during work hours. Occupational health & safety (OH&S) laws throughout Australia require employers to provide a safe workplace, including work vehicles, and as such employers who do not minimise this risk may be in breach of these laws.

Heavy mobile phone users are also significantly more likely to be involved in an accident than occasional mobile phone users (Laberge-Nadeau et al., 2003). As mobile phone use is rapidly increasing across all sectors of society (Allen Consulting Group, 2005) the road safety risks associated with using a mobile phone while driving could also be expected to increase (Wiesenthal & Singhal, 2005). Thus, it is important to identify relevant factors which may prove useful in designing strategies to limit the level of mobile phone use amongst Australian drivers.

1.3 Reasons for using a mobile phone

Although there are significant costs and safety risks arising from using a mobile phone while driving, mobile phone users, in general, perceive that the benefits of using a mobile phone outweigh any costs (Lissy, Cohen, Park, & Graham, 2000; Walsh & White, 2006). Previous research has revealed that using a mobile phone, in general, provides a number of practical and psychological benefits for users. It would be expected that these advantages may be contributing to the use of mobile phones by drivers.

The most significant benefit of using a mobile phone is contactability and accessibility irrespective of location (e.g., Ling, 2004; Walsh & White, 2006; Wei & Lo, 2006). Mobile phone technology has enabled cars to be used as mobile offices (Eost & Flyte, 1998) potentially increasing the likelihood of using a mobile phone while driving for people who drive for work-related purposes or who need to remain in contact with work colleagues or clients. However, as noted previously, OH&S implications may arise if employers expect their workers to use their phone for this reason. In Australia and overseas, young people consider that their mobile phone is a vital tool in the formation and maintenance of social networks and that there is social pressure to remain in contact at all times (Walsh & White, 2006; Wei & Lo, 2006). Young females, in particular, report that they feel safer when they have a mobile phone especially if they are driving or walking alone at night (Carroll, Howard, Peck, & Murphy, 2002). Additionally, an Australian study of parents and children, found that parents value having a mobile phone so their children can quickly and easily contact them in case of emergency (Mathews, 2004).

One study, assessing risks and benefits of using a mobile phone while driving, was conducted by the Harvard Centre for Risk Analysis (Lissy et al., 2000). This study identified that increased risk of fatality was minimal (in comparison to other causes of road-related deaths) and that using a mobile phone while driving increased the probability of non-fatal accidents while driving. Similar to general mobile phone research, the reported benefits of using a mobile phone while driving included peace of mind; improved social networking; use of otherwise unprofitable time; and ease of contact with emergency services reducing accident response times (Lissy et al., 2000). Although research has found that high level mobile phone users are more likely to report that using a mobile phone, in general, provides more benefits than low level users (Walsh & White, 2006), there has not been a study investigating whether all drivers or only specific driver groups perceive that significant benefits are gained by using a mobile phone while driving.

Whilst previous research provides a preliminary understanding of factors influencing mobile phone use while driving, there is yet to be an Australian study specifically addressing this behaviour. The majority of previous research has been conducted overseas and it remains unclear whether these results are applicable to an Australian driving population. This research will draw on previous research into driver behaviour and general mobile phone use to investigate the reasons that Australian drivers use (or do not use) their mobile phones while driving. The research will adopt a well-validated behavioural prediction model, the theory of planned behaviour, as the framework for the study.

1.4 The theory of planned behaviour (TPB)

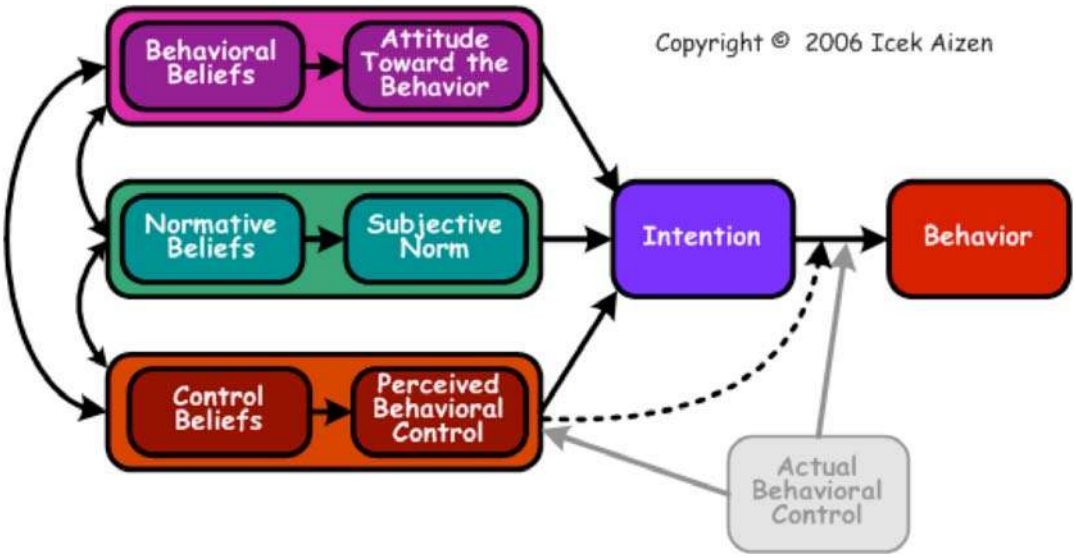
The theory of planned behaviour (TPB) (Ajzen, 1991) is a rational, deliberative, decision making model which suggests that attitude formation results from a careful consideration of the information available to an individual (Conner & Sparks, 2005). The TPB is also able to account for non-volitional behaviours that depend on other factors which are not within an individual's control, such as time or availability of resources, but still influence an individual's ability to perform a specified behaviour (Ajzen, 1991, 2001; Ajzen & Madden, 1986). The TPB posits that intention (i.e., readiness to act) is the most proximal determinant of behaviour and influences behaviour directly.

Intention, in turn, is influenced by an individual's attitude towards the behaviour, perceptions of pressure from others to engage in the behaviour (subjective norms) and perceptions of the level of control they have over the behaviour (perceived behavioural control, PBC). Attitude, subjective norm, and PBC are independent constructs, which have a mediated effect on behaviour via intention. Perceived behavioural control is also proposed to directly influence behaviour (in addition to intentions) (see Figure 1). The TPB model proposes that the more favourable the attitude, the more perceived normative pressure to perform the behaviour and the greater the perception of control over performing the behaviour, the stronger the individual's intention to perform a specified behaviour should be (Ajzen, 1991). Further, strong intention to perform the behaviour and a greater perception of control (where perceptions of control are an accurate reflection of actual behavioural control) over performing the behaviour, is more likely to result in behavioural performance (Ajzen, 1991).

An important feature of the TPB is the beliefs underlying the direct determinants (attitude, subjective norm, PBC) of intentions (see Figure 1). Attitudes are thought to be influenced by beliefs about the disadvantages and advantages of performing a specified behaviour (behavioural beliefs). Subjective norm is determined by the perceived expectations of specific individuals and groups (normative beliefs) and PBC is said to be a function of beliefs concerning the likelihood that specific factors would prevent (i.e., barriers) or facilitate (i.e., motivators) behavioural performance (control beliefs). A major advantage of adopting a TPB framework is the ability to assess the belief based determinants of attitudes, subjective norms and PBC components of the TPB and identify the specific beliefs that distinguish between individuals with strong and weak intentions to perform a behaviour and between those who perform and do not perform the specified behaviour (Ajzen, 1991; Fishbein & Stasson, 1990). These belief based analyses allow a distinction between sub samples that can assist in informing education and intervention programs. As such, the TPB provides a comprehensive framework for improving understanding of factors differentiating those who intend to engage in mobile phone use whilst driving and those who do not.

The TPB has been found to be an effective predictive model of intention and behaviour across a wide variety of behavioural domains (Armitage & Conner, 2001), including in the context of road safety (e.g., Conner, Smith, & McMillan, 2003; Elliot, Armitage, & Baughan, 2003). A meta-analysis of 185 tests of the TPB provided significant support for the model (Armitage & Conner, 2001). Intention was found to account for 27% of the variance in behaviour, with a further 2% of variance attributable to PBC. Furthermore, attitude, subjective norm, and PBC explained 39% of the variance in intentions. As the TPB has effectively improved understanding of numerous behaviours, it is believed the model has the capacity to predict intentions to use a mobile phone while driving in general and also for different driver groups to determine whether different driver groups intending to use a mobile phone while driving are influenced by different factors. For example, it may be that some groups are highly influenced by normative pressures whilst others may be more influenced by attitudes towards using a mobile phone while driving.

Figure 1: The theory of planned behaviour model



Within the road safety domain, the TPB has been used to examine a number of behaviours including: pedestrian road crossing (Evans & Norman, 1998); traffic violations (Parker, Manstead, Stradling, Reason, & Baxter, 1992); compliance with speed limits (Elliot et al., 2003); and, more recently, the TPB has provided a useful framework for predicting risky motorcycle behaviour in a study undertaken with ATSB funding (Tunnicliff, Watson, White, Wishart, & Schonfeld, 2005). In the case of speed limit adherence, for instance, the TPB predictors of attitude, subjective norm, and PBC accounted for 48% of the variability in intentions to comply with speed limits, and intentions and PBC accounted for 32% of the variability in actual compliance with speed limits (Elliot et al., 2003). Similarly, across a variety of traffic violations, the TPB explained approximately 42% of the variability in intentions to drink and drive; 47% of the variability in speeding intentions; 23% of the variability in intentions to follow closely; and 32% of the variance in intentions to overtake in dangerous circumstances (Parker et al., 1992). Overall, use of the TPB framework has improved understanding of a variety of road safety behaviours.

The TPB has also proved a useful model for investigating high level mobile phone use in general (Walsh & White, 2007) and as a theoretical framework to explore the beliefs and behaviour of low and high level mobile phone users (Walsh & White, 2006). In Walsh and White's study, support for the TPB as a predictive model of high level mobile phone use was demonstrated by the TPB accounting for 60% of the variance in intentions to use a mobile phone and 52% of the variability in mobile phone use. Attitude, subjective norm, and PBC all emerged as significant predictors of intention to use a mobile phone, and intention (but not PBC) significantly predicted mobile phone use (Walsh & White, 2007). The results of Walsh and White's (2006) study revealed that high and low level mobile phone users differed on specific behavioural (e.g., being readily available), normative (e.g., friends) and control (e.g., cost) beliefs, supporting the utility of the TPB in highlighting important beliefs to target for specific groups to encourage more appropriate mobile phone use. Together, these studies suggest that people used their mobile phone in many environments and perceived few constraints to performance which may influence people's decisions to use their phone when driving (Walsh & White, 2006, 2007).

A major advantage of the TPB model is that the model is able to be modified by incorporating additional factors relevant to the specific behaviour in question (Ajzen, 1991; Sutton, 1998). As such, the TPB model will be modified to assess risk perceptions (e.g., being fined, having an

accident) (Stradling & Parker, 1997) which are likely to influence mobile phone use while driving and have been found to predict driving behaviour within a TPB framework.

1.4.1 Risk perceptions

When deciding whether to engage in a specified behaviour, people assess the perceived risks and advantages resulting from behavioural performance (Bagozzi, 1981; Fishbein & Ajzen, 1975). Two of the major risks of using a mobile phone while driving are reduced driving performance leading to an increased risk of crashing (Lamble, Kauranen et al., 1999; Lamble, Rajalin et al., 2002) and the risk of apprehension (due to the illegal nature of the behaviour; Queensland Transport, 2007) if using a hand-held mobile while driving. Whilst Australian drivers have been found to be aware of the increased risk of crashing if they use a mobile phone while driving (McEvoy et al., 2006), mobile phone users are more likely to view the behaviour as less risky than non-mobile phone users (McEvoy et al., 2006; Wogalter & Mayhorn, 2005). Additionally, adolescents in the United States considered the risks of mobile phone use while driving to be less than speeding or drunk driving (Sarkar & Andreas, 2004). Further, drivers who engage in risky behaviours (e.g., drink driving, speeding) are less likely to view the behaviour as problematic, than drivers who do not engage in the behaviour (Sarkar & Andreas, 2004). When negative consequences are underestimated, there is a greater likelihood that drivers will engage in unsafe driving practices (Kannellaidis, Golias, & Zarifopoulos, 1995). Thus, it may be that drivers who use their mobile phone while driving may underestimate the risk to themselves and others.

In addition to assessing the risks of a chosen behaviour, people consider the benefits the behaviour provides. Speeding research has revealed both direct (e.g., enjoying the thrill) and indirect (e.g., getting to destination more quickly) benefits result in people deciding to speed (Kanellaidis et al., 1995). Similarly, mobile phone use while driving may provide direct (e.g., receiving information) and indirect (e.g., maintaining work productivity) benefits. The advantages perceived to arise from using a mobile phone while driving may outweigh any perceived risks making the behaviour difficult to resist (Lissy et al., 2000). Thus, it could be expected that drivers will continue to use a mobile phone while driving if the risks are perceived to be less than the benefits (Cohen & Graham, 2003). To assess whether perceived risks influence drivers' decisions to use their mobile phone, a measurement for perceived risk of crashing and perceived risk of apprehension are included in the current study.

1.5 Addictive tendencies toward mobile phone use

An emerging theme within the literature on mobile phone use is the potential for mobile phone addiction (e.g., Bianchi & Phillips, 2005; James & Drennan, 2005; Walsh, White, & Young, in press; Wilska, 2003). Addictive behaviours are characterised by symptoms such as a pre-occupation with the behaviour (behavioural salience); a need to engage in increasing levels of the behaviour (tolerance); non-performance of the behaviour causing distress (withdrawal); prior attempts to reduce the behaviour being unsuccessful (relapse and reinstatement); and the behaviour interfering with the individual's daily life (conflict with other activities) (Brown, 1997; Lemon, 2002; Orford, 2001). Related research has found symptoms of behavioural addiction amongst young Australian mobile phone users (Walsh et al., in press). Additionally, a recent Australian study found symptoms of addiction to be related to problematic mobile phone use, such as using a mobile phone while driving (Bianchi & Phillips, 2005).

Addictive behaviour is indicated when people experience a compulsive drive to engage in an activity despite negative consequences of the behaviour or societal restrictions (Nakken, 1996). As such, addicted individuals will continue to engage in the relevant behaviour in spite of appeals to cease and the illegal nature of some behaviour. As discussed previously, using a hand-held mobile

phone while driving is banned within Australia, yet some individuals continue to use a hand-held mobile for both calling and text messaging. As symptoms of addiction have been found amongst Australian youth who use a mobile phone (Walsh et al., in press), it may be that addictive tendencies towards mobile phone use are leading some Australians to use their mobile phone while driving. To increase understanding in this area, this study included a preliminary examination of the relationship between addictive tendencies toward mobile phone use and mobile phone use while driving. This information may assist in explaining why some people are compelled to continue to use a hand-held mobile while driving in spite of legislation banning the behaviour. Should addictive tendencies toward mobile phone use be found to be related to mobile phone use while driving, it may be that future education campaigns designed to limit mobile phone use while driving need to include strategies addressing mobile phone addiction.

1.6 The current research

This study will comprehensively investigate factors influencing mobile phone use while driving by Australian drivers to fill critical gaps in knowledge relating to this behaviour. Similar to previous road safety research, this study will also include scenario-based measures to identify various contextual influences on mobile phone use while driving. Scenario-based measures have been used in similar research (e.g., Conner et al., 2003; Evans & Norman, 1998, 2003; Parker et al., 1992) and have the advantage of measuring on-road performance in a consistent and safe manner whilst avoiding noted problems with recall methods. Additionally, scenario-based measures provide a more ethically sound measurement method than on-road measures as risks to road users are minimised. Results of the study will provide valuable information to enhance the effectiveness of campaigns to reduce mobile phone use while driving.

It is acknowledged that using a hands-free mobile phone while driving is a legal behaviour whilst using a hand-held mobile phone is not. Due to the similarity in safety risks of both types of mobile phone use while driving, it could be argued hands-free mobile phone use while driving should also be banned. Such restrictions, however, are difficult to enforce and will most likely meet with strong driver resistance limiting the effectiveness of legislation (Lamble et al., 2002). Due to the growing evidence relating to the crash risk associated with hands-free mobile phone use while driving, there are increasing calls for the use of phones in this manner to be banned either for all drivers or at least for novice drivers. Most recently, these concerns have been reflected in moves by various Australian state governments to ban the use of mobile phones while driving for Learner and Probationary P1 drivers (e.g., Queensland and Victoria, see http://arrivealive.vic.gov.au/c_youngGLS_6.html). This report, however, focuses on the safety, rather than legal aspects, of mobile phone use while driving. The following research questions in relation to mobile phone use while driving and the hypotheses listed below in relation to Study 2 were investigated in the present research study.

1.6.1 Research questions

- What are the underlying beliefs (behavioural, normative, and control) that influence people's use of a mobile phone while driving?
- Do these underlying beliefs differ according to age (17-25 years or 26 years and older), driving purpose (business or personal purposes), or type of mobile phone kit (hand-held or hands-free) groupings?
- What are the situations in which people are more or less likely to use their mobile phone while driving?

- What are the most important psychosocial factors that influence people's intentions to use a mobile phone while driving?
- Do the factors that influence intentions to use a mobile phone while driving differ according to the type of mobile phone use (calling or text messaging) and type of driving situation (driving at 100 km/h or waiting at traffic lights, and running late or not in a hurry)?
- Do the factors that influence intentions to use a mobile phone while driving differ according to age (17-25 years or 26 years and older) or driving purpose (business or personal purposes)?
- Are addictive tendencies toward mobile phone use related to mobile phone use while driving?

1.6.2 Hypotheses

The theory of planned behaviour model

- Hypothesis 1: After controlling for the effects of gender, age, and driving purpose, drivers will be more likely to intend to use a mobile phone while driving if they, have a positive attitude toward mobile phone use while driving, perceive normative pressure to use a mobile phone while driving (subjective norm), and perceive that mobile phone use while driving is within their control (PBC).
- Hypothesis 2: After controlling for the effects of gender, age, and driving purpose, it is expected that drivers will be more likely to intend to use a mobile phone for any purpose and for calling (i.e., to make or answer calls) and for text messaging (i.e., to send or read text messages) while driving if they have a positive attitude toward mobile phone use while driving, perceive normative pressure to use a mobile phone while driving (subjective norm), and perceive greater control (PBC) over using their mobile phone while driving, in four scenarios (see Table 12 for a description of scenarios).
- Hypothesis 3: In an exploratory manner, the behavioural, normative and control beliefs of drivers with strong and weak intentions to use a mobile phone while driving will be examined. It is expected that these beliefs will differ between drivers who report strong and weak intentions to use a mobile phone while driving.
- Hypothesis 4: Differences in behavioural, normative, and control beliefs of participants with strong and weak intentions to use a mobile phone while driving grouped according to type of mobile phone kit (hands-free or hand-held kit), age (17-25 years or 26 years and older), and driving purpose (business or personal purposes) will be explored.

Risk perceptions

- Hypothesis 5: The influence of risk of apprehension and risk of crashing will be explored, within the theory of planned behaviour model, in the prediction of intention to use a mobile phone while driving in general, for calling (i.e., to make or answer calls) and text messaging (i.e., to send or read text messages) in four driving scenarios (see Table 12 for a description of scenarios).

Driving condition and driver motivation

- Hypothesis 6: In an exploratory manner, the effect of driving condition and driver motivation on intention to use a mobile phone while driving will be investigated.

Addictive tendencies toward mobile phone use

- Hypothesis 7: In an exploratory manner, the hypothesis that people with addictive tendencies toward mobile phone use are more likely to intend to engage in mobile phone use while driving will be examined.
- Hypothesis 8: It is expected that addictive tendencies toward mobile phone use will be highest amongst younger drivers (17-25 years) than any other group.

2 METHOD – STUDY 1

2.1 Aim

Study 1 was conducted to obtain an understanding of the salient beliefs influencing mobile phone use while driving, allowing development of the belief-based TPB measures of attitudes, subjective norm and perceived behavioural control (in Study 2), as well as identifying a range of driving scenarios and their effects on mobile phone use while driving (to include in Study 2).

2.2 Design and procedure

Prior to conducting the study, ethical clearance was applied for and granted from the Queensland University of Technology's Human Research Ethics Committee (QUT reference number 0600000473). A questionnaire was distributed to a representative sample of participants in Brisbane, Queensland who held a current drivers licence and owned a mobile phone. Following the procedures suggested by Ajzen and Fishbein (1980), the questionnaire was designed to elicit the salient beliefs concerning mobile phone use while driving for both calling and text messaging behaviours. Using open-ended questions, participants were asked to list the advantages and disadvantages (behavioural beliefs) of using a mobile phone while driving, the groups or people they believed would approve or disapprove (normative beliefs) of mobile phone use while driving, and the factors or circumstances that would prevent or encourage (control beliefs) mobile phone use while driving. Content analysis was used to determine the most frequently occurring responses for each type of mobile phone use behaviour (i.e., calling or text messaging) which formed the basis of the behavioural, normative, and control beliefs in Study Two.

Participant's mobile phone use while driving in different situations was also assessed using both open-ended questions and 7-point Likert scales. Using content analysis, the most commonly identified situations where participants used a mobile phone while driving formed the basis for the scenarios utilised in Study 2.

2.3 Measures

Two open-ended questions for each behavioural, normative, and control belief were included (see Appendix A). Participants were asked to list the advantages and disadvantages of using a mobile phone while driving for both calling and text messaging behaviours (e.g., "What do you see as the disadvantages of using a mobile phone when driving, for text messages?"). The individuals or groups who approved and disapproved of mobile phone use while driving for both calling and text messaging behaviours were also reported by participants (e.g., "Are there any groups of people who would approve of you using a mobile phone when driving, for calls?"). Participants also listed the factors or circumstances that would prevent or encourage them to use their mobile phone while driving for both calling and text messaging behaviours (e.g., "Please write down any factors or circumstances that might prevent or discourage [make it harder] you from using your mobile phone when driving, for text messages?").

To understand use of a mobile phone while driving in various situations, participants were asked to describe the most recent time they used their mobile phone while driving (e.g., driving situation and type of use) and to indicate on 7-point scales their likelihood of using a mobile phone for making a call, answering a call, sending a text message, and reading a text message in 25 different driving scenarios incorporating both driving difficulty (e.g., speed limit, number of lanes, traffic) and

motivation (e.g., reason for making/sending or answering/reading a call or text message such as running late) for using a mobile phone (e.g., "How likely would you be to make a call when you are driving through a 40 km/h school zone?" and "How likely would you be to send a text message when you are driving and running late for an appointment/work?"; both scored 1 = *extremely unlikely* to 7 = *extremely likely*). Participants were also asked to indicate the likelihood that they would use their mobile phone while driving if they were expecting contact from a range of specified people such as parents, children, acquaintances, and work colleagues (e.g., "If you were expecting the following people to contact you, how likely would you be to use your mobile phone when driving?"; scored 1 = *extremely unlikely* to 7 = *extremely likely*). Questions assessing participant characteristics including gender, age, relationship status, and work status and level of mobile phone use in general and while driving were also included to obtain demographic information.

3 RESULTS – STUDY 1

3.1 Participants

Forty-seven participants (13 male, 34 female) aged 18 to 60 years (M = 31.79 years, SD = 11.30 years) completed the survey. Participants were recruited by a snowballing method, in that family, friends and work colleagues of the chief investigator distributed questionnaires amongst their networks. Information about participant characteristics is shown in Table 1.

Table 1: Participant demographics

		Frequency	Percent
Marital status	Single	11	23.4
	Dating	12	25.5
	Married	20	42.6
	De-Facto	3	6.4
	Divorced	1	2.1
Highest education level	Grade 10	4	8.5
	Grade 12	18	38.3
	Diploma/Certificate	3	6.4
	Undergraduate degree	12	25.5
	Post-graduate degree	8	17.0
	Other	2	4.3
Occupation	Hospitality	8	18.2
	Retail/Sales	10	22.7
	Office/ Clerical	3	6.8
	Trade	6	13.6
	Management	1	2.3
	Professional	8	18.2
	Other	8	18.2

Participants had held a drivers licence between 4 months and 42 years (M = 13.7 years, SD = 10.9 years). With respect to car licence type, one participant held a learner's licence, 12 held provisional licences and 34 held open licences. Four participants held both car and truck licences. On average, participants drove 8.48 hours per week (SD = 7.02 hours per week) with the minimum amount of driving being 1 hour and the maximum 40 hours. Approximately 55% of drivers reported driving mainly for personal purposes; 23% had equal personal and business and 21% drove mainly for business purposes.

Participants had owned a mobile phone between 13 months to 20 years (M = 6.95 years, SD = 4.17 years). Level of mobile phone use ranged widely with some participants reporting that they used their phone seven times a week (once per day) with the maximum being 602 times a week (M =

110.6, *SD* = 163.23). Business users were more likely to use their phone in general, than personal users, and were also more likely to use their phone while driving.

3.2 Mobile phone use while driving

As shown in Table 2, the majority of drivers in Study 1 reported using their mobile phone while driving at some stage, with approximately 15% using their mobile phone when driving more than once a day. The majority of participants did not own a hands-free kit. Of those who owned a hands-free kit, half reported using the hands-free kit all the time when driving. Thus, a large proportion of drivers in the sample use a hand-held mobile when driving. Additionally, younger drivers were more likely to send and read text messages when driving than older drivers.

Table 2: Mobile phone use while driving

		Frequency	Percent
Use a mobile phone when driving	Never	7	14.9
	Once a year	3	6.4
	1 – 2 times in 6 months	7	14.9
	1 – 2 times a month	9	19.1
	1 – 2 times a week	9	19.1
	Once a day	5	10.6
	More than once a day	7	14.9
Have a hands-free kit	Yes	17	31.6
	No	30	69.4
If yes, how often use hands-free kit	Hands-free all the time	8	50.0
	Hands-free most	3	18.8
	Equal	2	12.5
	Hand-held all the time	2	12.5
	Did not indicate	2	6.3

Participants rated how often they would use their mobile phone when driving for a number of different purposes. Overall, for those drivers reporting they used their mobile phone while driving, regardless of the frequency, the most common behaviour was answering a call (71%), followed by reading a text message (62%), making a call (56%), and sending a text message (39%). These results indicate that mobile phone use when driving is more likely a response to contact from others, rather than a self-initiated behaviour. There were some respondents, however, who reported using their phone to send text messages or make a phone call more than once a day. Younger drivers were more likely to report using a mobile when driving than older drivers, particularly text messaging.

Participants were also asked to indicate whether they would be likely to use their phone if they were expecting contact from certain people or groups of people (e.g., partner, friends, boss) on a scale of 1 = *extremely unlikely* to 7 = *extremely likely*. Parents were more likely, than any other group, to use their phone when driving if they were expecting contact from their children (*M* = 5.19, *SD* = 2.56). The remaining order of influence of expected contact on mobile phone use was partners (*M* = 5.13, *SD* = 2.38), close friends (*M* = 4.59, *SD* = 2.28), other family members (*M* = 4.36, *SD* =

2.33), employers (M = 4.33, SD = 2.35) and parents (M = 4.33, SD = 2.54). Expected contact from work colleagues (M = 4.14, SD = 2.12), people in the social network (M = 4.07, SD = 2.08) and acquaintances (M = 3.25, SD = 2.01) were least likely to influence mobile phone use when driving. Thus, it appears that it is close family members, rather than more distant friends or work colleagues, who influence mobile phone use when driving. These results will be examined in more detail in the main study to determine whether aged based differences are evidenced.

3.3 Belief-based measures

A series of open-ended questions were used to elicit salient beliefs about using a mobile phone when driving for both calling and text messaging. The specific behavioural, normative, and control beliefs identified separately for calling and text messaging while driving are presented in Appendix B. To highlight the similarities between beliefs for each behaviour, the behavioural, normative, and control beliefs common to both calling and text messaging are summarised. Given the similarities in beliefs between the two behaviours, the decision was made to examine the beliefs related to mobile phone use overall while driving, rather than for each specific behaviour of calling and text messaging. As specified by Ajzen and Fishbein (1980), only those beliefs reported by at least 10 percent of respondents are presented in the appendix and used in the formation of belief-based measures for Study 2. Total frequencies may be greater than the number of participants as many participants wrote more than one response to each question. It should also be noted that a proportion of participants did not complete the questions related to text messaging as they reported that they did not text message at all while driving.

3.3.1 Behavioural beliefs

Behavioural beliefs were assessed by respondents listing the advantages and disadvantages of using a mobile phone for calling and text messaging when driving (see Appendix B). The most frequently reported advantages of using a mobile phone when driving relate to time efficiency and convenience whilst safety risks (e.g., being distracted from driving) were the most frequently reported disadvantages. Overall, there were more positive beliefs reported for using a mobile phone while driving for calling than for text messaging. Additionally, respondents indicated a much stronger awareness of the dangers of text messaging when driving. The most commonly reported advantages and disadvantages across behaviours were:

Advantages	Disadvantages
• Using time effectively	• Being distracted from driving
• Convenience	• Less concentration
• Receiving information	• Risk of accident/injury
	• Being caught and fined by police

3.3.2 Normative beliefs

To elicit normative beliefs, respondents were asked to list the people or groups of people who would approve or disapprove of their using a mobile phone when driving for calling and text messaging (see Appendix B). Participants' reported referents for calling and text messaging were more likely to disapprove of them using a mobile phone when driving than to approve. Police, in particular, were perceived as the group of people least likely to approve of mobile phone use while driving. The common referents identified as approving and disapproving of mobile phone use

while driving were:

Approve	Disapprove
• Friends	• Police • Family • Parents • Friends • Other drivers

3.3.3 Control beliefs

Control beliefs were gauged by asking participants to list the factors which would facilitate or prevent mobile phone use while driving (see Appendix B). Use of a hands-free kit was most likely to facilitate mobile phone use while driving whilst the risk of fines or punishment was most likely to prevent mobile phone use by drivers in this sample. The most commonly reported control beliefs thought to encourage and prevent mobile phone use while driving were:

Encourage	Prevent
• Hands-free kit • Easy driving conditions • Emergency/urgent news	• Fines/Punishment • Risk of accident/injury • Demanding driving conditions • Police presence • Heavy traffic

3.4 Driving conditions

To determine the most realistic driving scenarios to include in Study 2, participants were asked to nominate how likely they would be to make a call, answer a call, send a text message or receive a text message in a range of driving conditions. The conditions were designed to assess the relative impact of road function (e.g., 60 km/h major road); driving complexity (e.g., merging traffic); situational factors (e.g., during work time) and environmental conditions (e.g., weather) on mobile phone use while driving. Items were scored from 1 = *extremely unlikely* to 7 = *extremely likely*. The full list of conditions and results are reported in Table 3. Examination of these different scenarios enabled the selection of behaviours for Study 2 to remain the same across scenarios and to identify the behaviours with the most variation so that they may be varied across scenarios.

Overall, answering a mobile phone call was the most likely behaviour in the majority of driving conditions, followed by making a call, reading a text message and sending a text message. This result suggests that mobile phone use when driving primarily occurs in response to contact from others. For the conditions related to the relative impact of road function, regardless of the type of mobile phone use behaviour, participants rarely used their phone while driving in a 40 km/h school zone. There was also little difference between using a mobile phone for any purpose when driving at 50 km/h, 60 km/h, or 100 km/h on single- or multi-lane roads. Participants were also most likely to use a mobile phone for any purpose when they were driving on a straight, familiar road and least likely on an unfamiliar or winding road. For conditions reflecting driving complexity, participants reported they were more likely to use their phone for any purpose when stuck in a traffic jam and

waiting at traffic lights and least likely when in merging traffic, changing lanes, or approaching a roundabout, suggesting that drivers may consciously consider driving complexity prior to using their phone while driving. Participants were most likely to use their phone while driving when they were running late for an appointment or work but were equally as likely to use it during work or non-work time. For environmental conditions affecting mobile phone use, participants were more likely to use their phone while driving in dry weather and when they were alone in the car, but reported no difference in mobile phone use according to the time of day.

Table 3: Mean level of mobile phone use across driving conditions

Driving Situation	Make a call	Answer a call	Send a text	Read a text
Road Function and Driving Complexity				
40 km/h school zone	1.55	2.00	1.43	1.68
50 km/h road	3.02	3.59	2.39	2.52
60 km/h minor road (one lane each direction)	3.22	3.74	2.26	2.63
60 km/h major road (more than one lane each direction)	3.02	3.52	2.17	2.54
100 km/h single-lane highway (one lane each direction)	2.98	3.45	1.93	2.49
100 km/h multi-lane highway	**3.04**	**3.42**	**1.96**	**2.65**
familiar road	**4.02**	**4.25**	**2.84**	**3.22**
unfamiliar road	2.53	2.77	1.76	2.11
straight road	**3.89**	**4.11**	**2.73**	**3.04**
windy road	2.13	2.20	1.42	1.56
changing lanes	1.53	1.78	1.22	1.31
in merging traffic	1.42	1.69	1.17	1.22
approaching a roundabout	1.64	1.82	1.24	1.24
waiting at traffic lights	**4.18**	**4.47**	**3.51**	**3.53**
peak hour traffic	2.98	3.31	2.49	2.67
in a traffic jam	4.60	4.89	4.02	4.22
Environmental Conditions				
dry weather	**3.82**	**3.87**	**2.78**	**2.96**
wet weather	2.36	2.47	1.58	1.71
during the day	**3.64**	**3.78**	**2.67**	**2.89**
at night	3.60	3.64	2.31	2.48
Situational Factors				
during work time	3.09	3.29	2.00	2.04
during non-work time	3.78	3.78	2.62	2.89
running late for an appointment/work	**3.76**	**3.49**	**2.44**	**2.40**
alone	**4.09**	**4.24**	**2.87**	**3.24**
passengers in the car	2.60	2.71	1.69	2.04

Note. Bolding indicates inclusion of factor in scenarios in Study 2

Given that participants overall were more likely to use their mobile phone for any purpose while driving during the day when they were alone in the car, driving on a straight, familiar road and in dry weather conditions, these factors were chosen to be included in the description that is to be kept the same (i.e., held constant) across scenarios for Study 2. The conditions chosen for Study 2 to be varied (i.e., manipulated) across scenarios were driving complexity (driving condition) and situational factors (driver motivation). Although participants were more likely to use a mobile phone when in a traffic jam than when waiting at traffic lights, we chose waiting at traffic lights as the first level of driving condition (i.e., stationary) as waiting at traffic lights is likely to be a more common occurrence in daily driving across a range of participants and a potentially more dangerous behaviour (as participants have a delayed response to the changing traffic signals and may be involved in a collision from behind). In addition, as very few participants reported using their mobile phone while performing complex behaviours such as merging traffic or changing lanes, and considering that there was little difference in behaviour according to speed limit and number of driving lanes, we chose driving at 100 km/h on a multi-lane highway as the second level of driving condition (i.e., moving). For driver motivation we chose to manipulate the situation running late (and not running late) for an appointment or work, as responses to this item seemed to indicate that participants felt pressured to use their mobile phone while driving in this situation.

4 DISCUSSION – STUDY 1

Study 1 was a preliminary study investigating underlying factors and beliefs relating to mobile phone use while driving. Participants provided information regarding the frequency and type of mobile phone use while driving; their underlying behavioural, normative and control beliefs relating to mobile phone use while driving; the role of expected contact from others on mobile phone use while driving; and the effect of various contextual influences on mobile phone use while driving. Results from the study improved understanding of various factors influencing mobile phone use while driving and provided a solid foundation for Study 2.

Most commonly, participants reported that they used their mobile phone to answer a call, followed by reading a text message, making a call, and sending a text message while driving. Participants reported that expected contact from other people influenced their mobile phone use while driving. For instance, parents reported they were more likely to use their mobile phone while driving if they were expecting contact from their children than any other group. Additionally, expected contact from partners, close friends, family members, employers, and parents influenced people's decisions to use their mobile phone while driving. The least influential groups were work colleagues, people in participant's wider social network and acquaintances. Thus, it appears that expected contact from close family and friends is most likely to influence mobile phone use while driving. Whilst these initial findings were unable to be further investigated in Study 2 due to space constraints in the survey, they provide a basis for future research investigating the effect of drivers' personal relationships on mobile phone use while driving.

Attitudinal, normative and control beliefs regarding using a mobile phone for calling or text messaging while driving were determined by participants' responses to open ended questions. Participants were more likely to list beliefs in relation to calling rather than text messaging. Overall, participants reported more disadvantages than advantages of using a phone while driving; more groups of people would disapprove than approve of their using a mobile phone while driving (particularly text messaging); and that external factors were more likely to prevent, rather than encourage, them to use a mobile phone while driving.

With respect to behavioural beliefs, the most common advantage of using a mobile phone for calls when driving was using time effectively, followed by continuing to do business and convenience. The most frequent response for perceived advantages for text messaging when driving was none, with convenience being cited most commonly by those drivers who perceived text messaging when driving to be advantageous. Distraction from driving, reduced concentration and risk of accident and injury were cited as the most commonly perceived disadvantages for both calling and text messaging while driving.

More groups of people were reported as disapproving of mobile phone use while driving than approving with the most common response for people who approve of calling or text messaging when driving being no-one. However, some participants reported that employers and friends would approve of their using a mobile phone when driving. With respect to people who would disapprove of mobile phone use while driving, the police were most commonly listed as disapproving of using a mobile phone while driving for both calling and text messaging. Family, parents and friends were also reported as disapproving of the behaviour by some participants. Thus, friends were perceived as a group who would both approve and disapprove of using a mobile phone while driving, suggesting normative influences may differ amongst drivers.

Various control-related factors were reported as impacting on mobile phone use while driving. For instance, having a hands-free kit was perceived to facilitate mobile phone use while driving whilst lack of a hands-free kit discouraged mobile phone use while driving. External factors, such as slow traffic and red lights, were believed to facilitate both calling and text messaging while driving

whilst heavy traffic and demanding driving conditions discouraged mobile phone use while driving. However, it was the risk of fines/punishment and the risk of accident/injury that were cited as the main factors preventing mobile phone use while driving.

Thus, although participants reported more disadvantages than advantages to using a mobile phone while driving; more societal disapproval than approval for using a mobile phone while driving; and indicated an awareness of safety risks of using a mobile phone while driving, these negative factors did not stop some drivers from using their phone when driving. To investigate these trends further, the six most commonly reported attitudinal, normative and control beliefs were included as the belief based measures in Study 2.

For the effect of contextual influences on mobile phone use while driving, participants reported that they were least likely to use their mobile phone for any purpose in complex driving conditions, such as changing lanes or when driving through a school zone, and most likely in relatively slow traffic, such as when waiting at traffic lights or in a traffic jam. Participants were also more likely to use their mobile phone when alone than when with passengers; in dry weather rather than wet weather; and on familiar rather than unfamiliar roads. The most commonly reported behaviour in most conditions was answering a call with the exception of running late for an appointment in which participants reported they were more likely to make a call. Sending text messages was the least likely behaviour in most conditions except when running late. These results suggest that patterns of use may change with motivational factors such as running late and that driving conditions influence drivers' decisions to use their mobile phone. These trends were considered further in the scenario conditions of Study 2.

Overall, the results of Study 1 provided important information regarding intrinsic and extrinsic factors influencing mobile phone use while driving. Examination of the underlying behavioural, normative, and control beliefs highlighted the most relevant beliefs about mobile phone use while driving for inclusion in Study 2. The motivational and driving conditions perceived as the most likely to influence mobile phone use while driving were identified for inclusion in Study 2 also. Additionally, results in Study 1 reveal that calling and text messaging while driving appear to be two distinct behaviours. As such, specific analyses will examine text messaging and calling behaviours in addition to overall mobile phone use when driving in Study 2.

5 METHOD – STUDY 2

5.1 Aim

Study 2 was conducted to identify the predictors of intentions to use a mobile phone amongst Queensland drivers by examining attitudes, norms, and control factors, as well as perceptions of risk, related to using a mobile phone while driving, from a theory of planned behaviour perspective. Study 2 also aimed to determine if the predictors of drivers mobile phone use intentions differed according to type of mobile phone use (calling or text messaging) and type of driving situation incorporating both driving condition (moving/stationary) and driving motivation (running late/not in a hurry). In addition, group comparisons were undertaken to identify any differences in beliefs according to age, driving purpose (business or personal purposes), or type of mobile phone kit (hand-held or hands-free) groupings. The relationship between addictive tendencies toward mobile phone use and mobile phone use while driving was also explored.

5.2 Design and procedure

A questionnaire was developed according to theory of planned behaviour guidelines (TPB; Ajzen, 1991) to assess the role of attitude, subjective norm, and perceived behavioural control (PBC) in the prediction of intention to use a mobile phone for any purpose while driving in general. In addition, the influence of attitude, subjective norm, and PBC on intentions to use a mobile phone for any purpose while driving, and for calling and text messaging while driving, in four different scenarios, were examined also. The four scenarios varied on driving condition and driving motivation (refer to the Measures section on p. 22 for a description of the scenarios). Presentation in questionnaires of the four different scenarios was counterbalanced across conditions. The influence of risk perceptions on drivers intentions to use a mobile phone while driving and intentions to call and text message while driving were also measured. In addition, the relationship between addictive tendencies toward mobile phone use and mobile phone use while driving was explored. The belief-based items generated in Study 1 were included to allow an analysis of the behavioural, normative and control beliefs influencing drivers' mobile phone use intentions. Information about participants' driving experience, mobile phone use generally and while driving, and background characteristic information such as gender, age, relationship status and employment was also requested.

Prior to conducting the study, ethical clearance was applied for and granted from the Queensland University of Technology's Human Research Ethics Committee (QUT reference number 0600000473). Data were collected over a period of 4 days in early December 2006 at a major travel centre (with truck facilities) on the M1 north and south of Brisbane, Queensland. Participants were approached in eating areas within the travel centre in both morning and afternoon time periods. Participants were initially screened to determine if they held a provisional or open drivers licence and if they had a mobile phone that they used more than once a day. If participants fulfilled both criteria, they were invited to complete a brief 10 minute survey and were compensated $10 cash for their time. It should be noted that it was necessary for the survey to be completed in approximately 10 minutes so as to not interfere with travel centre operations. As a result of the time limitation, only basic demographic information was included, one item measures were used for all TPB constructs, and separate measures for calling and text messaging intentions were included in the scenarios only and not for intentions to use a mobile phone while driving in general.

Upon completion of data collection and entry, descriptive statistical analyses were undertaken to enable description of the sample of participants obtained. Regression analyses were utilised to

identify the predictors of intentions to use a mobile phone while driving and to call and text message while driving overall and in the four different scenarios. Separate repeated measures analyses of variance were also conducted to assess the impact of driving condition (moving/stationary) and driver motivation (running late/not in a hurry) on mobile phone use while driving. A series of multivariate analyses of variance (MANOVA) were conducted to determine those beliefs that differed between drivers who intended to use a mobile phone while driving and those who did not and to examine differences in beliefs according to gender, age, driving purpose, and type of mobile phone handset.

5.3 Measures

The target behaviour of using a mobile phone for any purpose (e.g., to make or answer calls, send or receive text messages), while driving during the next week, was defined throughout the questionnaire. The target behaviour was framed in terms of the target, action, time, and context, as stipulated by Fishbein and Ajzen (1975). In addition, mobile phone use in four different scenarios, based on the results of Study 1, was also assessed. Key elements of each scenario remained the same (i.e., 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". Within each scenario only driving condition and motivation to use a mobile phone varied according to each of the four scenarios. The two aspects of driving condition were manipulated by using the two conditions of "driving at 100 km/h" or "waiting at traffic lights", reflecting moving and stationary driving conditions. Motivation to use a mobile phone while driving was manipulated using the two conditions of "running late" or "not in a hurry", corresponding to high and low motivation respectively. Overall, the four conditions were operationalised as moving, high motivation (scenario 1); moving, low motivation (scenario 2); stationary, high motivation (scenario 3); and stationary, low motivation (scenario 4).

All theory of planned behaviour and risk perception items were measured on 7-point Likert scales unless otherwise stated (see Appendix C). The predictors of attitude, subjective norm, perceived behavioural control, intention, and risk perception were assessed for mobile phone use while driving and for calling and text messaging while driving, overall and across four different scenarios.

5.3.1 Intention measure

Intention to use a mobile phone while driving in the next week was assessed overall using one item (e.g., "If you were driving in the next week, do you agree that it is likely that I will use my mobile phone while driving"; 1 = *extremely unlikely* to 7 = *extremely likely*). Intention was also assessed separately using one item for each of the four scenarios (e.g., "In the next week you are driving at 100 km/h and are running late. In this situation, to what extent do you agree that it is likely you would use your mobile phone"; 1 = *strongly disagree* to 7 = *strongly agree*).

5.3.2 Belief-based theory of planned behaviour measures

On the basis of Study 1, the belief-based measures of attitude (behavioural beliefs), subjective norm (normative beliefs), and perceived behavioural control (control belief barriers) were chosen. All belief-based items were measured without their corresponding value assessments due to space constraints in the questionnaire. Behavioural beliefs were assessed using 6 items (e.g., "How likely is it that your using a mobile phone while driving in the next week would result in the following: using time effectively; 1 = *extremely unlikely* to 7 = *extremely likely*). Six items assessed normative beliefs (e.g., "How likely is it that the following people or groups of people would approve of your using a mobile phone while driving in the next week: family members; 1 = *extremely unlikely* to 7 =

extremely likely). Control belief barriers were measured using 6 items (e.g., "How likely are the following factors to prevent you from using a mobile phone while driving in the next week: police presence; 1 = *extremely unlikely* to 7 = *extremely likely*).

5.3.3 Direct theory of planned behaviour measures

A direct measure of attitude toward using a mobile phone while driving was assessed overall utilising one item (e.g., "If you were driving in the next week, do you agree that using my mobile phone while driving would be good"; 1 = *extremely unlikely* to 7 = *extremely likely*) and separately using one item for each of the four scenarios (e.g., "In the next week you are waiting at traffic lights and you are not in a hurry. In this situation, to what extent do you agree that it is likely you would think using your mobile phone would be good"; 1 = *strongly disagree* to 7 = *strongly agree*).

One item measured subjective norm overall (e.g., "If you were driving in the next week, do you agree that those people who are important to me would want me to use my mobile phone while driving"; 1 = *extremely unlikely* to 7 = *extremely likely*) and separate one item measures were also included for each of the four scenarios (e.g., "In the next week you are driving at 100 km/h and are not in a hurry. 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"; 1 = *strongly disagree* to 7 = *strongly agree*).

A direct measure of perceived behavioural control toward using a mobile phone while driving was assessed overall utilising one item (e.g., "If you were driving in the next week, do you agree that I have complete control over whether I use my mobile phone while driving"; 1 = *extremely unlikely* to 7 = *extremely likely*) and separately using one item for each of the four scenarios (e.g., "In the next week you are waiting at traffic lights and are running late. 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"; 1 = *strongly disagree* to 7 = *strongly agree*).

5.3.4 Risk perception measures

Risk of apprehension and crash risk were assessed by one item in each of the four scenarios. Risk of apprehension was assessed by the item "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: "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*.

It should be noted that analyses reported in the body of the report include drivers with hands-free units. Although there is no risk of apprehension when using a hands-free unit, many drivers reported that they did not use it all the time. Analyses excluding drivers who use a hands-free unit all the time are included in Appendix D. There was no difference in the pattern of results.

5.3.5 Addiction measure

Fifteen items, drawn from an associated research program of the first author, were used to measure addictive tendencies toward mobile phone use. Items assessed tendencies such as withdrawal (e.g., "I feel anxious when I am unable to use my mobile phone"), conflict with other activities (e.g., "I interrupt whatever else I am doing when I am contacted on my mobile phone"), and loss of control (e.g., "I lose track of how much I am using my mobile phone") which are strongly related to addictive behaviours. Participants indicated how much they agreed or disagreed with each

statement on a scale, 1 = *strongly disagree* to 7 = *strongly agree*. A reliable addiction scale (Cronbach's alpha = .96) was developed by summing and averaging scores.

6 RESULTS – STUDY 2

6.1 Participants

1250 people who met the criteria for the study (used a mobile phone at least once per day and had an open or provisional drivers licence) were asked to participate. Of these, 801 completed the questionnaires, a response rate of 64.1%. The most common reason for not participating was lack of time. Despite efforts to screen participants, 5 cases were removed as they did not meet the criteria for the study. Three participants did not use their mobile phone at all, even though they had a mobile phone and two participants did not drive at all, even though they held a licence. The remaining participants (N = 796) were 443 male and 351 female (2 did not specify gender) drivers aged 17 to 76 years (M = 36.80 years, SD = 14.33 years).

As shown in Table 4, over half of participants were married, held a diploma/certificate or university degree, and were employed full-time. Most participants had held a drivers licence for more than 10 years (64%). With respect to car licence type, 16.5% of participants held a provisional licence and 83.5% held open licences. On average, participants drove 17.8 hours per week (SD = 14.20 hours) with the minimum amount of driving per week being 1 hour and the maximum 90 hours. Approximately 38% of drivers reported driving mainly for personal purposes; 24% had equal personal and business and 38% drove mainly for business purposes.

Table 4: Participant demographics

		Frequency	Percent
Marital status	Single	134	16.9
	Dating	146	18.4
	Married/De-Facto	474	59.8
	Separate/Divorced	29	3.7
	Widowed	10	1.3
Highest education level	Grade 10	148	18.7
	Grade 12	189	23.9
	Diploma/Certificate	250	31.6
	University degree	204	25.8
Work status	Full-time employment	405	51.1
	Part-time employment	110	13.9
	Self-employed	117	14.8
	Unemployed	19	2.4
	Full-time student	28	3.5
	Not in the workforce	88	11.1
	Employed/student	26	3.3

6.1.1 Mobile phone use

Approximately 27% of participants reported using their mobile phone mainly for business purposes; 19% used their mobile phone equally for personal and business purposes and 54% used their mobile phone mainly for personal purposes (see Table 5). Over 60% of participants did not have a hands-free kit. The average age of participants who reported having a hands-free kit was 37.4 years (*SD* = 13.29 years) and the average age of participants who reported they did not have a hands-free kit was 36.5 years (*SD* = 14.91 years). Of those participants who were employed, the majority reported that their employer did not have a policy restricting mobile phone use while driving and did not provide a hands-free kit in the absence of such a policy (see Table 5).

Table 5: Purpose of mobile phone use

		Frequency	Percent
Average use of mobile phone for business or personal purposes	All business	27	3.4
	Mostly business	186	23.4
	Approximately Equal	154	19.3
	Mostly personal	216	27.1
	All personal	213	26.8
Have a hands-free kit	Yes	287	36.1
	No	508	63.9
If yes, how often do you use hands-free	Hands-free all the time	143	49.1
	Hands-free most	55	18.8
	Equal	36	12.4
	Hand-held most	24	8.3
	Hand-held all the time	33	11.3
Employer policy restricting mobile phone use while driving	Yes	100	12.6
	No	379	47.6
	N/A	285	35.8
	Missing data	32	4.0
Provision of a hands-free mobile kit in the absence of a policy restricting mobile phone use	Yes	101	26.6
	No	253	66.8
	N/A	19	5.0
	Missing data	6	1.6

As can be seen in Table 6, there was a wide range in the level of daily mobile phone use. 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 (see Table 6).

Table 6: Average daily levels of mobile phone use

	M	SD	Range
Average number of calls made per day	6.09	8.50	0 – 100
Average number of calls received per day	7.13	9.32	0 – 75
Average number of SMS sent per day	4.95	7.31	0 – 50
Average number of SMS received per day	5.67	8.84	0 – 100

6.1.2 Mobile phone use according to individual characteristics of gender, age, and driving purpose

In a descriptive manner, differences in the average daily levels and type of self-reported mobile phone use were also examined according to gender, age, and driving purpose for those reporting that they used their mobile phone for making or receiving calls and sending or receiving text messages on a daily basis (see Figure 2). The following differences emerged:

Gender differences in mobile phone use (males vs. females)

In terms of gender differences in self-reported daily level and type of mobile phone use, males reported a higher daily level of mobile phone use for making (M = 7.74; SD = 10.01) and receiving (M = 9.06; SD = 10.64) calls than females (for making calls M = 4.10; SD = 5.49; for receiving calls M = 5.04; SD = 6.84). Females, however, reported a higher average daily level of mobile phone use for sending (M = 6.62; SD = 8.15) and receiving (M = 7.19; SD = 10.80) text messages than males (for sending text messages M = 5.53; SD = 7.17; for receiving text messages M = 5.74; SD = 7.45). Overall, males used their phone for business purposes more than females. Males (41%) reported having a hands-free kit more than females (30%).

Age differences in mobile phone use (younger 17-25 years vs. older 26+ years)

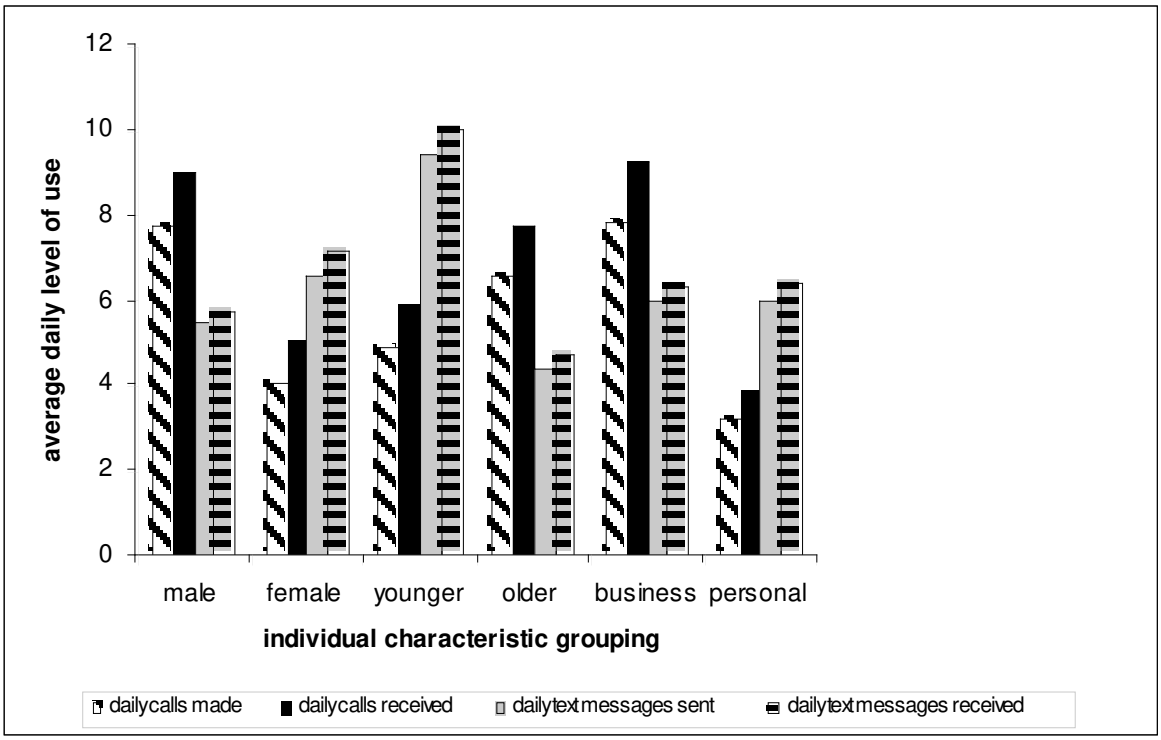
Drivers were divided into two groups: younger drivers (17-25 years) and older drivers (26+ years). This division was based on the premise that licensed drivers who drive within the first 7 years of having a licence are at an increased risk of crashing, and as a result, we wanted to determine whether specific factors influenced this group, in comparison to all other drivers. Differences in self-reported daily levels and type of mobile phone use were also evident on the basis of age for younger (17-25 years) and older (26+ years) participants. Older participants reported a higher daily level of calls made (M = 6.59; SD = 9.48) and received (M = 7.79; SD = 10.31) compared to younger participants (calls made M = 4.92; SD = 5.05; calls received M = 5.95; SD = 6.17); however, younger participants reported a higher daily level of text messages sent (M = 9.42; SD = 9.17) and received (M = 10.06; SD =10.09) than older participants (text messages sent M = 4.37; SD = 6.15; text messages received M = 4.75; SD = 8.18).

Driving purpose differences in mobile phone use (those driving for mostly business vs. mostly personal purposes)

With respect to different driver types, business drivers had a higher average number of calls made (M = 7.87; SD = 10.08) and received (M = 9.28; SD = 10.84) per day compared to personal drivers (calls made M = 3.22; SD = 3.26; calls received M = 3.92; SD = 4.34). Both business and personal drivers reported similar levels of text messages sent (business M = 6.01; SD = 7.88; personal M =

6.04; *SD* = 7.34) and received (business *M* = 6.33; *SD* = 9.59; personal *M* = 6.44; *SD* = 8.35) on a daily basis. Business drivers (57%) reported using a hands-free kit more often than those driving for mostly personal purposes (30%).

Figure 2: Self-reported level and type of mobile phone use according to gender, age and driving purpose

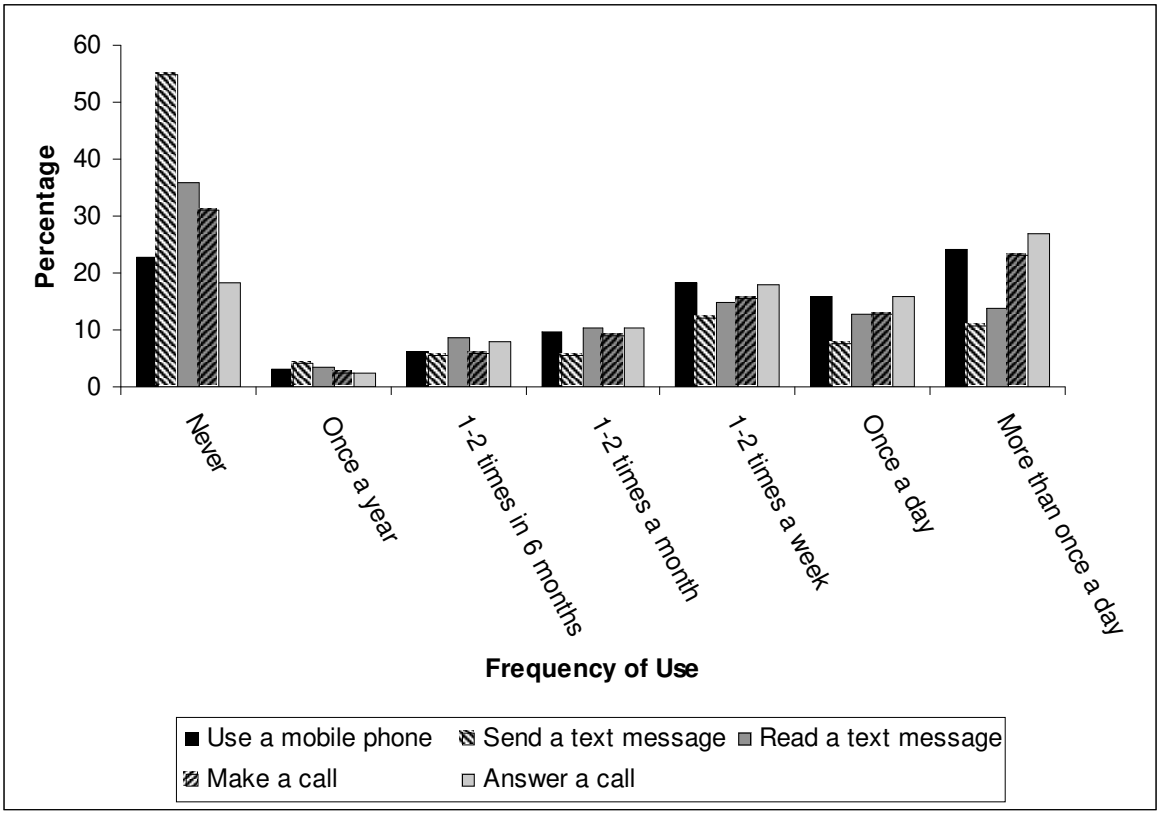


6.2 Mobile phone use while driving

6.2.1 Descriptive statistics

As shown in Figure 3, the majority of participants reported using their mobile phone while driving at some stage, with 40% using their mobile phone for any purpose while driving once a day or more. The most frequently reported behaviour performed daily or more was answering a mobile phone call (43%), followed by making a mobile phone call (36%), reading a text message (27%), and sending a text message (18%). In line with these findings, the behaviour that participants reported performing the least was sending a text message (55%), followed by reading a text message (36%), making a call (31%), and answering a call (18%). The majority of participants did not own a hands-free kit (64%). Of those who owned a hands free kit, over half (68%) reported using the hands-free kit most or all of the time when driving.

Figure 3: Self-reported frequency and type of mobile phone use while driving



6.2.2 Mobile phone use while driving according to individual characteristics of gender, age, and driving purpose

A comparison of self-reported mobile phone use while driving on the basis of gender (male vs. female), age (younger vs. older), and driving purpose (business vs. personal) was also undertaken. More male participants reported using their mobile phone while driving once a week or more for any purpose (67%) compared to female participants (48%) and this trend continued for the specific behaviours of making and answering calls and sending and reading text messages while driving.

A larger proportion of younger participants (17-25 years) reported using their mobile phone while driving at least once a week or more for any purpose (68%) compared to older (26+ years) participants (54%). Younger participants also reported sending and reading more text messages and making and answering more calls while driving than older participants. Younger participants used their phone most often for personal purposes and were less likely to have a hands-free kit (31%) than older participants (38%).

Participants who mainly drove for business purposes were twice as likely to use their mobile phone while driving on a daily basis (50%), than participants who mainly drove for personal purposes (25%). Business drivers were also more likely, than personal drivers, to report that they used their mobile phone to make and answer calls and send and read text messages while driving at least once a week.

6.2.3 Relationship between mobile phone use while driving and calling and text messaging while driving

Participants were asked to report how often they used their mobile phone for any purpose, made a call, answered a call, sent a text message, and read a text message, while driving, on a scale from 1 = *more than once a day* to 7 = *never*. To establish if the mobile phone use behaviours of calling and text messaging and mobile phone use in general were viewed as similar or different behaviours by participants, the correlations amongst these behaviours were examined. Table 7 shows that making and answering a call were highly correlated with mobile phone use in general whereas sending or reading a text message were only moderately correlated. Overall, the moderate correlations between calling and text messaging suggest that while these behaviours are somewhat related, they are also separate. Examination of the correlations between calling and text messaging and overall mobile phone use behaviours in each scenario revealed a similar pattern of results in that calling was highly correlated with mobile phone use and only moderate correlations emerged between text messaging and mobile phone use in general. These findings indicate that drivers consider mobile phone use while driving to refer to calling, rather than texting.

Table 7: Correlations between calling, text messaging, and general mobile phone use while driving

Variable	M	SD	1	2	3	4	5
1. Make a call while driving	3.92	2.39					
2. Answer a call while driving	3.37	2.16	.86***				
3. Send a text while driving	5.19	2.26	.55***	.49***			
4. Read a text while driving	4.42	2.28	.62***	.59***	.81***		
5. Mobile phone use while driving	3.58	2.25	.80***	.83***	.55***	.64***	

*** $p < .001$

Note. Scaled from 1 = *more than once a day* to 7 = *never*.

6.3 Prediction of intention to use a mobile phone while driving

Using bi-variate correlations, the relationship between the participant characteristics of age, gender and driving purpose and the theory of planned behaviour variables was examined. Table 8 shows the bi-variate correlations between these factors and the means and standard deviation for each item.

A regression analysis was also conducted to examine the influence of gender, age, and driving purpose (mostly business or mostly personal), within the theory of planned behaviour framework, on intentions to use a mobile phone while driving. The predictors of age, gender, and driving purpose were entered into the regression at step 1 and the theory of planned behaviour predictors (attitude, subjective norm, PBC) were entered in step 2. Table 9 displays the regression results for the whole sample. Given the large sample size, we controlled for Type 1 error rate by adopting a more stringent alpha level of .001 to interpret significant results. Please note that the regression beta weights presented are those obtained at the final step of analysis (step 2).

Table 8: Means, standard deviations, and bi-variate correlations of demographic characteristics and TPB measures

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

*** $p < .001$

[a] Scaled from 1 = *all business* to 7 = *all personal*

[b] Scaled from 1 = *extremely unlikely* to 7 = *extremely likely*

Table 9: Regression analysis predicting intention to use a mobile phone while driving

Variable		B	β[a]	R^2	ΔR^2
Step 1	Gender	-.14	-.03	.17	.17***
	Age	**-.02**	**-.11*** **		
	Driving purpose	**-.17**	**-.13*** **		
Step 2	**Attitude**	**.58**	**.49*** **	.49	.32***
	Subjective norm	**.17**	**.13*** **		
	Perceived behavioural control	.08	.08		

*** $p < .001$

Step 2 $F(6, 749) = 121.23$, $p = .000$

[a] Beta weights are reported at the final step of the analyses

Note. Bolding indicates a variable is a significant predictor of intention

In step 1, gender, age, and driving purpose all significantly predicted intentions to use a mobile phone while driving accounting for 17% of the variance. In step 2, with the entry of the theory of planned behaviour variables, however, gender was no longer a significant predictor and perceived behavioural control did not emerge as significant predictor. An additional significant proportion of variance (32%) in intentions to use a mobile phone while driving was explained by the entry of the theory of planned behaviour predictors. At the final step, the significant predictors of intentions to use a mobile phone while driving were age, driving purpose, attitude, and subjective norm.

An additional regression analysis was conducted excluding participants who owned a hands-free mobile phone kit and reported using the hands-free kit all the time (i.e., those participants who do not engage in illegal activity by using a hand-held mobile phone while driving). Similar to the regression analysis results with all participants reported above, at the final step of the analysis, the

significant predictors of intention to use a mobile phone while driving were age, driving purpose, attitude, and subjective norm (see Appendix D).

Given that age and driving purpose emerged as significant predictors of intention to use a mobile phone for any purpose while driving, separate regression analyses were conducted for mostly business purpose drivers, mostly personal purpose drivers, younger (17-25 years) drivers, and older (26 years and over) drivers, to determine if the predictors of intention to use a mobile phone while driving were the same or different for these groups (see Table 10). Attitude, subjective norm, and PBC were all entered into the first step of the analyses. The TPB model accounted for between 42% and 49% of the variance in intention to use a mobile phone for any purpose while driving. Similar to the pattern for drivers overall, attitude and subjective norm significantly predicted intentions to use a mobile phone for any purpose while driving for mostly business drivers and for older drivers. In contrast, for younger drivers, attitude and PBC emerged as significant predictors of mobile phone use intentions while driving, and only attitude emerged as a significant predictor of intentions to use a mobile phone while driving for mostly personal drivers.

Table 10: Regression analysis predicting intention to use a mobile phone for any purpose, mostly business purposes, mostly personal purposes, and for younger, and older drivers

Intention to use a mobile phone for any purpose while driving	B	β	R^2	Δ R^2
Mostly business drivers				
Attitude	.57	.51***	.43	.42***
Subjective norm	.19	.16†		
Perceived behavioural control	.08	.07		
Mostly personal drivers				
Attitude	.84	.60***	.47	.47***
Subjective norm	.10	.07		
Perceived behavioural control	.10	.11		
Younger drivers (17-25 years)				
Attitude	.72	.65***	.49	.49***
Subjective norm	-.11	-.10		
Perceived behavioural control	.20	.19†		
Older drivers (26 years and over)				
Attitude	.60	.49***	.44	.43***
Subjective norm	.30	.24***		
Perceived behavioural control	.06	.06		

*** $p < .001$ † $p = .001$

Mostly business drivers $F(3,477) = 118.63$, $p < .001$

Mostly personal drivers $F(3,294) = 86.97$, $p < .001$

Younger drivers $F(3,215) = 55.13$, $p < .001$

Older drivers $F(3,538) = 172.01$, $p < .001$

6.4 Comparisons within driver groups

Using multivariate analyses of variance (MANOVA), the differences in the beliefs of those who held strong and weak intentions to use a mobile phone while driving and who owned and did not own a hands-free mobile phone kit were examined. In addition, given that the participant characteristics of age and driving purpose emerged as significant predictors of intentions to use a mobile phone while driving, additional analyses were conducted to explore differences in beliefs of age groups and driving purpose groups for those with strong and weak intentions to use a mobile phone while driving. Given the large sample size, we controlled for Type 1 error rate by adopting a more stringent alpha level of .001 to interpret significant results.

6.4.1 Differences in beliefs of those with strong and weak intentions to use a mobile phone while driving

Table 11 displays the MANOVA results for the whole sample of participants with strong and weak intentions to use a mobile phone for any purpose while driving. There were significant multivariate effects found for behavioural beliefs, $F(6, 757) = 60.83$, $p < .001$; normative beliefs, $F(6, 764) = 28.31$, $p < .001$; and control beliefs, $F(6, 766) = 8.99$, $p < .001$.

As shown in Table 11, examination of the univariate effects revealed that participants with weak and strong intentions to use a mobile phone while driving differed on specific behavioural, normative and control beliefs. Specifically, for behavioural beliefs, participants with strong intentions were more likely to believe that using time effectively and receiving information were advantages and being distracted from driving was a disadvantage of using a mobile phone while driving, than those with weak intentions to use a mobile phone while driving. Those with strong intentions to use a mobile phone while driving were also more likely to perceive that all normative referents would approve of them using a mobile phone while driving, than participants with weak intentions to perform this behaviour. Finally, participants with strong intentions to use a mobile phone while driving were less likely to believe that risk of fines, risk of an accident, lack of a hands-free kit, and heavy traffic would be likely to prevent them from engaging in this behaviour, than participants with weak intentions to use a mobile phone while driving.

Table 11: Mean differences in beliefs of participants with strong and weak intentions to use a mobile phone while driving

	Weak Int	Strong Int
Behavioural belief	*n* = 358	*n* = 406
Using time effectively	2.57	4.98***
Being distracted from driving	3.58	4.33***
Being involved in a crash	2.99	3.23
Receiving information (e.g., directions, important news)	2.72	4.47***
Receiving assistance in an emergency	3.22	3.46
Being caught and fined by the police	2.90	3.09
Normative belief	*n* = 361	*n* = 410
Friends	2.54	4.22***
Family members	2.26	3.67***
Partner/boyfriend/girlfriend	2.37	3.95***
Work colleagues	2.55	4.26***
Other drivers	2.20	3.45***
Police	1.83	2.47***
Control belief	*n* = 363	*n* = 410
Risk of fines	5.24	4.29***
Demanding driving conditions (e.g., weather, changing lanes)	5.72	5.29
Risk of an accident	5.69	4.96***
Police presence	5.66	5.35
Lack of hands-free kit	4.93	4.32***
Heavy traffic	5.31	4.60***

*** $p < .001$

Note. Scaled from 1 = *extremely unlikely* to 7 = *extremely likely*.

6.4.2 Differences in beliefs of those with strong and weak intentions to use a mobile phone while driving according to mobile phone handset, age, and driving purpose groupings

To determine where differences in intentions may lie within each mobile phone handset (hands-free kit vs. hand-held mobile), age (younger: 17-25 years vs. older: 26+ years), and driving purpose grouping (business vs. personal purposes), separate MANOVA analyses were conducted (see Appendix E for results of the analyses and Table 30 for a summary of the differences across groups).

The significant differences in beliefs of participants with strong and weak intentions to use a mobile phone while driving in each group are presented below.

Differences in beliefs of *hands-free* mobile phone kit owners with strong and weak intentions to use a mobile phone while driving
• Strong intenders were less likely to believe they would be involved in a crash or caught and fined by the police than weak intenders. • Strong intenders were more likely, than weak intenders, to believe that family members would approve of them using a mobile phone while driving. • Strong intenders were less likely view police presence as a deterrent than weak intenders.
Differences in beliefs of *hand-held* mobile phone kit owners with strong and weak intentions to use a mobile phone while driving
• Strong intenders were more likely, than weak intenders, to believe that using time effectively and receiving information were advantages. They were also less likely to believe that they were would be distracted from driving and caught and fined by police than weak intenders. • Strong intenders were more likely to believe that all normative referents (except police) would approve than weak intenders. • Strong intenders were less likely to believe that the risk of being fined or having an accident and lack of a hands-free kit would prevent them from using a mobile phone than weak intenders.
Differences in beliefs of *younger* (17-25 years) participants with strong and weak intentions to use a mobile phone while driving
• Strong intenders were more likely, than weak intenders, to believe that advantages were using time effectively and receiving information. • Strong intenders were more likely, than weak intenders, to perceive that friends, their partner/boyfriend/girlfriend, and work colleagues would approve of their using a mobile phone while driving. • Strong intenders were less likely, than weak intenders, to believe risks of fines or an accident and lack of a hands-free kit would prevent them from using a mobile phone.
Differences in beliefs of *older* (26+ years) participants with strong and weak intentions to use a mobile phone while driving
• Strong intenders were more likely, than weak intenders, to believe that advantages were using time effectively and receiving information, whilst a disadvantage was being distracted from driving. • Strong intenders were more likely to perceive approval from all normative referents for using a mobile phone while driving than weak intenders. • Strong intenders were less likely, than weak intenders, to believe that being fined, having an accident, and heavy traffic would prevent them from using a mobile phone while driving.
Differences in beliefs of participants driving for mostly *business* purposes with strong and weak intentions to use a mobile phone while driving
• Strong intenders were more likely, than weak intenders, to believe that advantages were using time effectively and receiving information and a disadvantage was being distracted from driving. • Strong intenders were more likely to perceive normative approval from all identified referents (except police) than weak intenders. • Strong intenders were less likely to believe that risk of fines or an accident would prevent them from using a mobile phone than weak intenders.

Differences in beliefs of participants driving for mostly *personal* purposes with strong and weak intentions to use a mobile phone while driving
• Strong intenders were more likely to believe that advantages were using time effectively and receiving information than weak intenders. • Strong intenders were more likely to perceive normative approval from all referents (except police) than weak intenders. • Strong intenders were less likely to believe that risk of fines and lack of a hands-free kit would stop them from using their mobile phone than weak intenders.

6.5 Scenario based measures of mobile phone use while driving

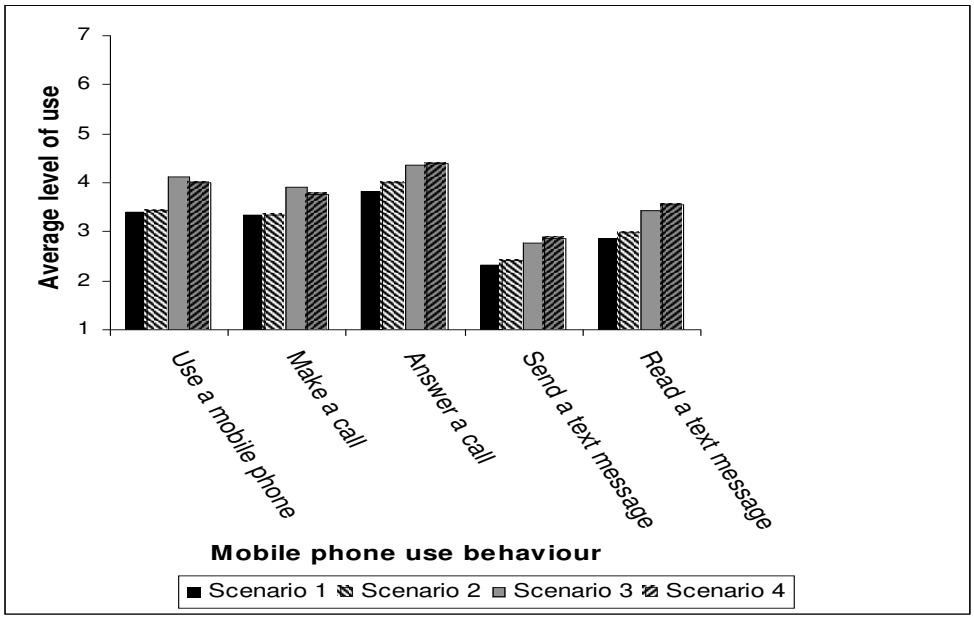
6.5.1 Descriptive statistics

Figure 4 shows the average ratings of intention reported by participants to use a mobile phone while driving in each of four scenarios (for a description of each of the four scenarios, see Table 12). Participants were more likely to intend to use their mobile phone in general, and for calling and text messaging when waiting at traffic lights (scenario 3 and 4). Overall, participants were also more likely to make or answer a call across the four scenarios than they were to send or read a text message.

Table 12: Description of scenarios

Scenario	Description
Factors held constant throughout all scenarios	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. Imagine that you are driving in the above conditions in the next week and...
One (*moving, high motivation*)	...you are driving at 100 km/h and are running late
Two (*moving, low motivation*)	...you are driving at 100 km/h and are not in a hurry
Three (*stationary, high motivation*)	...you are waiting at traffic lights and are running late
Four (*stationary, low motivation*)	...you are waiting at traffic lights and are not in a hurry

Figure 4: Intention to use a mobile phone use in each driving scenario



Note. Scaled from 1 = *strongly disagree* to 7 = *strongly agree*.

6.5.2 Regression analyses predicting intentions to use a mobile phone while driving according to scenario

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 (refer to respective correlation Tables 14, 16, 18, and 20). The risk items and TPB items had low correlations and, in some cases, the risk items did not correlate with perceived behavioural control. The means and standard deviations are presented in Table 13 for the TPB and risk items in each scenario for intentions to use a mobile phone while driving.

Table 13: Means and standard deviations for TPB items and risk items according to scenario

	Scenario 1		*Scenario 2*		*Scenario 3*		*Scenario 4*	
	M	**SD**	**M**	**SD**	**M**	**SD**	**M**	**SD**
Intention to use a mobile phone while driving	3.39	2.21	3.44	2.21	4.11	2.17	4.00	2.18
Intention to make or answer a call while driving	3.58	2.11	3.69	2.07	4.13	2.11	4.08	2.07
Intention to send or read a text message while driving	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. Scaled from 1 = *extremely unlikely* to 7 = *extremely likely*.

Separate regression analyses were conducted for each of the four scenarios to determine: (1) the important theory of planned behaviour predictors of intentions to use a mobile phone while driving for each scenario; (2) to examine the influence of gender, age, and driving purpose (mostly business or mostly personal), within the theory of planned behaviour framework, on intentions to use a mobile phone while driving, in each scenario; and (3) to examine the contribution of the addition of two risk items as predictors within the theory of planned behaviour framework, for each of the four scenarios. To determine the important predictors in each scenario, the variables of age, gender, and driving purpose were entered in the first step of the regression, followed by the TPB predictors of attitude, subjective norm, and perceived behavioural control in the second step, and the risk items assessing the likelihood of crashing and being caught and fined by police were entered in step 3. Given the large sample size, we controlled for Type 1 error rate by adopting a more stringent alpha level of .001 to interpret significant results. Please note that the beta weights presented for all regression analyses are those obtained at the final step of analyses (step 3).

Scenario One (driving at 100 km/h, running late)

Scenario 1 assessed participants' intentions to use a mobile phone while driving at 100 km/h (i.e., moving) and running late (i.e., high motivation). As shown in Table 15, gender, age, and driving purpose all significantly predicted intentions to use a mobile phone while driving accounting for 15% of the variance in step 1. In step 2, with the entry of the theory of planned behaviour variables, however, gender was no longer a significant predictor and perceived behavioural control did not emerge as significant predictor. An additional significant proportion of variance (47%) in intentions to use a mobile phone while driving was explained by the entry of the theory of planned behaviour predictors. The addition of the two risk items as predictors in the third step did not increase the explained variance in intention. At the final step, the significant predictors of intentions to use a mobile phone while driving at 100 km/h and running late were age, driving purpose, attitude, and subjective norm.

Table 14: Bi-variate correlations between demographic items, TPB predictors, risk perceptions, and intention to use a mobile phone while driving – Scenario 1: 100 km/h and running late

Scenario 1 variables	1	2	3	4	5	6	7	8	9
1. Gender									
2. Age	-.03								
3. Driving purpose	.33***	-.01							
4. Attitude	-.23***	-.16***	-.22***						
5. Subjective norm	-.24***	-.05	-.29***	.70***					
6. Perceived behavioural control	-.05	.04	-.12	.23***	.25***				
7. Likelihood of having a crash	.18***	-.02	.21***	-.27***	-.24***	.06			
8. Likelihood of being caught and fined	.17***	.05	.17***	-.20***	-.17***	.10	.66***		
9. Intention	-.22***	-.19***	-.30***	.76***	.62***	.24***	-.26***	-.18***	

*** $p < .001$

Table 15: Regression analysis predicting intention to use a mobile phone while driving at 100 km/h and running late – Scenario 1

Scenario 1 Variables		B	β[a]	R^2	Δ R^2
Step 1	Gender	-.03	-.01	.15	.15***
	Age	**-.01**	**-.09*** **		
	Driving purpose	**-.13**	**-.11*** **		
Step 2	**Attitude**	**.69**	**.61*** **	.61	.47***
	Subjective norm	**.15**	**.13*** **		
	Perceived behavioural control	.06	.06		
Step 3	Likelihood of having a crash	-.07	-.06	.62	.00
	Likelihood of being caught and fined	.03	.03		

*** $p < .001$

Step 3 $F(8, 741) = 148.25$, $p < .001$

[a] Beta weights are reported at the final step of the analyses

Note. Bolding indicates a variable is a significant predictor of intention

Scenario Two (driving at 100 km/h, not in a hurry)

Scenario 2 assessed participants' intentions to use a mobile phone when they are driving at 100 km/h (i.e., moving) and are not in a hurry (i.e., low motivation). Gender, age, and driving purpose all significantly predicted intentions to use a mobile phone while driving accounting for 20% of the variance in step 1 (see Table 17). In step 2, with the entry of the theory of planned behaviour variables, however, gender and age were no longer significant predictors and subjective norm, and perceived behavioural control did not emerge as significant predictors. An additional significant proportion of variance (46%) in intentions to use a mobile phone while driving was explained by the entry of the theory of planned behaviour predictors. The addition of the two risk items as predictors in the third step did not increase the explained variance in intention. At the final step, the significant predictors of intentions to use a mobile phone while driving at 100 km/h and not in a hurry were driving purpose and attitude.

Table 16: Bi-variate correlations between demographic items, TPB predictors, risk perceptions, and intention to use a mobile phone while driving – Scenario 2: 100 km/h and not in a hurry

Scenario 2 variables	1	2	3	4	5	6	7	8	9
1. Gender									
2. Age	-.03								
3. Driving purpose	.33***	-.01							
4. Attitude	-.24***	-.21***	-.29***						
5. Subjective norm	-.26***	-.11	-.31***	.74***					
6. Perceived behavioural control	-.03	-.01	-.15***	.21***	.24***				
7. Likelihood of having a crash	.18***	-.01	.22***	-.30***	-.25***	.02			
8. Likelihood of being caught and fined	.14***	.06	.17***	-.22***	-.17***	.06	.66***		
9. Intention	-.25***	-.21***	-.34***	.79***	.64***	.23***	-.29***	-.22***	

*** $p < .001$

Table 17: Regression analysis predicting intention to use a mobile phone while driving at 100 km/h and not in a hurry – Scenario 2

Scenario 2 Variables		B	β[a]	R^2	Δ R^2
Step 1	Gender	-.17	-.04	.19	.19***
	Age	-.01	-.06		
	Driving purpose	**-.12**	**-.10*** **		
Step 2	**Attitude**	**.74**	**.64*** **	.65	.46***
	Subjective norm	.11	.09		
	Perceived behavioural control	.07	.07		
Step 3	Likelihood of having a crash	-.02	-.02	.65	.00
	Likelihood of being caught and fined	-.03	-.03		

*** $p < .001$

Step 3 $F(8, 736) = 172.12$, $p < .001$

[a] Beta weights are reported at the final step of the analyses

Note. Bolding indicates a variable is a significant predictor of intention

Scenario Three (waiting at traffic lights, running late)

Scenario 3 assessed participants' intentions to use a mobile phone while waiting at traffic lights (i.e., stationary) when running late (i.e., high motivation). Age and driving purpose (but not gender) significantly predicted intentions to use a mobile phone while driving accounting for 9% of the variance in step 1 (see Table 19). In step 2, with the entry of the theory of planned behaviour variables, however, driving purpose was no longer a significant predictor and subjective norm did not emerge as a significant predictor. An additional significant proportion of variance (47%) in intentions to use a mobile phone while driving was explained by the entry of the theory of planned behaviour predictors. The addition of the two risk items as predictors in the third step did not increase the explained variance in intention. At the final step, the significant predictors of intentions to use a mobile phone while waiting at traffic lights when running late were age, attitude, and perceived behavioural control.

Table 18: Bi-variate correlations between demographic items, TPB predictors, risk perceptions, and intention to use a mobile phone while driving – Scenario 3: Waiting at traffic lights and running late

Scenario 3 variables	1	2	3	4	5	6	7	8	9
1. Gender									
2. Age	-.03								
3. Driving purpose	.33***	-.01							
4. Attitude	-.13***	-.16***	-.17***						
5. Subjective norm	-.21***	-.06	-.24***	.73***					
6. Perceived behavioural control	-.03	.01	-.09	.23***	.26***				
7. Likelihood of having a crash	.17***	.04	.17***	-.24***	-.21***	-.00			
8. Likelihood of being caught and fined	.13***	.05	.13***	-.16***	-.12	.06	.69***		
9. Intention	-.13***	-.20***	-.20***	.72***	.58***	.27***	-.21***	-.12	

*** $p < .001$

Table 19: Regression analysis predicting intention to use a mobile phone while waiting at traffic lights and running late – Scenario 3

Scenario 3 Variables		B	β[a]	R²	Δ R²
Step 1	Gender	-.03	-.01	.08	.08***
	Age	**-.02**	**-.11*** **		
	Driving purpose	-.07	-.06		
Step 2	**Attitude**	**.64**	**.60*** **	.55	.47***
	Subjective norm	.10	.09		
	Perceived behavioural control	**.12**	**.11*** **		
Step 3	Likelihood of having a crash	-.07	-.07	.56	.00
	Likelihood of being caught and fined by the police	.04	.04		

*** $p < .001$

Step 3 $F(8, 741) = 115.97$, $p < .001$

[a] Beta weights are reported at the final step of the analyses

Note. Bolding indicates a variable is a significant predictor of intention

Scenario Four (waiting at traffic lights, not in a hurry)

Scenario 4 assessed participants' intentions to use a mobile phone while waiting at traffic lights (i.e., stationary) when not in a hurry (i.e., low motivation). Gender, age and driving purpose all significantly predicted intentions to use a mobile phone while driving accounting for 13% of the variance in step 1 (see Table 21). In step 2, with the entry of the theory of planned behaviour variables, however, gender and driving purpose were no longer significant predictors and subjective norm and perceived behavioural control did not emerge as significant predictors. An additional significant proportion of variance (46%) in intentions to use a mobile phone while driving was explained by the entry of the theory of planned behaviour predictors. The addition of two risk items as predictors in the third step did not increase the explained variance in intention. At the final step, the significant predictors of intentions to use a mobile phone while driving and waiting at traffic lights and running late were age and attitude.

Table 20: Bi-variate correlations between demographic items, TPB predictors, risk perceptions, and intention to use a mobile phone while driving – Scenario 4: Waiting at traffic lights and not in a hurry

Scenario 4 variables	1	2	3	4	5	6	7	8	9
1. Gender									
2. Age	-.03								
3. Driving purpose	.33***	-.01							
4. Attitude	-.18***	-.21***	-.19***						
5. Subjective norm	-.24***	-.13***	-.24***	.78***					
6. Perceived behavioural control	-.02	-.01	-.10	.21***	.24***				
7. Likelihood of having a crash	.17***	.09	.16***	-.22***	-.22***	-.01			
8. Likelihood of being caught and fined	.16***	.06	.13***	-.13***	-.16***	.08	.66***		
9. Intention	-.19***	-.24***	-.23***	.76***	.62***	.22***	-.21***	-.11	

*** $p < .001$

Table 21: Regression analysis predicting intention to use a mobile phone while waiting at traffic lights and not in a hurry – Scenario 4

Scenario 4 Variables		B	β[a]	R²	Δ R²
Step 1	Gender	-.14	-.03	.13	.13***
	Age	**-.02**	**-.10*** **		
	Driving purpose	-.08	-.07		
Step 2	**Attitude**	**.71**	**.65*** **	.59	.46***
	Subjective norm	.07	.06		
	Perceived behavioural control	.07	.07		
Step 3	Likelihood of having a crash	-.02	-.02	.59	.00
	Likelihood of being caught and fined by the police	.01	.01		

*** $p < .001$

Step 3 $F(8, 736) = 134.67$, $p < .001$

[a] Beta weights are reported at the final step of the analyses

Note. Bolding indicates a variable is a significant predictor of intention

Additional regression analyses were conducted for each of the four scenarios excluding participants who own a hands-free mobile phone kit and report using it all the time. Overall, the general pattern of results remained the same at the final step as those reported for the whole sample above, with the exception of subjective norm no longer emerging as a predictor of intentions to use a mobile phone while driving at the final step in Scenario 1 (see Appendix D). It is interesting to note that only drivers who were at risk of being caught and fined were included in these additional analyses; however, the risk of apprehension remained non-significant.

6.5.3 Regression analyses predicting intentions to use a mobile phone while driving for calls and text messages according to scenario

As discussed previously, the correlations between calling and text messaging and overall mobile phone use behaviours while driving in each scenario revealed that calling intentions while driving were highly correlated with mobile phone use intentions while driving. Only moderate correlations, however, emerged between text messaging intentions while driving and mobile phone use intentions while driving. In addition, only moderate correlations emerged between calling and text messaging intentions while driving. These correlations suggest that, while these behaviours are related, they are also considered distinct mobile phone use behaviours. Further, both types of calling intentions (i.e., answering and making a call) were correlated highly with each other and both types of text messaging intentions (i.e., sending or reading a text message) were correlated highly with each other. Consequently, the predictors of intentions for making or answering a call (referred to as *calling* or *intention to call*) while driving and sending or reading a text message (referred to as *text messaging* or *intention to text message*) while driving were examined separately for each of the four driving scenarios (refer to Table 13 for means and standard deviations of intentions to make or answer a call and send or read a text message while driving across the four scenarios). The correlations between intention to call while driving and the TPB predictors and risk items and intention to text message while driving and the TPB predictors and risk items are presented for each scenario in Tables 22 and 23, respectively. Please note that the correlations between all other items are the same as those presented in the scenario analyses for intention to use a mobile phone while driving and, as such, they are not presented here again.

Table 22: Bi-variate correlations between intentions to call while driving, TPB predictors, and risk items for each scenario

	Scenario 1 Intention to Call	*Scenario 2* Intention to Call	*Scenario 3* Intention to Call	*Scenario 4* Intention to Call
Gender	-.22***	-.24***	-.17***	-.20***
Age	-.19***	-.20***	-.19***	-.17***
Driving Purpose	-.30***	-.31***	-.23***	-.26***
Attitude	.68***	.70***	.67***	.67***
Subjective norm	.58***	.59***	.59***	.60***
Perceived behavioural control	.23***	.28***	.25***	.25***
Likelihood of having a crash	-.24***	-.24***	-.21***	-.22***
Likelihood of being caught and fined	-.14***	-.13***	-.11	-.12

*** $p < .001$

Table 23: Bi-variate correlations between intentions to text message while driving, TPB predictors, and risk items for each scenario

	Scenario 1 Intention to Text Message	*Scenario 2* Intention to Text Message	*Scenario 3* Intention to Text Message	*Scenario 4* Intention to Text Message
Gender	-.07	-.08	.01	-.01
Age	-.35***	.37***	-.39***	-.40***
Driving Purpose	-.05	-.04	.04	.02
Attitude	.42***	.45***	.38***	.42***
Subjective norm	.33***	.33***	.28***	.29***
Perceived behavioural control	.06	.07	.08	.10
Likelihood of having a crash	-.05	-.05	-.01	-.01
Likelihood of being caught and fined	.02	.04	.07	.06

*** $p < .001$

Separate regression analyses were conducted for calling and text messaging to understand: (1) the important theory of planned behaviour predictors of intentions to use a mobile phone while calling and text messaging for each scenario; (2) to examine the influence of gender, age, and driving purpose (mostly business or mostly personal), within the theory of planned behaviour framework, on intentions to call and text while driving, in each scenario; and (3) to examine the contribution of the addition of two risk items as predictors within the theory of planned behaviour framework, for calling and text messaging within each of the four scenarios. To determine the important predictors of calling and text messaging in each scenario, the variables of age, gender, and driving purpose were entered in the first step of the regression, followed by the TPB predictors of attitude,

subjective norm, and perceived behavioural control in the second step, and the two risk items assessing the likelihood of crashing and being caught and fined by police was entered in step 3. Given the large sample size, we controlled for Type 1 error rate by adopting a more stringent alpha level of .001 is used to interpret significant results. Please note that the beta weights presented for all regression analyses are those obtained at the final step of analyses (step 3). The regression results for making or answering a call while driving and sending or reading a text message while driving are presented in Tables 24 and 25, respectively.

As shown in Table 24 below, age emerged as a significant predictor of calling intentions while driving at 100 km/h and running late and while waiting at traffic lights and running late. Driving purpose was a significant predictor of intention to call while driving at 100 km/h and running late, driving at 100 km/h and not in a hurry, and waiting at traffic lights and not in a hurry. Of the TPB predictors, attitude was a consistent significant predictor of intention to call while driving across all four scenarios. Subjective norm also emerged as a significant predictor of intention to call while driving at 100 km/h and running late, and while waiting at traffic lights for both situations when running late and not in a hurry. Perceived behavioural control emerged as a significant predictor of intentions to call while driving at 100 km/h and not in a hurry, and while waiting at traffic lights for both situations when running late and not in a hurry. Across all scenarios, none of the risk items contributed to the prediction of intention to call while driving.

Analyses were conducted excluding drivers who owned a hands-free mobile phone kit and reported using it all the time while driving. The overall pattern of results was the same across all scenarios with the exception that driving purpose was no longer a significant predictor of intention to call while driving in scenario 2 (driving at 100 km/h, not in a hurry) and PBC was no longer a significant predictor of intention to call while driving in scenario 3 (waiting at traffic lights, running late) (see Appendix D). The risk of apprehension remained non-significant.

Table 24: Regression analyses predicting intention to call while driving for each scenario

Scenario Variables – Intention to call		B	β[a]	R^2	Δ R^2
Scenario One: 100 km/h, running late					
Step 1	Gender	-.04	-.01	.14	.14***
	Age	**-.02**	**-.11*** **		
	Driving purpose	**-.14**	**-.12*** **		
Step 2	**Attitude**	**.57**	**.52*** **	.53	.39***
	Subjective norm	**.16**	**.15*** **		
	Perceived behavioural control	.06	.06		
Step 3	Likelihood of having a crash	-.08	-.08	.53	.00
	Likelihood of being caught and fined by police	.06	.06		
Scenario Two: 100 km/h, not in a hurry					
Step 1	Gender	-.11	-.03	.16	.16***
	Age	-.01	-.07		
	Driving purpose	**-.10**	**-.09†**		
Step 2	**Attitude**	**.60**	**.56*** **	.55	.39***
	Subjective norm	.12	.11		
	Perceived behavioural control	**.12**	**.13*** **		
Step 3	Likelihood of having a crash	-.07	-.07	.55	.00
	Likelihood of being caught and fined by police	.06	.06		

Scenario Three: Waiting at traffic lights, running late					
Step 1	Gender	-.11	-.03	.10	.10***
	Age	**-.02**	**-.11*** **		
	Driving purpose	-.09	-.08		
Step 2	**Attitude**	**.49**	**.47*** **	.51	.42***
	Subjective norm	**.22**	**.20*** **		
	Perceived behavioural control	**.10**	**.10*** **		
Step 3	Likelihood of having a crash	-.05	-.05	.51	.00
	Likelihood of being caught and fined by police	.04	.04		
Scenario Four: Waiting at traffic lights, not in a hurry					
Step 1	Gender	-.08	-.02	.12	.12***
	Age	-.01	-.06		
	Driving purpose	**-.13**	**-.12*** **		
Step 2	**Attitude**	**.51**	**.49*** **	.50	.38***
	Subjective norm	**.16**	**.14†**		
	Perceived behavioural control	**.12**	**.12*** **		
Step 3	Likelihood of having a crash	-.04	-.04	.50	.00
	Likelihood of being caught and fined by police	.00	.00		

*** $p < .001$ † $p = .001$ [a] Beta weights are reported at the final step of the analyses

Note. Bolding indicates a variable is a significant predictor of intention

Scenario 1 Step 3 $F(8, 741) = 105.77, p < .001$ Scenario 2 Step 3 $F(8, 737) = 112.65, p < .001$

Scenario 3 Step 3 $F(8, 742) = 98.06, p < .001$ Scenario 4 Step 3 $F(8, 735) = 92.24, p < .001$

Table 25: Regression analyses predicting intention to text message while driving for each scenario

Scenario Variables – Intention to text message		B	β	R^2	Δ R^2
Scenario One: 100 km/h, running late					
Step 1	Gender	-.01	-.00	.14	.14***
	Age	**-.04**	**-.31*** **		
	Driving purpose	.04	.04		
Step 2	**Attitude**	**.31**	**.32*** **	.28	.14***
	Subjective norm	.13	.13		
	Perceived behavioural control	-.03	-.04		
Step 3	Likelihood of having a crash	-.02	-.02	.29	.01†
	Likelihood of being caught and fined by police	.12	.13		
Scenario Two: 100 km/h, not in a hurry					
Step 1	Gender	-.08	-.02	.15	.15***
	Age	**-.04**	**-.29*** **		
	Driving purpose	.07	.07		
Step 2	**Attitude**	**.41**	**.42*** **	.29	.14***
	Subjective norm	.04	.03		
	Perceived behavioural control	-.02	-.02		
Step 3	Likelihood of having a crash	-.02	-.02	.31	.02***
	Likelihood of being caught and fined by police	**.14**	**.16*** **		

Scenario Three: Waiting at traffic light, running late					
Step 1	Gender	.05	.01	.15	.15***
	Age	**-.05**	**-.35*** **		
	Driving purpose	.09	.08		
Step 2	**Attitude**	**.32**	**.32*** **	.27	.11***
	Subjective norm	.06	.06		
	Perceived behavioural control	-.00	-.00		
Step 3	Likelihood of having a crash	-.03	-.03	.29	.02***
	Likelihood of being caught and fined by police	**.16**	**.17*** **		
Scenario Four: Waiting at traffic light, not in a hurry					
Step 1	Gender	.02	.01	.17	.17***
	Age	**-.05**	**-.34*** **		
	Driving purpose	.06	.06		
Step 2	**Attitude**	**.43**	**.42*** **	.30	.13***
	Subjective norm	-.05	-.05		
	Perceived behavioural control	.04	.03		
Step 3	Likelihood of having a crash	.04	.04	.31	.01†
	Likelihood of being caught and fined by police	.08	.09		

*** $p < .001$ † $p = .001$ [a] Beta weights are reported at the final step of the analyses

Note. Bolding indicates a variable is a significant predictor of intention

Scenario 1 Step 3 $F(8, 741) = 37.68, p < .001$ Scenario 2 Step 3 $F(8, 737) = 41.55, p < .001$

Scenario 3 Step 3 $F(8, 742) = 37.28, p < .001$ Scenario 4 Step 3 $F(8, 736) = 41.59, p < .001$

As shown in Table 25 above, for intentions to text message while driving across all four scenarios, the only individual characteristics emerging as a significant predictor was age in all four scenarios. Of the TPB predictors, attitude was a consistent significant predictor of intention to text message while driving in each of the four scenarios. For the risk items, the likelihood of being caught and fined by police contributed to the prediction of text messaging intentions while driving at 100 km/h and not in a hurry and while waiting at traffic lights and running late. Regression analyses were also conducted excluding participants who owned a hands-free mobile phone kit and reported using it all the time while driving for each of the four scenarios. Attitude and age remained strong predictors of intention to text message while driving across all four scenarios; however, risk of being caught and fined by police was no longer a significant predictor in any of the scenarios. Subjective norm also emerged as an additional predictor of intention to text message while driving at 100 km/h and running late (see Appendix D).

6.6 The effect of driving condition and driving motivation on mobile phone use while driving

Regression analyses indicated that the predictors of intentions to use a mobile phone differed according to the type of scenario in which this behaviour may occur. Given the finding that there are differences according to scenario type, further analyses were performed to examine the situations in which drivers would be more or less likely to intend to use a mobile phone when driving condition and motivation differed. Repeated measures analyses of variance were conducted to determine if drivers' intent to use a mobile phone varied when driving condition (moving at 100 km/h vs. stationary at traffic lights) and motivation (running late vs. not in a hurry) was manipulated. Drivers' intentions to use a mobile phone while driving were examined for mobile

phone use overall and for the four behaviours of making a call, answering a call, sending a text message, and reading a text message across four different conditions: (1) driving at 100 km/h and running late; (2) driving at 100 km/h and not in a hurry; (3) waiting at traffic lights and running late; and (4) waiting at traffic lights and not in a hurry. Given the large sample size, we controlled for Type 1 error rate by adopting a more stringent alpha level of .001 to interpret significant results. Examination of the means across the four conditions for intentions to engage in each of the mobile phone use behaviours (intention to use a mobile phone for any purpose, to make a call, to answer a call, to send a text message, and to read a text message) revealed a consistent significant main effect of driving condition (i.e., moving and stationary) on mobile phone use intentions. There was no main effect of motivation (i.e., running late and not in a hurry) on mobile phone use intentions and no effect of an interaction between driving condition and driving motivation on mobile phone use intentions. As the pattern of results was the same for all mobile phone use behaviours, only the analysis for intention to use a mobile phone for any purpose while driving are shown in Table 26 (for the remaining analyses refer to Appendix F for these results).

Table 26: Mean level of intention to use a mobile phone for any purpose according to driving condition and driver motivation

		Driving Condition			
		Moving		Stationary	
Motivation	Running late	3.40	(S1)	4.12	(S3)	3.76
	Not in a hurry	3.44	(S2)	4.01	(S4)	3.73
		3.42		4.07		

Note. Scaled from 1 = *extremely unlikely* to 7 = *extremely likely*.

Examination of the means across the four different conditions showed that drivers had higher intentions to use a mobile phone for any purpose while stationary at traffic lights and running late (see Table 26). Repeated measures ANOVA revealed that it was driving condition, and not motivation, which influenced mobile phone use while driving, evidenced by a significant main effect of driving condition on mobile phone use intentions, Wilk's $\Lambda = .84$, $F(1, 779) = 149.16$, $p < .001$, partial $\eta 2 = .16$, but no main effect of motivation on mobile phone use intentions, Wilk's $\Lambda = 1.00$, $F(1, 779) = .41$, $p = .522$, partial $\eta 2 = .00$. There was no significant interaction of driving condition by motivation on intention to use a mobile phone, Wilk's $\Lambda = .99$, $F(1, 779) = 4.53$, $p = .034$, partial $\eta 2 = .01$.

6.7 Addictive tendencies towards mobile phone use and intention to use a mobile phone while driving

To establish the relationship between addictive tendencies towards mobile phone use and intention to use a mobile phone while driving in general and in specific situations, bi-variate correlations between these items were examined. In addition, as young people are more likely to engage in excessive and problematic mobile phone use (Bianchi & Phillips, 2005) analyses were conducted to examine the relationship between addictive tendencies and age also. As shown in Table 27, the interpretable correlations (above .30) were between the addiction scale and intention to use a mobile phone while driving in general, between the tendencies toward mobile phone addiction scale and intention to use a mobile phone while waiting at traffic lights when not in a hurry, and between the addiction scale and age. The positive correlations between intention to use a mobile phone while driving and the addictive tendencies scale, suggests that those with higher intentions to use a mobile phone while driving had a stronger tendency towards mobile phone addiction. The negative correlation between age and the addictive tendencies scale suggests that younger drivers were more

likely to demonstrate addictive tendencies toward using their mobile phone. This statement is also supported by examination of the mean addictive tendencies scale scores according to age grouping (see Table 28) where younger drivers had a higher mean score than older drivers on the addictive tendencies scale.

Table 27: Bi-variate correlations between addictive tendencies scale, age, and intention to use a mobile phone while driving in general and in each scenario

Variable	Correlation with Addiction Scale
1. Intention – use mp while driving	**.31*** **
2. Intention – use mp 100 km/h, running late	.26***
3. Intention – use mp 100 km/h, not in a hurry	.28***
4. Intention – use mp waiting at traffic lights, running late	.30***
5. Intention – use mp waiting at traffic lights, not in a hurry	**.33*** **
6. Age	**-.41*** **

Note. For ease of reference, interpretable correlations above .30 are bolded

Table 28: Mean level of addictive tendencies according to age grouping

Age grouping	M	SD	*n*
17 to 25	3.39	1.17	221
26 and over	2.45	1.04	550
Total - All ages	2.74	1.16	771

Note. Scaled from 1 = *strongly disagree* to 7 = *strongly agree*.

7 SUMMARY TABLES

Table 29: Summary table of regression analyses

	Gender	Age	Driving purpose	Attitude	Subjective norm	PBC	Crash risk[a]	Apprehension risk[a]
General intent to use a mobile phone while driving								
Intent to use a mobile phone while driving		✓	✓	✓	✓			
Intent to use a mobile phone while driving (business)				✓	✓			
Intent to use a mobile phone while driving (personal)				✓				
Intent to use a mobile phone while driving (younger)				✓		✓		
Intent to use a mobile phone while driving (older)				✓	✓			
General intent to use a mobile phone while driving in specific scenarios								
Intent to use a mobile phone while driving at 100 km/h, running late		✓	✓	✓	✓			
Intent to use a mobile phone while driving at 100 km/h, not in a hurry			✓	✓				
Intent to use a mobile phone while waiting at traffic lights, running late		✓		✓		✓		
Intent to use a mobile phone while waiting at traffic lights, not in a hurry		✓		✓				
Intent to make/answer calls while driving in specific scenarios								
Intent to call while driving at 100 km/h, running late		✓	✓	✓	✓			
Intent to call while driving at 100 km/h, not in a hurry			✓	✓		✓		
Intent to call while waiting at traffic lights, running late		✓		✓	✓	✓		
Intent to call while waiting at traffic lights, not in a hurry			✓	✓	✓	✓		
Intent to send/receive texts while driving in specific scenarios								
Intent to text while driving at 100 km/h, running late		✓		✓				
Intent to text while driving at 100 km/h, not in a hurry		✓		✓				✓
Intent to text while waiting at traffic lights, running late		✓		✓				✓
Intent to text while waiting at traffic lights, not in a hurry		✓		✓				

✓ indicates a significant predictor variable

[a] not included for analyses pertaining to general intention to use a mobile phone while driving

Table 30: Summary table of belief analyses

Beliefs	Whole sample	Younger drivers	Older drivers	Business drivers	Personal drivers	Hands-free	Hand-held
Behavioural belief							
Using time effectively	✓	✓	✓	✓	✓		✓
Being distracted from driving	✓		✓	✓			✓
Being involved in a crash						✓	
Receiving information (e.g., directions, important news)	✓	✓	✓	✓	✓		✓
Receiving assistance in an emergency							
Being caught and fined by the police						✓	✓
Normative belief							
Friends	✓	✓	✓	✓	✓		✓
Family members	✓		✓	✓	✓	✓	✓
Partner/boyfriend/girlfriend	✓	✓	✓	✓	✓		✓
Work colleagues	✓	✓	✓	✓	✓		✓
Other drivers	✓		✓	✓	✓		✓
Police	✓		✓				
Control belief							
Risk of fines	✓	✓	✓	✓	✓		✓
Demanding driving conditions (e.g., weather, changing lanes)							
Risk of an accident	✓	✓	✓	✓			✓
Police presence						✓	
Lack of hands-free kit	✓	✓			✓		✓
Heavy traffic	✓		✓				✓

✓ indicates a significant difference in mean scores for a belief

8 DISCUSSION – STUDY TWO

Study 2 was a quantitative study examining the attitudinal, normative, control, and risk factors predicting mobile phone use amongst Queensland drivers. The study used a theory of planned behaviour (TPB) framework to examine the influence of these attitudinal, normative and control factors in addition to the effect of age, driving purpose, driving conditions, and motivational factors on mobile phone use while driving. Additionally, analyses investigated whether predictors differed according to type of mobile phone use when driving (i.e., calling vs. text messaging). Analyses (reported in Appendix D) were conducted excluding those drivers who reported using a hands-free unit all the time. The overall pattern of results remained the same. Interestingly, there was no increase in the perceived risk of apprehension for those drivers for whom this was a realistic risk.

Group comparisons were conducted to explore the beliefs of drivers with strong and weak intentions to use a mobile phone while driving. Specifically, these analyses examined whether drivers with strong and weak intentions to use a mobile phone while driving differed on their behavioural, normative, and control beliefs, according to the type of mobile phone handset used, driver age, and driving purpose. Finally, in an exploratory manner, the relationship between addictive tendencies toward mobile phone use and mobile phone use while driving was examined.

A broad cross-section of participants took part in the study. Participants ranged in age from 17 to 76 years with more males than females completing the survey. The majority of participants held open driver's licences with the average amount of driving per week ranging from one to 90 hours per week. There were approximately equal numbers of drivers who drove for mostly personal and mostly business purposes, with full-time, part-time, self-employed, and unemployed participants included in the sample.

On average, participants used their mobile phone 23 times per day. As the high level mobile phone users are categorised as people who use their mobile phone more than ten times per day (Australian Communications and Media Authority, 2007), many drivers in this study engaged in very high levels of general mobile phone use. The high average level of mobile phone use may be due, in part, to the relatively high percentage (27%) of participants in the study who primarily used their mobile phone for business purposes. Business users reported using their mobile phones for calls at double the rate of personal users; however, there was minimal difference in the level of text messaging between business and personal mobile phone users. Although the rate of mobile phone use was relatively high overall, drivers reported making and answering 6 to 7 calls per day. Thus, drivers should be encouraged to schedule their activities so that they make calls when they are not driving.

8.1 General mobile phone use while driving

- The most commonly reported behaviour was answering a mobile phone call while driving. The least common behaviour was sending a text message while driving.
- The majority of mobile phone use while driving was conducted on hand-held mobile phones.
- Most employees were not provided with a hands-free mobile phone kit.

The majority of participants in this study reported using a mobile phone when driving at some time with 40% of participants reporting they used a mobile phone when driving on a daily basis. However, as over 42% of participants reported answering a mobile phone call when driving at least

once per day, it appears that people may underestimate their actual level of mobile phone use when driving. The next most commonly reported behaviour was making a call when driving (36%) followed by reading a text message when driving (27%). Participants reported they were least likely to send a text message when driving with 55% of participants stating they never engaged in this behaviour. Younger drivers (17-25 years) were more likely, than older drivers (26 years and over) to text while driving, whilst people who drove for business purposes used their mobile phone for calls more than people who drove mostly for personal purposes.

The majority of drivers in this study (64%) did not use a hands-free mobile phone kit while driving. Of those drivers who had a hands-free kit, 50% did not use the hands-free kit at all times. Thus, the majority of mobile phone use while driving is conducted on hand-held devices. The commonality of hand-held mobile phone use while driving suggests that, although using a hand-held mobile while driving is illegal, people may not consider it a 'real' crime, similar to speeding (Corbett, 2000). Further research could investigate perceptions of both hands-free and hand-held mobile phone use while driving amongst the Australian driving population.

Of the employed drivers, less than a quarter of their employers had policies restricting mobile phone use while driving. Employed drivers were also asked to nominate whether their employer provided a hands-free mobile phone kit in the absence of a policy restricting mobile phone use while driving. Approximately 20% of employers provided hands-free kits to their employees indicating that some employers supported their employees using a mobile phone while driving. Throughout Australia, OH&S legislation imposes a duty of care on employers to provide a safe workplace. Employers who do not do everything in their power to actively discourage this unsafe driving practice may be failing in that duty. Additionally, there is a risk of voiding their insurance cover and rendering themselves liable for damages in the case of a crash involving mobile phone use.

Overall, levels of self-reported mobile phone use and the percentages of people who use a hands-free and hand-held mobile phone while driving were comparable to the Community Attitudes to Road Safety (Wave 18) survey (Pennay, 2006). Thus, it appears that participants in this study were broadly representative of the wider community with respect to mobile phone use while driving.

8.2 Differences in types of mobile phone use while driving

- Drivers perceived that calling and text messaging on a mobile phone while driving were distinct mobile phone use behaviours.

As stated in the earlier sections, participants were more likely to use a mobile phone for calls rather than text messages while driving. As such, analyses were conducted to determine the relationship between these behaviours. Results revealed that when people report mobile phone use while driving, they are more likely to be referring to making or receiving calls rather than sending or reading text messages. This finding indicates that calling and text messaging on a mobile phone while driving are perceived as distinct behaviours. Using a hand-held mobile phone while driving is an illegal behaviour and recognition of the illegality of the behaviour by participants may explain why text messaging was not associated with using a mobile phone in general. In contrast, hands-free kits provide drivers with a legal option to use a mobile phone for calls while driving, which may explain the strong association between calling and using a mobile phone in general as use of a hands-free kit is the only legal way a mobile phone can be used while driving. Additionally, participants in Study 1 perceived text messaging while driving to be a more dangerous behaviour than calling while driving.

Moderate correlations were found between using a mobile phone for calls and text messages while driving indicating that some participants who engage in one behaviour are more likely to engage in

the other. This trend was most evident amongst younger drivers who were more likely to call or text while driving, than older drivers who were less likely to text while driving.

Given the differences in the prevalence and the perceptions of each behaviour, future research and any campaigns designed to address mobile phone use when driving should focus on the distinct behaviours of using a mobile phone for calls or text messages while driving.

8.3 Efficacy of the TPB as a model to understand and predict mobile phone use while driving

Hypothesis 1: After controlling for the effects of gender, age, and driving purpose, drivers will be more likely to intend to use a mobile phone while driving for any purpose if they, have a positive attitude toward mobile phone use while driving, perceive normative pressure to use a mobile phone while driving (subjective norm), and perceive that mobile phone use while driving is within their control (PBC).

- Attitude and subjective norm, but not perceived behavioural control, emerged as significant predictors of intention to use a mobile phone for any purpose while driving.

Overall, the results provide qualified support for the hypothesis that the TPB would be an effective model in the prediction of mobile phone use for any purpose while driving. The full model incorporating both participant characteristics (gender, age, driving purpose) and the TPB predictors (attitude, subjective norm, PBC) explained 49% of the variance in intentions to use a mobile phone while driving. The TPB predictors, alone, accounted for 32% of the variance in intention to use a mobile phone while driving after controlling for participant characteristics. Although, the TPB was able to account for a significant proportion of the variability in intentions, comparable to other road safety related TPB research (e.g., Parker et al., 1992), only attitude and subjective norm, but not PBC, emerged as significant predictors of intention to use a mobile phone while driving. These results suggest that those people with a more positive attitude toward using a mobile phone while driving and who perceive normative pressure to use a mobile phone while driving will have stronger intentions to use a mobile phone while driving. This pattern of results, however, differed for younger drivers and those driving for mostly purposes. For younger drivers, a more positive attitude toward using a mobile phone while driving and a greater perception of control over using a mobile phone while driving resulted in stronger intention to use a mobile phone while driving. For mostly personal drivers, only a more positive attitude indicated stronger intention to use a mobile phone while driving.

Hypothesis 2: After controlling for the effects of gender, age, and driving purpose, it is expected that drivers will be more likely to intend to use a mobile phone for any purpose and for calling (i.e., to make or answer calls) and for text messaging (i.e., to send or read text messages) while driving if they have a positive attitude toward mobile phone use while driving, perceive normative pressure to use a mobile phone while driving (subjective norm), and perceive greater control (PBC) over using their mobile phone while driving, in four scenarios (see Table 11 for a description of scenarios).

- Attitude emerged as a significant predictor of intention to use a mobile phone for any purpose while driving across all scenarios. In addition, subjective norm predicted intention to use a mobile phone while driving at 100 km/h and running late (scenario 1) and PBC also emerged as a significant predictor of intention to use a mobile phone while waiting at traffic lights and running late (scenario 3).

The results provide partial support for the hypothesis that the TPB would be an effective predictive model of mobile phone use while driving across each of the four scenarios. Overall, after participant characteristics were controlled for, the TPB accounted for between 46% and 47% of additional variance of intention to use a mobile phone for any purpose while driving in the scenario based measures. The average amount of variance explained by the TPB in the scenario based measures was greater than in the general driving questions and was, therefore, more effective in the prediction of using a mobile phone while driving in specific driving conditions compared to general driving. The increased variance accounted for in the scenarios suggests that allowing participants to visualise specific instances when they might perform a behaviour assists in behavioural prediction. It should be noted, however, that attitude was a consistent, significant predictor of intentions to use a mobile phone while driving regardless of the scenario, whereas normative and control influences were not.

- Attitude, subjective norm and perceived behavioural control predicted intentions to call while waiting at traffic lights when either running late or not in a hurry (scenarios 3 and 4). In contrast, only attitude and subjective norm predicted intention to use a mobile phone while driving at 100 km/h and running late (scenario 1) and attitude and PBC emerged as significant predictors of intentions to call while driving at 100 km/h and not in a hurry (scenario 2).
- Attitude was the only significant predictor of intentions to text message while driving across all four scenarios.

The TPB significantly accounted for 39% to 42% of additional variance of intention to use a mobile phone for calling while driving in the scenario measures, after demographic controls. In two of the 4 scenarios, the full TPB model predicted calling intentions while driving; however, this varied for the remaining two scenarios, providing qualified support for the TPB as a predictive model of intentions to call while driving. In contrast, the TPB variables added between 11% and 13% to the prediction of text messaging while driving, after demographic controls. Attitude was the only significant predictor of intentions to text message while driving across all four scenarios. The difference in the amount of variance explained in these analyses support the previously discussed finding that text messaging and calling when driving are perceived as different behaviours.

The relatively low amount of variance explained by the TPB in relation to sending or reading text messages while driving suggests that other factors influence this behaviour. Previous research has found that self and social identity factors influence general mobile phone use amongst youth (Ling, 2004; Walsh & White, 2007; Wei & Lo, 2006). As drivers aged 17 to 25 years were most likely to use a mobile phone for text messages while driving, it may be that inclusion of identity factors in future research may assist in increasing understanding of why young people, in particular, text message while driving.

Overall summary of the efficacy of the TPB model in predicting mobile phone use for any purpose while driving and for calling and text messaging while driving

- Attitude was the only consistent predictor of mobile phone use while driving in all analyses and was the strongest influence on intention to use a mobile phone while driving in all analyses.
- Perception of social pressure (subjective norm) was a significant predictor of intention to use a mobile phone for any purpose and for calls, rather than text messages, while driving.
- Perception of control (PBC) over factors preventing mobile phone use while driving was not highly influential and only predicted intention to use a mobile phone for calls in some scenarios.

The combination of TPB predictors significantly predicted mobile phone use for any purpose while driving, across scenarios and predicted calling and text messaging while driving respectively. Interestingly, however, attitude was the only consistent predictor of intention to use a mobile phone across all analyses in the study. Thus, overall, it is the strength of one's attitude which is most influential on drivers decisions to use a mobile phone while driving.

The effect of subjective norm and PBC varied amongst conditions and behaviours. Subjective norm predicted intention to use a mobile phone for any purpose while driving and intention to use a mobile phone for calls while driving at 100 km/h when running late (scenario 1) and while waiting at traffic lights either when running late or when not in a hurry (scenarios 3 and 4). However, subjective norm did not predict intention to use a mobile phone for text messaging while driving in any scenario.

In contrast to expectations, PBC did not emerge as a significant predictor of intention to use a mobile phone for any purpose while driving. Similar to subjective norm, PBC predicted intention to call while driving at 100 km/h and not in a hurry (scenario 2) and while waiting at traffic lights when either running late or not in a hurry (scenarios 3 and 4), but did not predict intention to use a mobile phone for text messaging in any scenario.

The variation in predictors across behaviours supports the TPB principle that measures be specifically designed to test individual, rather than composite, behaviours (Ajzen, 1991). By separating mobile phone use while driving into calling and text messaging for some analyses, important information has been gained to understand further the influences on different types of mobile phone use by drivers.

Hypothesis 3: In an exploratory manner, the behavioural, normative, and control beliefs of drivers with strong and weak intentions to use a mobile phone while driving will be examined. It is expected that these beliefs will differ between drivers who report strong and weak intentions to use a mobile phone while driving.

- Drivers with strong intentions to use their mobile phone while driving reported more advantages would arise from their using a mobile phone while driving, more approval from others for their using a mobile phone while driving, and that fewer factors would prevent them using their mobile phone while driving, than drivers with weak intentions to use their mobile phone while driving.

Exploratory analyses were conducted to determine if behavioural, normative and control beliefs differed between drivers with strong intention to use a mobile phone while driving and those who reported weak intention to use a mobile phone while driving. In support of Hypothesis 3, strong intenders reported greater endorsement of the advantages of using a mobile phone while driving, perceived more normative approval for using a mobile phone while driving, and more control over factors preventing them from using a mobile phone while driving than weak intenders.

Unfortunately, due to time constraints for survey completion, separate belief measures for calling and text messaging while driving were not included in the survey. Given the difference in TPB predictors for calling and text messaging, future research could endeavour to examine specific beliefs relating to each of these behaviours to improve understanding of the underlying factors differentiating calling and text messaging while driving.

Hypothesis 4: Differences in behavioural, normative, and control beliefs of participants with strong and weak intentions to use a mobile phone while driving grouped according to type of mobile phone kit (hands-free or hand-held kit), age (17-25 years or 26 years and older), and driving purpose (business or personal purposes) will be explored.

- There were significant differences in behavioural, normative, and control beliefs between strong and weak intenders on the basis of type of mobile phone, age, and driving purpose.

Consistent behavioural beliefs emerging across all groups were that older drivers, hand-held mobile phone owners, and those driving for mostly business purposes, with strong intentions to use a mobile phone while driving were all more likely to believe that being distracted from driving was a disadvantage of using a mobile phone while driving, compared to weak intenders. In contrast, hands-free mobile phone owners with weak intentions and hand-held mobile phone owners with strong intentions believed that being caught and fined by the police were disadvantages of using a mobile phone while driving. Hands-free mobile phone owners with weak intentions to use a mobile phone were the only group to report that being involved in a crash was a disadvantage of using a mobile phone while driving. Across all groups, participants with strong intentions to use a mobile phone while driving were more likely than weak intenders to believe that using time effectively and receiving information were advantages of using a mobile phone while driving, with the exception of hands-free mobile phone owners who were equally as likely to endorse the advantages of using a mobile phone while driving.

With the exception of younger drivers, strong intenders across all groups were more likely than weak intenders to believe that family members would approve of them using a mobile phone while driving. Other consistent normative beliefs emerging across all groups (except hands-free mobile phone owners) were that strong intenders were more likely than weak intenders to perceive normative approval from friends, their partner/boyfriend/girlfriend, and work colleagues for using their mobile phone while driving. Strong intenders from all groups, except hands-free mobile phone owners and younger drivers, believed that other drivers would approve of them using a mobile phone while driving. In contrast to the rest of the groups, older drivers with strong intentions were more likely than older drivers with weak intentions to believe that police would approve of them using a mobile phone while driving.

Across all groups (with the exception of hands-free mobile phone owners), weak intenders were more likely than strong intenders to believe that risk of fines would prevent them from using a mobile phone while driving. In addition, hand-held mobile phone owners, younger and older drivers, and those driving for mostly business purposes, with weak intentions to use a mobile phone while driving were all more likely than strong intenders to believe that risk of an accident would prevent them from using a mobile phone while driving. Hand-held mobile phone owners, younger drivers, and those driving for mostly personal purposes, with strong intentions, believed that lack of a hands-free kit would prevent them from using a mobile phone while driving. Older drivers and hand-held mobile phone owners with weak intentions to use a mobile phone while driving were the only two groups to believe that heavy traffic would prevent them from using their mobile phone while driving. Hands-free mobile phone owners were the only group in which drivers with strong and weak intentions differed on whether police presence would stop them from using a mobile phone while driving. Specifically, weak intending drivers with hands-free units were more likely than strong intending drivers to view police presence as a deterrent.

For a more detailed discussion related to each grouping (i.e., type of handset, age, and driving purpose) please refer to Appendix E.

8.4 The TPB and mobile phone use while driving: discussion

8.4.1 Attitudinal factors

- Attitude was the strongest predictor of mobile phone use while driving. Drivers with a favourable attitude towards mobile phone use while driving were most likely to use their mobile phone while driving in all analyses.
- Drivers with strong intentions to use their mobile phone while driving believed that using a mobile phone while driving was likely to result in them using time effectively, receiving information, and being distracted from driving.

As stated earlier, attitude was the only consistent predictor of intention to use a mobile phone while driving in any comparative analyses conducted in the study. Thus, overall, it is the strength of one's attitude towards mobile phone use while driving which is most strongly related to intention to use a mobile phone while driving for general use, for calling, and for text messaging in any driving conditions and amongst any driver groups. Overall, participants did not report a highly favourable attitude towards using a mobile phone while driving. However, the predictive strength of attitude reveals that people with a more favourable attitude are more likely to intend to use a mobile phone while driving the majority of the time whilst people with a less positive attitude are less likely to intend to use a mobile phone while driving. This finding may be explained by cross-situational consistency in which people will engage in a regular behaviour irrespective of the situation.

Inspection of differences in behavioural beliefs of people who intend to use a mobile phone while driving revealed the strong intenders were more likely than weak intenders to believe that using time effectively and receiving information were advantages of using a mobile phone while driving. These advantages were reported at higher levels amongst the general population and most comparative group analyses discussed further in relevant sections. Thus, the people who report strong intention to use a mobile phone while driving do so because mobile phone use is believed to assist in time management and helps them remain contactable with others.

Interestingly, people who reported general strong intention to use a mobile while driving also reported that using a mobile phone while driving would result in their being distracted from driving. Thus, it appears that the advantages of using a mobile phone while driving may outweigh the potential disadvantages of using a mobile phone while driving for those people who are more likely to use a mobile phone while driving for any purpose. There was no significant difference in beliefs relating to being involved in a crash, receiving assistance in an emergency and being caught and fined by the police amongst the general driving population. As such, these factors do not appear to influence people's attitude and subsequent intention to use a mobile phone while driving. Overall, given the predictive strength of attitude, any future campaigns addressing mobile phone use while driving should incorporate strategies designed to either evoke negative attitudes about mobile phone use while driving or to reduce the effect of highly positive attitudes toward mobile phone use while driving.

8.4.2 Normative factors

- Perceptions of approval from others influenced intentions to use a mobile phone while driving with drivers who perceived social pressure to use their mobile phone while driving more likely to intend to use their mobile phone for any purpose and for calls while driving.
- Perceived approval from others did not influence text messaging while driving.

- Drivers with strong intentions to use their mobile while driving reported that all reference groups (friends, family members, partners, work colleagues, other drivers, and police) were more likely to approve of them using a mobile phone while driving than weak intenders.

Subjective norm predicted general intention to use a mobile phone use while driving once demographic variables were accounted for. Thus, perceived pressure to use a mobile phone while driving is influential, irrespective of age and driving purpose. Overall, participants reported fairly low levels of approval for using a mobile phone while driving amongst significant people in their lives. However, the emergence of subjective norm as a significant predictor of mobile phone use while driving indicates that those people who perceive more approval from others are more likely to engage in mobile phone use while driving than those who do not perceive less approval from others for this behaviour.

The effect of subjective norm on intention to use a mobile phone varied across the driving conditions and mobile phone behaviours (i.e., calling and text messaging). Thus, normative influences appear to be related to calling, rather than text messaging, while driving.

The finding that the effect of subjective norm varied across conditions highlights the need to understand perceptions of approval for behaviours in different situations. For instance, as subjective norm predicted calling when running late, it appears that people are more susceptible to normative pressure when other people or 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). Thus, some drivers may perceive they use their phone in a positive manner in response to normative influences.

Additionally, subjective norm predicted intention to use a mobile phone for calls when waiting at traffic lights. As such, people may perceive that others are more likely to approve of their using a mobile phone when stationary rather than when in fast moving traffic. Due to space constraints in the questionnaire, it was not possible to assess differences in beliefs relating to using mobile phone use when stationery versus when in moving traffic in this study. Future research could investigate the underlying beliefs in these two differing driving conditions.

Comparative analyses of the beliefs of strong versus weak intenders of mobile phone use revealed that strong intenders reported that all referent groups, including police, would be more likely to approve of their using a mobile phone while driving than low intenders. Overall, the highest level of approval was perceived to be from work colleagues and friends. As such, campaigns using normative influences in their design could include reference to work colleagues and friends. The high level of perceived approval from work colleagues may be due, in part, to the high proportion of people who drove mainly for business purposes in this sample. This trend was examined in more depth in group comparisons between business and personal drivers (see Appendix E).

8.4.3 Control factors

- Perceptions of control over factors preventing mobile phone use while driving were not highly influential on intention to use a mobile phone while driving. Drivers who perceived they could control factors preventing mobile phone use while driving were more likely to intend to use a mobile phone for calls while driving.
- Perceptions of control over factors preventing mobile phone use while driving did not influence general mobile phone use while driving or using a mobile phone for text messages while driving.

- Drivers with strong intentions to use a mobile phone were less likely, than weak intending drivers, to report that the risk of an accident, lack of a hands-free kit, or heavy traffic would prevent them from using a mobile phone while driving.

In contrast to predictions, PBC did not predict general intention to use a mobile phone while driving or intention to use a mobile phone for text messages while driving. However, PBC predicted intention to use a mobile phone for calls in three scenarios. Overall, people reported high levels of control over general mobile phone use while driving and for calling or text messaging while driving in all conditions. As PBC is most effective in the prediction of non-volitional behaviours (Ajzen, 1991), the lack of predictive ability of PBC in most of the analyses in this study suggests that people actively choose when and how they will use a mobile phone while driving. This finding is consistent with previous research which found that most mobile phone users consider mobile phone use to be a highly volitional behaviour (Walsh & White, 2007).

The finding that PBC predicted intention to use a mobile phone for calls, rather than text messages, while driving suggests that calling behaviours may be affected by outside pressures. There were a large number of business drivers in this study. It may be that these people, particularly, felt they were unable to freely choose to use their mobile phone while driving. For instance, business people may be more likely to make and answer calls while driving to keep in contact with clients.

For the scenario measures, PBC predicted intention to use a mobile phone for calling when not in hurry. This result indicates that people who believe they can control factors preventing their mobile phone use will use their mobile phone when they are able to. As an associated research program (Walsh, White & Young, 2007, in press) has found that people use their mobile phone when they are bored and for pleasure, it may be that some people choose to use their mobile phone when they are not in a hurry as it gives them something else to do while driving.

Control beliefs of drivers with strong versus weak intention to use a mobile phone while driving differed according to demographic characteristics. These specific trends will be discussed in the relevant sections. The two most consistent beliefs across all demographic comparisons were that strong intenders perceived there was less chance of being fined or having an accident if they used their mobile phone than weak intenders. Thus, although strong intenders were aware of the risks of using a mobile phone while driving, these risks did not prevent them from engaging in mobile phone use while driving.

8.5 Risk perceptions

Hypothesis 5: The influence of risk of apprehension and risk of crashing will be explored, within the theory of planned behaviour model, in the prediction of intention to use a mobile phone while driving in general, for calling (i.e., to make or answer calls) and text messaging (i.e., to send or read text messages) in four driving scenarios (see Table 12 for a description of scenarios).

- Inclusion of apprehension risk and crash risk within the TPB model did not add to the prediction of intention to use a mobile phone for any purpose while driving
- Apprehension risk and crash risk did not predict intention to use a mobile phone for calls while driving.
- Apprehension risk, but not crash risk, predicted intention to use a mobile phone for text messages while driving in two scenarios.

The addition of risk perception items, in the scenario measures, did not significantly improve prediction of mobile phone use for any purpose while driving after controlling for the TPB

predictors. Thus, Hypothesis 6 was not supported. In the belief-based analyses, participants reported relatively high levels of agreement that the risk of an accident and of fines (control beliefs) would prevent them from using a mobile phone while driving. The lack of predictive validity of risk measures in the driving scenarios, however, indicates that although drivers are aware that using a mobile phone while driving could result in an accident or apprehension (in the case of hand-held mobile phone use), these risks do not influence their intentions to use a mobile phone while driving.

As discussed earlier, drivers perceived sending or receiving text messages on a mobile phone while driving as a separate behaviour to using a mobile phone to make or receive calls while driving. In contrast to voice calling, text messaging on a mobile phone is an illegal behaviour increasing the risk of apprehension. Additionally, drivers report that text messaging while driving is a riskier behaviour than voice calling while driving (White, Eiser, & Harris, 2004) suggesting that crash risk may be more salient for text messaging while driving. Thus, exploratory analyses were conducted to determine whether the effect of risk perceptions differed for calling and text messaging while driving.

The perceived likelihood of having a crash and the perceived likelihood of being caught and fined by the police did not predict intention to use a mobile phone for making or answering calls while driving in the four scenarios. Whilst participants reported that having an accident or being fined were likely (behavioural beliefs), this perception did not influence their intention to call while driving. Hands-free drivers are not engaging in an illegal behaviour and may believe using a hands-free kit to be safer than a hand-held mobile phone. Thus, apprehension risk may have been less influential in general calling analyses.

In contrast to calling while driving, risk perceptions significantly explained additional variance in the prediction of sending or reading text messages while driving over the TPB predictors. However, the only significant single risk predictor was the likelihood of being fined in two scenarios, 100 km/h, not in a hurry and waiting at traffic lights, running late. Thus, the risk of crashing did not influence intention to text message while driving, whilst apprehension risk only impacted on text messaging while driving in some conditions. Overall, risk of apprehension and risk of crashing are not readily perceived by drivers and do not prevent mobile phone use while driving.

8.6 The effect of driving condition and driving motivation on intention to use a mobile phone while driving

Hypothesis 6: In an exploratory manner, the effect of driving condition and driver motivation on intention to use a mobile phone while driving will be investigated.

- Drivers were most likely to intend use their mobile phone when they were stationary (waiting at traffic lights) rather than when they were driving at 100 km/h.
- Drivers did not differ in intention to use a mobile phone according to whether they were running late or were not in a hurry.

Driving conditions (stationary vs. moving), rather than motivation (running late vs. not in a hurry), were most impactful on drivers' decisions to use their phone while driving. Drivers were most likely to use their mobile phone when they were stationary (waiting at traffic lights) rather than when they were driving at 100 km/h. Thus, driving conditions influence mobile phone use while driving. As discussed earlier, drivers in this study reported an awareness of the safety risks arising from using a mobile phone while driving. It may be that using a mobile phone while waiting at traffic lights is perceived to be safer than using a mobile phone while moving. Alternatively, drivers may believe using their mobile phone while waiting at traffic lights is an effective use of

time. Further research could investigate drivers' beliefs regarding mobile phone use in moving versus stationary vehicles.

No difference was found in whether drivers were likely to use their mobile phone when running late or when they were not in a hurry. Although it was hoped that one motivational factor would emerge as influencing mobile phone use while driving more than the other, this result indicates that the motivations underlying mobile phone use while driving differ amongst drivers. For instance, some people use mobile phones to relieve boredom (Leung & Wei, 2000; Walsh, White, & Young, 2007), other drivers may use their mobile phone to report an accident which may delay them in traffic (Chapman & Schofield, 1998; Lissy et al., 2000). Further research is required to investigate the range of motivational factors influencing mobile phone use while driving.

8.7 Addictive tendencies towards mobile phone use

Research into general mobile phone addiction is in relatively preliminary stages and forms part of a program of research of the first author. As mobile phone addiction has been indicated amongst Australian youth (Walsh et al., in press), a measure of addictive tendencies toward mobile phone use were included in this study to provide an initial indication of whether people who demonstrate addictive tendencies are more likely to use a mobile phone while driving than people who do not indicate addictive tendencies.

Hypothesis 7: In an exploratory manner, the hypothesis that people with addictive tendencies toward mobile phone use are more likely to intend to engage in mobile phone use while driving will be examined.

- Intention to use a mobile phone while driving increased as addictive tendencies towards mobile phone use amongst drivers increased.

Drivers who reported higher levels of addictive tendencies toward mobile phone use were more likely to intend to use a mobile phone while driving than drivers who had low levels or no tendency toward addiction. People with addictive tendencies towards a behaviour are more difficult to persuade to give up the behaviour, particularly if the behaviour provides benefits for them (Glasser, 1985). As the majority of mobile phone users reported mobile phone use while driving was beneficial to them (behavioural beliefs), mobile phone use while driving may be difficult to reduce amongst those drivers who have addictive tendencies towards mobile phone use. Additionally, the compulsive nature of addictive behaviours makes them difficult to overcome as the compulsion presents a particularly strong drive to engage in the behaviour (Nakken, 1996). Thus, it would be expected that addicted individuals will be more difficult to dissuade from engaging in mobile phone use while driving.

Hypothesis 8: It is expected that addictive tendencies toward mobile phone use will be highest amongst younger drivers (17-25 years) than any other group.

- Drivers aged 17-25 years were more likely to report addictive tendencies toward mobile phone use than any other group.

The tendency towards mobile phone addiction was most prevalent amongst drivers aged 25 and under providing support for this hypothesis. Youth have grown up with mobile technology and have incorporated the device into their lives increasing their reliance on mobile phones. As people are resistant to efforts to minimise the behaviours to which they are addicted (Nakken, 1996), reducing mobile phone use while driving amongst young people who demonstrate addictive tendencies to using their mobile phone may be difficult.

Further research is required to reveal the extent addictive tendencies towards mobile phone use, particularly amongst young people, and the effects of mobile phone addiction on using a mobile phone while driving. This information could prove valuable in designing campaigns to specifically target drivers with addictive tendencies towards using their mobile phone.

9 CONCLUSION

This research program investigated psychological factors influencing mobile phone use while driving. The study assessed drivers' intentions to use a mobile phone while driving in general, and for calls, and for text messages, in four scenarios. The theory of planned behaviour (TPB) provided the framework for the study and assessed the effect of attitudinal, normative and control factors on drivers' intentions to use their mobile phone while driving. After controlling for the effects of participants characteristics of gender, age, and driving purpose, this research examined the role of attitude, subjective norm, and perceived behavioural control, in addition to apprehension risk, and crash risk, in the prediction of intention to use a mobile phone while driving. Using group based comparisons, behavioural, normative, and control belief differences for participants with strong and weak intentions to use a mobile phone while driving were also explored. Additional analyses explored the relationship between addictive tendencies and mobile phone use while driving. Finally, analyses were conducted to assess the effect of driving conditions and motivational factors on intention to use a mobile phone while driving.

In all analyses, attitude was found to be the most consistent predictor of intention to use a mobile phone while driving. Thus, drivers with a positive attitude towards using a mobile phone while driving are most likely to intend to engage in this behaviour. Additionally, in the main, 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, suggesting that mobile phone use is a volitional behaviour perceived by participants as being within their control. Overall, drivers with strong intentions to use a mobile phone driving reported more advantages would arise from their using a mobile phone while driving, specific referents would approve of them using their mobile phone while driving, and that fewer factors would prevent them from using their mobile phone while driving than drivers with weak intentions to engage in this behaviour.

Perceived risk of apprehension and perceived risk of crashing did not influence drivers' intentions to use their mobile phone while driving for making or receiving calls. Apprehension risk only emerged in relation to using a mobile phone for text messages in two scenarios (driving at 100 km/h when not in a hurry and waiting at traffic lights when running late). Thus, in general, the risks of using a mobile phone while driving do not deter drivers from intending to engage in this behaviour.

Although research into addictive tendencies towards mobile phone use is in exploratory stages, the results of this study indicate that addictive tendencies towards using a mobile phone influence mobile phone use while driving. This finding was evidenced by the relationship between addictive tendencies and self-reported mobile phone use while driving; specifically, as addiction tendencies increased, mobile phone use while driving also increased.

Finally, drivers were more likely to intend to use their mobile phone when they were stationary than moving. There was no difference in whether drivers intended to use their phone when they were in not in a hurry or running late. Thus, driving conditions, rather than the motivational factors examined in the present research, were more impactful on intentions to use a mobile phone while driving.

9.1.1 Strengths

There are a number of strengths to this study. First, the study is the first known Australian study investigating a range of psychosocial factors influencing drivers' decisions to use their mobile phone while driving. The lack of previous research in this area has been a significant gap in our understanding of why people engage in this unsafe driving practice. Second, the study used a well-validated theoretical framework, the TPB, to understand beliefs relating to mobile phone use while driving and motivational factors influencing this behaviour. The inclusion of additional predictors, such as risk perceptions, in the TPB model further improved our knowledge of the factors influencing mobile phone use while driving. Third, the study not only examined the underlying factors influencing mobile phone use while driving in general, but also identified the influences on what emerged as the distinct behaviours of calling and text messaging while driving. In addition, the study was able to explore the impact of factors that contribute to mobile phone use decision-making in a number of commonly occurring driving scenarios which varied on the key elements of driving condition (stationary versus moving) and driver motivation (running late versus not in a hurry).

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 being included. As such, comparisons between different categories of driver groups were able to be conducted. These comparisons are discussed in more depth in Appendix E. Results in the study provide crucial information relating to some of the main underlying factors that impact on whether drivers choose to use their mobile phone while driving. This information may enhance the effectiveness of campaigns designed to reduce mobile phone use amongst Australian drivers.

9.1.2 Limitations

There are a number of limitations in this study. First, data were collected at travel centres located on major highways. As such, the participants in the study may have been biased towards drivers who were travelling for work purposes or who were stopping on a long journey. Although there was a strong representation of people from at-risk groups (business and younger drivers), there may not have been a sufficient representation of people who drive for short distances each day.

Second, methodological limitations may have impacted on results. The study relied 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 artificial nature of scenario-based measures may not have provided a realistic indication of the effect of driving condition and driver motivation on mobile phone use while driving.

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 and is a strong predictor of behaviour (Ajzen, 1991); other factors may influence behavioural performance. Additionally, mobile phone use while driving may be a response to unexpected contact, and therefore reflects a person's willingness to use a mobile phone while driving rather than actual intention to use a mobile phone while driving. Although willingness is a similar measure to intention in that both are proximal predictors of behaviour and both constructs have been incorporated within a theory of reasoned action/theory of planned behaviour model framework (see Gibbons, Gerrard, Blanton, & Russell, 1998), willingness is more reactive and indicates a general openness to performing a behaviour if the opportunity arises. In contrast, intentions are more deliberative in nature and indicate a formulated plan for behavioural performance (Norman &

Conner, 2005). It may be the measures in the study assessed willingness rather than intention to use a mobile phone while driving.

9.1.3 Future research

Limitations in the study provide direction for future research. For example, as the location of data collection may have resulted in a biased sample, future research could be conducted in a variety of locations to ensure an adequate representation of all driver groups, especially those who drive for short distances each day. It may be also that asking people under which conditions they would be willing, rather than intend, to use a mobile phone while driving would improve our understanding of unplanned factors which influence people to use their phone while driving. It may be that some drivers are more willing to use their mobile phone while driving under some conditions (for instance, if they are expecting important news) than at other times.

Additionally, the results of this study provide a number of directions for future research. First, the TPB accounted for a relatively small percentage of the variance in intention to engage in text messaging while driving suggesting that there are other factors influencing intentions to perform this behaviour. For instance, mobile phone use amongst young people has been found to be related to identity factors (Walsh & White, 2006). As young people were found to be more likely to text message while driving, including factors such as self and social identity in future research may improve understanding of the reasons why younger drivers, in particular, text message while driving. In addition, calling and text messaging while driving emerged as separate behaviours. Future research assessing underlying behavioural, normative, and control beliefs relating to each of these behaviours separately may reveal whether different beliefs influence drivers' decisions to engage in the distinct behaviours of calling or text messaging while driving.

Second, analyses investigating the role of driving conditions and driver motivation on mobile phone use while driving indicated that there was no effect of motivational factors on drivers' intention to use their mobile phone while driving. In all analyses, drivers reported they were equally likely to use their mobile phone when they were not in a hurry as when they were running late. This finding indicates that drivers use their mobile phone while driving for a range of reasons. Further, in Study 1, participants were more likely to report they would use their mobile phone while driving if they were expecting contact from other people. Further research, then, is required to investigate the range of motivational and situational factors influencing mobile phone use while driving.

Finally, the findings of this study could inform future research examining theory-based interventions designed to reduce the amount of mobile phone while driving. Given that attitude was found to be the most consistent predictor of intention to use a mobile phone while driving including attitudinal components may be effective. For instance, challenging drivers to consider whether the benefits (e.g., using time effectively) outweigh the increased risk of crashing if they use their mobile while driving may encourage safer attitudes subsequently reducing the prevalence of this behaviour.

Overall, the present research aimed to use quantitative and qualitative methods to investigate the psychosocial factors underlying intentions to use a mobile phone while driving. Using a well validated theoretical framework, the theory of planned behaviour, the attitudinal, normative, and control factors influencing intentions to use a mobile phone while driving were examined. In addition, the effect of age, driving purpose, risk, driving conditions, and motivational factors on mobile phone use while driving were explored. Finally, the relationship between addictive tendencies toward mobile phone use and intention to use a mobile phone while driving were explored also. Results of the study provided some support for the use of the theory of planned behaviour as a predictive model for intentions to use a mobile phone for any purpose and for calling and text messaging while driving. Attitude emerged as the most consistent predictor of intention to

use a mobile phone for any purpose while driving and for calling and text messaging while driving, with subjective norm and perceived behavioural control demonstrating variable influences across analyses in the prediction of intention to use a mobile phone while driving. In general, risk was not overly impactful on intention to use a mobile phone while driving and the influence of age and driving purpose on intention to use a mobile phone while driving varied also. Driving conditions, but not motivation, impacted upon intention to use a mobile phone for any purpose while driving and also for calling and text messaging while driving. Finally, exploratory analyses revealed a relationship between addictive tendencies toward mobile phone use and intention to use a mobile phone while driving, particularly for younger drivers. Overall, results of the study contribute to improving our understanding of why drivers use their mobile phones while driving by highlighting the psychosocial factors influencing drivers decisions to engage in this behaviour. Future research could design an intervention based on the findings of this research and assess the efficacy of such campaigns to reduce this unsafe driving practice.

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APPENDIXES

APPENDIX A: STUDY ONE QUESTIONNAIRE

Psychosocial factors influencing mobile phone use when driving.

Thank you for participating in this study. Your answers to the questions are anonymous and will not be used for any other purposes than the present research.

Some questions may appear repetitive however; a slightly different piece of information is being requested in each. Please read the instructions carefully and answer each item honestly. After reading each question, write the response or circle the number that best represents your opinion.

There are no right or wrong answers. Answering any questions is voluntary.

If you have any queries or comments regarding the questionnaire, please contact the Chief Investigator, Mrs Shari Walsh on (07) 3864 4881 or Dr Katy White on 3864 4689.

This project is funded by the Australian Transport Safety Bureau.

1. Do you have **a current drivers licence?** ☐ **Yes** Please continue ☐ **No** Please do not continue

2. How **long** have you had a **drivers licence?** _____ years _____ months

3. What **type of drivers licence** do you hold? *Please circle.*

Car		Truck/Bus	
1	Learner	1	Learner
2	Provisional	2	Open
3	Open		

4. On average, how much of your **driving** is for **business or personal purposes**? *Please tick one option.*

☐ All business	☐ Mainly business	☐ Approximately equal	☐ Mainly personal	☐ All personal

5. Approximately how many **hours of driving** do you do **each week**? _____ hours per week

6. Do you have **a mobile phone?** ☐ **Yes** Please continue ☐ **No** Please do not continue

7. How **long have you had a** mobile phone? _____ years; _____months

8. **On average**, *Please write one number on each row.*

How many **calls** would you **make** on your mobile phone	**each day**? _____	or **each week**? _____
How many **calls** would you **receive** on your mobile phone	**each day**? _____	or **each week**? _____
How many **SMS** would you **send** on your mobile phone	**each day**? _____	or **each week**? _____
How many **SMS** would **receive** on your mobile phone	**each day**? _____	or **each week**? _____

9. On average, how much do you **use your mobile phone** for **business or personal purposes**? *Please tick one option.*

☐ All business	☐ Mainly business	☐ Approximately equal	☐ Mainly personal	☐ All personal

Please write your thoughts about using a mobile phone when driving for the following questions.

Question 1. What do you see as the **advantages** of using a mobile phone when driving:

For calls? _____

_____

For text messages? _____

_____

Question 2. What do you see as the **disadvantages** of using a mobile phone when driving:

For calls? _____

_____

For text messages? _____

_____

Question 3. Is there **anything else** you would associate with using a mobile phone when driving:

For calls? _____

_____

For text messages? _____

_____

Question 4. Are there any **groups of people** who would **approve** of you using a mobile phone when driving:

For calls? _____

_____

For text messages? _____

_____

Question 5. Are there any **groups of people** who would **disapprove** of you using a mobile phone when driving:

For calls? _____

_____

For text messages? _____

_____

Question 6. Are there any **groups of people** who come to mind when you think about using a mobile phone when driving?

For calls? _____

_____

For text messages?_____

_____

Question 7. Please write down any **factors or circumstances** that might **prevent or discourage** (make it harder) you from using your mobile phone when driving.

For calls? _____

_____

For text messages?_____

_____

Question 8. Please write down **any factors or circumstances** that might **facilitate or encourage** (make it easier) you to use your mobile phone when driving.

For calls? _____

_____

For text messages?_____

_____

Question 9. Please **describe the most recent time you used your mobile phone when driving** (e.g. driving situation, type of use and reason for use)?

_____

_____

_____

_____

Question 10. How often do you **use any type of mobile phone** when driving? *Please circle*

Never	Once a year	1 or 2 times in 6 months	1 or 2 times a month	1 or 2 times a week	Once a day	More than once a day

Some people may drive more than one vehicle each week. The following question relates to the vehicle you drive most often.

In the car you drive most regularly, do you have a **hands-free mobile** unit? ☐ Yes ☐ No

If **yes**, *please circle* how **often** do you **use** the **hands-free unit in comparison to a hand held mobile** in the car?

Hands-free mobile	1 All the time	2	3	4 Half the time	5	6	7 All the time	Hand held mobile

Question 11.

How **often** do you do the following on your mobile phone **when driving**? *Please circle one option in each line.*	**More than once a day**	**Daily**	**1 or 2 times a week**	**1 or 2 times a month**	**1 or 2 times in six months**	**Once a year**	**Never**
Send a **short text** message	1	2	3	4	5	6	7
Read a **short text** message	1	2	3	4	5	6	7
Send a **long text** message	1	2	3	4	5	6	7
Read a **long text** message	1	2	3	4	5	6	7
Make a **short phone call**	1	2	3	4	5	6	7
Make a **long phone call**	1	2	3	4	5	6	7
Answer a mobile phone **call** – **unknown** number	1	2	3	4	5	6	7
Answer a mobile phone **call** – **known** number	1	2	3	4	5	6	7

Question 12.

What do you consider to be A long mobile phone call? _____

A long text message? _____

Question 13.

If you were **expecting the following people to contact you**, how **likely** would you be **to use your mobile phone when driving?** *Please circle one option in each line.*	Extremely unlikely	Quite unlikely	Somewhat unlikely	Neither likely or unlikely	Somewhat likely	Quite likely	Extremely likely	Not Applicable
Your **partner**?	1	2	3	4	5	6	7	N/A
Your **children**?	1	2	3	4	5	6	7	N/A
Your **parents**?	1	2	3	4	5	6	7	N/A
Other family members?	1	2	3	4	5	6	7	N/A
A **close friend**?	1	2	3	4	5	6	7	N/A
Someone in your **social network**?	1	2	3	4	5	6	7	N/A
An **acquaintance**?	1	2	3	4	5	6	7	N/A
Your **boss**?	1	2	3	4	5	6	7	N/A
A **work colleague**?	1	2	3	4	5	6	7	N/A

Question 14. EXAMPLE QUESTION AND HOW TO **ANSWER**

	Make a call?	Answer a call?	Send a text?	Read a text?
On a typical day	1 2 ***3*** 4 5 6 7	1 2 3 4 ***5*** 6 7	1 2 3 4 ***5*** 6 7	1 ***2*** 3 4 5 6 7

*Please **circle one** response in **each column** as shown above*

	1 Extremely unlikely	2 Quite unlikely	3 Somewhat unlikely	4 Neither likely nor unlikely	5 Somewhat likely	6 Quite likely	7 Extremely likely
When you are **driving**	**How likely** would you be to						
	Make a call?		**Answer a call?**		**Send a text?**		**Read a text?**
through a **40km/hour school zone**	1 2 3 4 5 6 7		1 2 3 4 5 6 7		1 2 3 4 5 6 7		1 2 3 4 5 6 7
on a **50km/hour road**	1 2 3 4 5 6 7		1 2 3 4 5 6 7		1 2 3 4 5 6 7		1 2 3 4 5 6 7
on an **60km/hour minor road** (one lane each direction)	1 2 3 4 5 6 7		1 2 3 4 5 6 7		1 2 3 4 5 6 7		1 2 3 4 5 6 7
on a **60km/hour major road** (more than one lane each direction)	1 2 3 4 5 6 7		1 2 3 4 5 6 7		1 2 3 4 5 6 7		1 2 3 4 5 6 7
on a **100km/hour single-lane highway** (one lane each direction)	1 2 3 4 5 6 7		1 2 3 4 5 6 7		1 2 3 4 5 6 7		1 2 3 4 5 6 7
on a **100km/hour multi-lane highway**	1 2 3 4 5 6 7		1 2 3 4 5 6 7		1 2 3 4 5 6 7		1 2 3 4 5 6 7
on a **familiar road**	1 2 3 4 5 6 7		1 2 3 4 5 6 7		1 2 3 4 5 6 7		1 2 3 4 5 6 7
on an **unfamiliar road**	1 2 3 4 5 6 7		1 2 3 4 5 6 7		1 2 3 4 5 6 7		1 2 3 4 5 6 7
on a **straight road**	1 2 3 4 5 6 7		1 2 3 4 5 6 7		1 2 3 4 5 6 7		1 2 3 4 5 6 7
on **a windy road**	1 2 3 4 5 6 7		1 2 3 4 5 6 7		1 2 3 4 5 6 7		1 2 3 4 5 6 7
and **changing lanes**	1 2 3 4 5 6 7		1 2 3 4 5 6 7		1 2 3 4 5 6 7		1 2 3 4 5 6 7
in **merging traffic**	1 2 3 4 5 6 7		1 2 3 4 5 6 7		1 2 3 4 5 6 7		1 2 3 4 5 6 7
approaching a **roundabout**	1 2 3 4 5 6 7		1 2 3 4 5 6 7		1 2 3 4 5 6 7		1 2 3 4 5 6 7
and are waiting at **traffic lights**	1 2 3 4 5 6 7		1 2 3 4 5 6 7		1 2 3 4 5 6 7		1 2 3 4 5 6 7
in **peak hour traffic**	1 2 3 4 5 6 7		1 2 3 4 5 6 7		1 2 3 4 5 6 7		1 2 3 4 5 6 7
and are stuck in a **traffic jam**	1 2 3 4 5 6 7		1 2 3 4 5 6 7		1 2 3 4 5 6 7		1 2 3 4 5 6 7
in **dry weather**	1 2 3 4 5 6 7		1 2 3 4 5 6 7		1 2 3 4 5 6 7		1 2 3 4 5 6 7
in **wet weather**	1 2 3 4 5 6 7		1 2 3 4 5 6 7		1 2 3 4 5 6 7		1 2 3 4 5 6 7
during the **day**	1 2 3 4 5 6 7		1 2 3 4 5 6 7		1 2 3 4 5 6 7		1 2 3 4 5 6 7

at **night**	1 2 3 4 5 6 7	1 2 3 4 5 6 7	1 2 3 4 5 6 7	1 2 3 4 5 6 7
during **work time**	1 2 3 4 5 6 7	1 2 3 4 5 6 7	1 2 3 4 5 6 7	1 2 3 4 5 6 7
during **non-work time**	1 2 3 4 5 6 7	1 2 3 4 5 6 7	1 2 3 4 5 6 7	1 2 3 4 5 6 7
when **running late** for an appointment/work	1 2 3 4 5 6 7	1 2 3 4 5 6 7	1 2 3 4 5 6 7	1 2 3 4 5 6 7
when **alone**	1 2 3 4 5 6 7	1 2 3 4 5 6 7	1 2 3 4 5 6 7	1 2 3 4 5 6 7
with passengers in the car	1 2 3 4 5 6 7	1 2 3 4 5 6 7	1 2 3 4 5 6 7	1 2 3 4 5 6 7

Demographic Information

Please tell us about yourself. The information will not be used for identification purposes but will help ***describe the characteristics*** of people who completed these questionnaires.

1. **Gender**	☐ Male ☐ Female

2. **Age**	_____ years

3. What is your **current relationship status**? *Please tick one option.*

☐ Single	☐ Dating	☐ Married	☐ De-facto	☐ Divorced	☐ Widowed

4. What is the **highest level of education** you have **completed**? *Please tick one option.*

☐ Grade 10	☐ Grade 12	☐ Diploma/Trade Certificate
☐ Undergraduate degree	☐ Post-graduate degree	☐ Other _____

5. Which best describes your **current work status**? *Please tick all relevant boxes.*

☐ Full-time employment	☐ Full-time student	☐ Part-time employment
☐ Unemployed	☐ Home duties	☐ Retired

5a. If you are currently **working** - Which best describes your **occupation**? *Please tick one option.*

☐ Hospitality	☐ Retail/ Sales	☐ Office/clerical	☐ Trade
☐ Management	☐ Professional	☐ Other _____	

6. What is your **average weekly income**, after tax?	$_____

Thank you for completing this survey. Your assistance is greatly appreciated.

APPENDIX B: STUDY ONE BELIEF TABLES

Table B1: Behavioural Beliefs for Using a Mobile Phone While Driving

	Advantages	Frequency	Disadvantages	Frequency
Calls	Using time effectively	15	Being distracted from driving	22
	Continue doing business	9	Less concentration	16
	Convenience	9	Dangerous	16
	Receiving information	7	Risk of accident/injury	7
	Receiving assistance in an emergency	6	Being caught and fined by police	4
Text messages	None	15	Being distracted from driving	15
	Convenience	10	Eyes off road	11
	Using time effectively	6	Less concentration	9
	Receiving information	6	Risk of accident/injury	8

Table B2: Normative Beliefs for Using a Mobile Phone While Driving

	Approve	Frequency	Disapprove	Frequency
Calls	No-one	18	Police	17
	Work/employers	9	Everyone	14
	Friends	5	Family	9
			Parents	8
			Friends	5
			Other drivers	5
Text messages	No-one	22	Police	22
	Friends	6	Family	11
	Young people	5	Everyone	9
			Parents	8
			Friends	7
			Other drivers	7

Table B3: Control Beliefs for Using a Mobile Phone While Driving

	Encourage	Frequency	Prevent	Frequency
Calls	Hands-free kit	27	Fines/punishment	14
	Easy driving conditions (e.g., slow traffic/red lights)	8	Risk of accident/injury	13
	Emergency/urgent news	7	Heavy traffic	9
	Speaker on phone	5	Demanding driving conditions (e.g., wet road)	9
			No hands-free kit	8
			Police presence	7
Text messages	Hands-free kit	9	Fines/punishment	10
	Easy driving conditions (e.g., slow traffic/red lights)	6	Risk of accident/injury	9
	Emergency/Urgent news	5	Demanding driving conditions (e.g., wet road)	7
			Police presence	5
			Heavy traffic	4

APPENDIX C: STUDY TWO QUESTIONNAIRE

Participant information form

Psychosocial factors influencing mobile phone use when driving.

Principal researcher Mrs Shari Walsh, PhD Scholar, School of Psychology and Counselling

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Associate researcher Dr Katherine White, School of Psychology and Counselling

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Description
The purpose of this project is to improve understanding of psychological factors influencing mobile phone use by Australian drivers. The research team requests your assistance in providing information about your mobile phone use. To thank you for your participation, you will receive a $10 cash incentive.
Voluntary Participation
Your participation will involve completion of a questionnaire. Participation is expected to take approximately 10 minutes. All participation in this project is voluntary. If you do agree to participate, you can withdraw from participation at any time during the project without comment or penalty. Your decision to participate will in no way impact upon your current or future relationship with QUT.
Confidentiality
All comments and responses are anonymous and will be treated confidentially. The names of individual persons are not required in any of the responses and no identifying data will be collected. The research team will be the only personnel with access to the completed questionnaires which will be stored in a secure location. All responses will be analysed and reported in the aggregate form so that no single participant is identifiable.
Expected benefits
It is expected that this project will not benefit you directly. However, it may improve understanding of how to promote appropriate mobile phone use.
Risks
There are no known risks associated with your participation in this project.
Questions / further information
Please contact the researchers if you require further information about the project, or to have any questions answered.
Concerns / complaints
Please contact the Research Ethics Officer on 3138 2340 or ethicscontact@qut.edu.au if you have any concerns or complaints about the ethical conduct of the project.
Informed consent
Completion and return of the questionnaire will be accepted as informed consent to participate.

PART I

1. Approximately, how **long** have you held a **drivers licence?** (Please **tick one** option).

Less than 1 year | 1 – 2 years | 2 – 5 years | ☐ 6 – 10 years | ☐ More than 10 years

2. What **type of drivers licence** do you hold? ☐ Provisional ☐ Open

3. Approximately how many **hours of driving in total** do you do **each week**? _____ hours per week

4. On average, how much of your **driving** is for **business or personal purposes**? (Please **circle one** option).

1	2	3	4	5	6	7
All business			Approximately equal			All personal

5. **On average**, Please **write one number** in **each row**.

How many **calls** would you **make** on your mobile phone **each day**? _____ or **each week**? _____

How many **calls** would you **receive** on your mobile phone **each day**? _____ or **each week**? _____

How many **SMS** would you **send** on your mobile phone **each day**? _____ or **each week**? _____

How many **SMS** would **receive** on your mobile phone **each day**? _____ or **each week**? _____

6. **On average**, how much do you **use your mobile phone** for **business or personal purposes**? (Please **circle one** option).

1	2	3	4	5	6	7
All business			Approximately equal			All personal

7. In the car you drive most regularly, do you have a **hands-free mobile** unit? (Please **tick one** option)

☐ Yes Please answer below ☐ No Please turn over page

7a **IF YES**, how often do you **use** a **hands-free unit in comparison to a hand held mobile** while driving? (Please **circle one** option).

Hands-free mobile	1	2	3	4	5	6	7	**Hand held mobile**
	All the time			Half the time			All the time	

8. How **often** do you do the following on your mobile phone **while driving**? Please **circle one** option in each line	More than once a day	Daily	1 or 2 times a week	1 or 2 times a month	1 or 2 times in six months	Once a year	Never
Use a mobile phone for any purpose (*send or receive text messages, answer or make a call*)…	1	2	3	4	5	6	7
Send a **text** message……..	1	2	3	4	5	6	7
Read a **text** message……..	1	2	3	4	5	6	7
Make a mobile **phone call**.....	1	2	3	4	5	6	7
Answer a mobile phone **call**.....	1	2	3	4	5	6	7

The following set of questions relate to your general mobile phone use

9. How much do you agree with the following statements in relation to your mobile phone use? Please **circle one** option in each line	Strongly disagree	Disagree	Somewhat Disagree	Neither agree nor disagree	Somewhat agree	Agree	Strongly Agree
I interrupt whatever else I am doing when I am contacted on my mobile phone.	1	2	3	4	5	6	7
I often use my mobile phone for no particular reason.....	1	2	3	4	5	6	7
I feel connected to others when I am using my mobile phone.....	1	2	3	4	5	6	7
Arguments have arisen with others because of my mobile phone use.....	1	2	3	4	5	6	7
I lose track of how much I am using my mobile phone.....	1	2	3	4	5	6	7
I often think about my mobile phone when I am not using it.....	1	2	3	4	5	6	7
I hide how much I use my mobile phone from those people closest to me.....	1	2	3	4	5	6	7
I am concerned that I rely too much on my mobile phone.....	1	2	3	4	5	6	7
I have been unable to reduce my mobile phone use.....	1	2	3	4	5	6	7
I keep checking my mobile phone for messages or calls……	1	2	3	4	5	6	7
I feel anxious when I am unable to use my mobile phone……..	1	2	3	4	5	6	7
I find it hard to control how much I use my mobile phone to contact others.....	1	2	3	4	5	6	7
The thought of being without my mobile phone makes me feel distressed…….	1	2	3	4	5	6	7
I get excited when I hear my mobile phone ring/ receive a text message……..	1	2	3	4	5	6	7
I use my mobile phone at increasingly higher levels.....	1	2	3	4	5	6	7

PART II: This section relates to **using a mobile phone** (to make or answer calls, send or read text messages) **while driving** in the next week.

1. How **likely** is it that your **using a mobile phone while driving** in the next week would **result** in the following? Please **circle one** option in each line	Extremely unlikely	Quite unlikely	Slightly unlikely	Neither likely nor unlikely	Slightly likely	Quite likely	Extremely likely
Using time effectively	1	2	3	4	5	6	7
Being distracted from driving	1	2	3	4	5	6	7
Being involved in a crash	1	2	3	4	5	6	7
Receiving information (e.g., directions, important news)	1	2	3	4	5	6	7
Receiving assistance in an emergency	1	2	3	4	5	6	7
Being caught and fined by the police	1	2	3	4	5	6	7

2. **How likely is it that the following** people or groups of people **would** approve **of your** using a mobile phone while driving **in the next week?** Please **circle one** option in each line	Extremely unlikely	Quite unlikely	Slightly unlikely	Neither likely nor unlikely	Slightly likely	Quite likely	Extremely likely
Friends	1	2	3	4	5	6	7
Family members	1	2	3	4	5	6	7
Partner/boyfriend/girlfriend	1	2	3	4	5	6	7
Work colleagues	1	2	3	4	5	6	7
Other drivers	1	2	3	4	5	6	7
Police	1	2	3	4	5	6	7

3. How likely are the following factors to **prevent** you from **using a mobile phone while driving** in the next week? Please **circle one** option in each line	Extremely unlikely	Quite unlikely	Slightly unlikely	Neither likely nor unlikely	Slightly likely	Quite likely	Extremely likely
Risk of fines	1	2	3	4	5	6	7
Demanding driving conditions (e.g., weather, changing lanes)	1	2	3	4	5	6	7
Risk of an accident	1	2	3	4	5	6	7
Police presence	1	2	3	4	5	6	7
Lack of hands-free kit	1	2	3	4	5	6	7
Heavy traffic	1	2	3	4	5	6	7

4. If you were driving in the next week, do you **agree** that? Please **circle one** option in each line	Extremely unlikely	Quite unlikely	Slightly unlikely	Neither likely nor unlikely	Slightly likely	Quite likely	Extremely likely
It is **likely** that **I will use my mobile phone** while driving.....	1	2	3	4	5	6	7
Using my mobile phone while driving would be **good**.....	1	2	3	4	5	6	7
Those **people who are important to me** would **want** me to use my mobile phone while driving.....	1	2	3	4	5	6	7
I have **complete control** over whether I use my mobile phone while driving.....	1	2	3	4	5	6	7

PART III

Scenario	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...

1. You are driving at **100 km per hour** and are **running late.** In this situation, **to what extent do you agree** that it is **likely you would**: Please **circle one** option in each line	Strongly disagree	Disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Agree	Strongly agree
Use your mobile phone.....	1	2	3	4	5	6	7
Think using your mobile phone would be **good**.....	1	2	3	4	5	6	7
Think that those **people who are important to you** would **want** you to use your mobile phone	1	2	3	4	5	6	7
Have **complete control** over whether you use your mobile phone.....	1	2	3	4	5	6	7
Have a crash if you use your mobile phone.....	1	2	3	4	5	6	7
Be **caught and fined** by the police if you use your mobile phone.....	1	2	3	4	5	6	7
Make a call.....	1	2	3	4	5	6	7
Answer a call.....	1	2	3	4	5	6	7
Send a text	1	2	3	4	5	6	7
Read a text.....	1	2	3	4	5	6	7

2. You are driving at **100 km per hour** and are **not in a hurry.** In this situation, **to what extent do you agree** that it is **likely you would**: Please **circle one** option in each line	Strongly disagree	Disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Agree	Strongly agree
Use your mobile phone…….....	1	2	3	4	5	6	7
Think using your mobile phone would be **good**……	1	2	3	4	5	6	7
Think that those **people who are important to you** would **want** you to use your mobile phone .....……	1	2	3	4	5	6	7
Have **complete control** over whether you use your mobile phone…..……	1	2	3	4	5	6	7
Have a crash if you use your mobile phone…….....	1	2	3	4	5	6	7
Be **caught and fined** by the police if you use your mobile phone.....	1	2	3	4	5	6	7
Make a call…….....……	1	2	3	4	5	6	7
Answer a call…….....	1	2	3	4	5	6	7
Send a text …….....……	1	2	3	4	5	6	7
Read a text.....	1	2	3	4	5	6	7

Scenario	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...

3. You are **waiting at traffic lights** and are **running late.** In this situation, **to what extent do you agree** that it is **likely you would**: Please **circle one** option in each line	**Strongly disagree**	**Disagree**	**Somewhat disagree**	**Neither agree nor disagree**	**Somewhat agree**	**Agree**	**Strongly agree**
Use your mobile phone.....	1	2	3	4	5	6	7
Think using your mobile phone would be **good**.....	1	2	3	4	5	6	7
Think that those **people who are important to you** would **want**	1	2	3	4	5	6	7
Have **complete control** over whether you use your mobile	1	2	3	4	5	6	7
Have a crash if you use your mobile phone.....	1	2	3	4	5	6	7
Be **caught and fined** by the police if you use your mobile	1	2	3	4	5	6	7
Make a call.....	1	2	3	4	5	6	7
Answer a call.....	1	2	3	4	5	6	7
Send a text	1	2	3	4	5	6	7
Read a text.....	1	2	3	4	5	6	7

4. You are **waiting at traffic lights** and are **not in a hurry.** In this situation, **to what extent do you agree** that it is **likely you would**: Please **circle one** option in each line	**Strongly disagree**	**Disagree**	**Somewhat disagree**	**Neither agree nor disagree**	**Somewhat agree**	**Agree**	**Strongly agree**
Use your mobile phone.....	1	2	3	4	5	6	7
Think using your mobile phone would be **good**.....	1	2	3	4	5	6	7
Think that those **people who are important to you** would **want**	1	2	3	4	5	6	7
Have **complete control** over whether you use your mobile	1	2	3	4	5	6	7
Have a crash if you use your mobile phone.....	1	2	3	4	5	6	7
Be **caught and fined** by the police if you use your mobile	1	2	3	4	5	6	7
Make a call.....	1	2	3	4	5	6	7
Answer a call.....	1	2	3	4	5	6	7
Send a text	1	2	3	4	5	6	7
Read a text.....	1	2	3	4	5	6	7

PART IV

Demographic Information

Please tell us about yourself. The information will not be used for identification purposes but will help **describe the characteristics** of people who completed these questionnaires.

1. **Gender** (Please **tick one** option)	2. **Age**
☐ Male ☐ Female	_____ years

3. What is your **current relationship status**? (Please **tick one** option).
☐ Single ☐ Dating ☐ Married/De-facto ☐ Separated/Divorced ☐ Widowed

4. What is the **highest level of education** you have **completed**? (Please **tick one** option).
☐ Grade 10 ☐ Grade 12 ☐ Diploma/Trade Certificate ☐ University degree

5. Which best describes your **current work status**? (Please **tick all relevant** boxes).		
☐ Full-time employment	☐ Full-time student	☐ Part-time employment
☐ Self-employed	☐ Unemployed	☐ Not in the workforce

6. If you work, does your **employer** have a **policy restricting mobile phone use** while driving? (Please **tick one** option).
☐ Yes ☐ No ☐ N/A

7. If no, does your **employer provide** a **hands-free mobile** unit? (Please **tick one** option).
☐ Yes ☐ No ☐ N/A

Thank you for completing this survey. Your assistance is greatly appreciated.

APPENDIX D: ADDITIONAL ANALYSES EXCLUDING PARTICIPANTS WHO OWN AND USE A HANDS-FREE MOBILE PHONE KIT ALL THE TIME

Regression Analysis Predicting Intention to Use a Mobile Phone While Driving

Table D1: Descriptive Analysis of Participant Characteristics and Intentions to Use a Mobile Phone While Driving: Means, Standard Deviations, and Bivariate Correlations

Variable	M	SD	1	2	3	4	5	6	7
1. Gender	-	-							
2. Age	35.91	14.69	-.01						
3. Driving purpose	4.47	1.80	.30***	.05					
4. Attitude	2.62	1.86	-.23***	-.27***	-.27***				
5. Subjective norm	2.27	1.71	-.21***	-.18***	-.21***	.62***			
6. Perceived behavioural control	4.63	2.38	-.09	-.12	-.10	.21***	.27***		
7. Intention	3.81	2.37	-.21***	-.29***	-.30***	.65***	.50***	.25***	

*** $p < .001$

Table D2: Regression Analysis Using Participant Characteristics and the Theory of Planned Behaviour to Predict Intentions to Use a Mobile Phone While Driving

Variable		B	β[a]	R^2	ΔR^2
Step 1	Gender	-.19	-.04	.19	.19***
	Age	**-.02**	**-.13*** **		
	Driving purpose	**-.16**	**-.13*** **		
Step 2	**Attitude**	**.59**	**.47*** **	.47	.29***
	Subjective norm	**.18**	**.13†**		
	Perceived behavioural control	.08	.08		

*** $p < .001$ † $p = .001$

Step 2 $F(6, 614) = 91.91$, $p < .001$

[a] Beta weights are reported at the final step of the analyses

Note. Bolding indicates a variable is a significant predictor of intention

Regression Analyses Predicting Intention to Use a Mobile Phone While Driving for Each Scenario

Table D3: Means and Standard Deviations for TPB Items and Risk Items Across Four Scenarios

	Scenario 1		*Scenario 2*		*Scenario 3*		*Scenario 4*	
	M	**SD**	**M**	**SD**	**M**	**SD**	**M**	**SD**
Intention to use a mobile phone while driving	3.15	2.13	3.20	2.15	3.99	2.15	3.85	2.15
Intention to make or answer a call while driving	3.38	2.05	3.45	2.01	4.01	2.09	3.90	2.05
Intention to send or read a text message while driving	2.69	1.94	2.80	1.95	3.29	2.06	3.36	2.07
Attitude	2.52	1.83	2.54	1.79	3.26	1.96	3.12	1.91
Subjective norm	2.46	1.77	2.39	1.68	2.86	1.84	2.76	1.76
Perceived behavioural control	4.73	2.29	4.88	2.23	5.05	2.06	5.16	2.04
Likelihood of having a crash	4.07	2.08	3.86	2.04	3.65	2.07	3.52	2.05
Likelihood of being caught and fined	4.25	2.11	4.15	2.08	4.24	2.06	4.21	2.08

Note. Scaled from 1 = *extremely unlikely* to 7 = *extremely likely*.

Table D4: Descriptive Analysis of Intentions to Use a Mobile Phone While Driving at 100km/h and Running Late – Scenario 1: Bivariate Correlations

Scenario 1 variables	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**
1. Gender									
2. Age	-.01								
3. Driving purpose	.30***	.05							
4. Attitude	-.23***	-.22***	-.18***						
5. Subjective norm	-.22***	-.13	-.23***	.69***					
6. Perceived behavioural control	-.01	.02	-.09	.19***	.19***				
7. Likelihood of having a crash	.17***	.02	.15***	-.22***	-.17***	.11			
8. Likelihood of being caught and fined	.14***	.11	.07	-.14***	-.07	.18***	.63***		
9. Intention	-.20***	-.25***	-.25***	.74***	.58***	.19***	-.20***	-.10	

*** $p < .001$

Table D5: Hierarchical Regression Analysis Predicting Intention to Use a Mobile Phone While Driving at 100km/h and Running Late – Scenario 1

Scenario 1 Variables		B	β[a]	R²	Δ R²
Step 1	Gender	.01	.00	.14	.14***
	Age	**-.02**	**-.11*** **		
	Driving purpose	**-.12**	**-.10*** **		
Step 2	**Attitude**	**.70**	**.60*** **	.58	.44***
	Subjective norm	.14	.11		
	Perceived behavioural control	.05	.05		
Step 3	Likelihood of having a crash	-.07	-.07	.58	.00
	Likelihood of being caught and fined	.05	.05		

*** $p < .001$

Step 3 $F(8, 607) = 105.65$, $p < .001$

[a] Beta weights are reported at the final step of the analyses

Note. Bolding indicates a variable is a significant predictor of intention

Table D6: Descriptive Analysis of Intentions to Use a Mobile Phone While Driving at 100km/h and Not in a Hurry – Scenario 2: Bivariate Correlations

Scenario 2 variables	1	2	3	4	5	6	7	8	9
1. Gender									
2. Age	-.01								
3. Driving purpose	.30***	.05							
4. Attitude	-.24***	-.28***	-.24***						
5. Subjective norm	-.27***	-.18***	-.25***	.72***					
6. Perceived behavioural control	.02	-.04	-.11	.16***	.17***				
7. Likelihood of having a crash	.18***	.02	.15***	-.24***	-.19***	.07			
8. Likelihood of being caught and fined	.13†	.11	.06	-.14***	-.09	.12	.64***		
9. Intention	-.25***	-.28***	-.31***	.78***	.62***	.18***	-.24***	-.14***	

*** $p < .001$ † $p = .001$

Table D7: Hierarchical Regression Analysis Predicting Intention to Use a Mobile Phone While Driving at 100km/h and Not in a Hurry – Scenario 2

Scenario 2 Variables		B	β[a]	R²	Δ R²
Step 1	Gender	-.20	-.05	.20	.20***
	Age	-.01	-.07		
	Driving purpose	**-.13**	**-.11*** **		
Step 2	**Attitude**	**79**	**.66*** **	.65	.45***
	Subjective norm	.09	.07		
	Perceived behavioural control	.06	.06		
Step 3	Likelihood of having a crash	-.03	-.03	.65	.00
	Likelihood of being caught and fined	-.01	-.01		

*** $p < .001$

Step 3 $F(8, 600) = 139.32$, $p < .001$

[a] Beta weights are reported at the final step of the analyses

Note. Bolding indicates a variable is a significant predictor of intention

Table D8: Descriptive Analysis of Intentions to Use a Mobile Phone While Waiting at Traffic Lights and Running Late – Scenario 3: Bivariate Correlations

Scenario 3 variables	1	2	3	4	5	6	7	8	9
1. Gender									
2. Age	-.01								
3. Driving purpose	.30***	.05							
4. Attitude	-.12	-.20***	-.13†						
5. Subjective norm	-.20***	-.10	-.20***	.69***					
6. Perceived behavioural control	.01	.02	-.06	.19***	.22***				
7. Likelihood of having a crash	.15***	.08	.09	-.20***	-.16***	.02			
8. Likelihood of being caught and fined	.12***	.10	.02	-.10	-.05	.11	.66***		
9. Intention	-.11	-.24***	-.16***	.70***	.54***	.23***	-.19***	-.06	

*** $p < .001$ † $p = .001$

Table D9: Hierarchical Regression Analysis Predicting Intention to Use a Mobile Phone While Waiting at Traffic Lights and Running Late – Scenario 3

Scenario 3 Variables		B	β[a]	R^2	Δ R^2
Step 1	Gender	.01	.00	.08	.08***
	Age	**-.02**	**-.11*** **		
	Driving purpose	-.06	-.05		
Step 2	**Attitude**	**.65**	**.59*** **	.52	.44***
	Subjective norm	.10	.08		
	Perceived behavioural control	**.10**	**.09†**		
Step 3	Likelihood of having a crash	-.10	-.09	.52	.01
	Likelihood of being caught and fined by the police	.07	.07		

*** $p < .001$ † $p = .001$

Step 3 $F(8, 606) = 84.75$, $p < .001$

[a] Beta weights are reported at the final step of the analyses

Note. Bolding indicates a variable is a significant predictor of intention

Table D10: Descriptive Analysis of Intentions to Use a Mobile Phone While Waiting at Traffic Lights and Not in a Hurry – Scenario 4: Bivariate Correlations

Scenario 4 variables	1	2	3	4	5	6	7	8	9
1. Gender									
2. Age	-.01								
3. Driving purpose	.30***	.05							
4. Attitude	-.17***	-.25***	-.15***						
5. Subjective norm	-.24***	-.18***	-.19***	.75***					
6. Perceived behavioural control	.01	-.01	-.07	.19***	.21***				
7. Likelihood of having a crash	.16***	.13†	.10	-.18***	-.18***	.02			
8. Likelihood of being caught and fined	.14***	.12	.05	-.07	-.09	.13†	.63***		
9. Intention	-.17***	-.30***	-.19***	.74***	.58***	.19***	-.18***	-.04	

*** $p < .001$ † $p = .001$

Table D11: Hierarchical Regression Analysis Predicting Intention to Use a Mobile Phone While Waiting at Traffic Lights and Not in a Hurry – Scenario 4

Scenario 4 Variables		B	β[a]	R²	Δ R²
Step 1	Gender	-.14	-.03	.14	.14***
	Age	**-.02**	**-.13*** **		
	Driving purpose	-.07	-.06		
Step 2	**Attitude**	**.72**	**.64*** **	.57	.43***
	Subjective norm	.06	.05		
	Perceived behavioural control	.06	.06		
Step 3	Likelihood of having a crash	-.05	-.04	.57	.00
	Likelihood of being caught and fined by the police	.05	.05		

*** $p < .001$

Step 3 $F(8, 601) = 101.50$, $p < .001$

[a] Beta weights are reported at the final step of the analyses

Note. Bolding indicates a variable is a significant predictor of intention

Regression Analyses Predicting Intention to Call and Text Message While Driving for Each Scenario

Table D12: Bivariate Correlations between Intentions to Call while Driving and the TPB Predictors and Risk Items for each Scenario

	Scenario 1 Intention to Call	*Scenario 2* Intention to Call	*Scenario 3* Intention to Call	*Scenario 4* Intention to Call
Gender	-.20***	-.20***	-.15***	-.19***
Age	-.22***	-.25***	-.22***	-.21***
Driving Purpose	-.26***	-.27***	-.20***	-.23***
Attitude	.66***	.68***	.63***	.65***
Subjective norm	.56***	.55***	.55***	.57***
Perceived behavioural control	.20***	.23***	.21***	.23***
Likelihood of having a crash	-.20***	-.18***	-.19***	-.18***
Likelihood of being caught and fined	-.05	-.04	-.05	-.06

*** $p < .001$

Table D13: Hierarchical Regression Analyses Predicting Intention to Make or Answer a Call While Driving for Each Scenario

	Scenario Variables – Intention to call	B	β[a]	R^2	Δ R^2
Scenario One: 100km/h, running late					
Step 1	Gender	-.01	-.00	.13	.13***
	Age	**-.01**	**-.10†**		
	Driving purpose	**-.13**	**-.11*** **		
Step 2	**Attitude**	**.54**	**.49*** **	.50	.37***
	Subjective norm	**.20**	**.17*** **		
	Perceived behavioural control	.06	.07		
Step 3	Likelihood of having a crash	-.10	-.10	.50	.01
	Likelihood of being caught and fined by police	.08	.08		
Scenario Two: 100km/h, not in a hurry					
Step 1	Gender	-.05	-.01	.15	.15***
	Age	-.01	-.08		
	Driving purpose	-.09	-.09		
Step 2	**Attitude**	**.62**	**.56*** **	.52	.37***
	Subjective norm	.11	.09		
	Perceived behavioural control	**.11**	**.12*** **		
Step 3	Likelihood of having a crash	-.07	-.07	.52	.00
	Likelihood of being caught and fined by police	.08	.08		
Scenario Three: Waiting at traffic lights, running late					
Step 1	Gender	-.09	-.02	.09	.09***
	Age	**-.02**	**-.11*** **		
	Driving purpose	-.09	-.07		
Step 2	**Attitude**	**.48**	**.45*** **	.47	.38***
	Subjective norm	**.23**	**.20*** **		
	Perceived behavioural control	**.09**	**.09*** **		
Step 3	Likelihood of having a crash	-.08	-.08	.48	.00
	Likelihood of being caught and fined by police	.07	.06		
Scenario Four: Waiting at traffic lights, not in a hurry					
Step 1	Gender	-.09	-.02	.12	.12***
	Age	-.01	-.07		
	Driving purpose	**-.12**	**-.11†**		
Step 2	**Attitude**	**.50**	**.47*** **	.48	.36***
	Subjective norm	**.18**	**.16†**		
	Perceived behavioural control	**.11**	**.11*** **		
Step 3	Likelihood of having a crash	-.04	-.04	.48	.00
	Likelihood of being caught and fined by police	.02	.02		

*** $p < .001$ † $p = .001$ *Note*. Bolding indicates a variable is a significant predictor of intention

[a] Beta weights are reported at the final step of the analyses

Scenario 1 Step 3 $F(8, 607) = 76.36$, $p < .001$ Scenario 2 Step 3 $F(8, 601) = 80.97$, $p < .001$
Scenario 3 Step 3 $F(8, 606) = 68.83$, $p < .001$ Scenario 4 Step 3 $F(8, 600) = 69.64$, $p < .001$

Table D14: Bivariate Correlations between Intentions to Text while Driving and the TPB Predictors and Risk Items for each Scenario

	Scenario 1 Intention to Text	*Scenario 2* Intention to Text	*Scenario 3* Intention to Text	*Scenario 4* Intention to Text
Gender	-.10	-.09	-.03	-.05
Age	-.35***	-.39***	-.40***	-.41***
Driving Purpose	-.10	-.11	-.03	-.06
Attitude	.52***	.57***	.46***	.53***
Subjective norm	.44***	.45***	.36***	.39***
Perceived behavioural control	.11	.10	.10	.13***
Likelihood of having a crash	-.11	-.10	-.09	-.06
Likelihood of being caught and fined	-.05	-.03	.00	.00

*** $p < .001$

Table D15 : Hierarchical Regression Analysis Predicting Intention to Send or Read a Text Message While Driving for Each Scenario

	Scenario Variables – Intention to text	B	β[a]	R²	Δ R²
Scenario One: 100km/h, running late					
Step 1	Gender	.06	.01	.14	.14***
	Age	**-.04**	**-.28*** **		
	Driving purpose	.02	.02		
Step 2	**Attitude**	**.37**	**.35*** **	.35	.21***
	Subjective norm	**.18**	**.17*** **		
	Perceived behavioural control	.01	.01		
Step 3	Likelihood of having a crash	-.03	-.04	.35	.00
	Likelihood of being caught and fined by police	.06	.06		
Scenario Two: 100km/h, not in a hurry					
Step 1	Gender	.10	.03	.17	.17***
	Age	**-.03**	**-.26*** **		
	Driving purpose	.04	.03		
Step 2	**Attitude**	**.50**	**.46*** **	.40	.23***
	Subjective norm	.10	.09		
	Perceived behavioural control	.00	.00		
Step 3	Likelihood of having a crash	-.02	-.02	.40	.00
	Likelihood of being caught and fined by police	.07	.08		
Scenario Three: Waiting at traffic lights, running late					
Step 1	Gender	.06	.02	.17	.17***
	Age	**-.05**	**-.35*** **		
	Driving purpose	.06	.05		
Step 2	**Attitude**	**.35**	**.34*** **	.32	.15***
	Subjective norm	.10	.09		
	Perceived behavioural control	.02	.02		
Step 3	Likelihood of having a crash	-.05	-.05	.33	.01***
	Likelihood of being caught and fined by police	.11	.10		
Scenario Four: Waiting at traffic lights, not in a hurry					
Step 1	Gender	.04	.01	.19	.19***
	Age	**-.05**	**-.32*** **		
	Driving purpose	.02	.02		
Step 2	**Attitude**	**.49**	**.46*** **	.37	.19***
	Subjective norm	-.01	-.01		
	Perceived behavioural control	.05	.05		
Step 3	Likelihood of having a crash	.04	.04	.38	.00
	Likelihood of being caught and fined by police	.03	.03		

*** $p < .001$ *Note. Bolding indicates a variable is a significant predictor of intention*

[a] Beta weights are reported at the final step of the analyses

Scenario 1 Step 3 $F(8, 607) = 41.60$, $p < .001$ Scenario 2 Step 3 $F(8, 601) = 49.94$, $p < .001$
Scenario 3 Step 3 $F(8, 606) = 36.84$, $p < .001$ Scenario 4 Step 3 $F(8, 600) = 45.46$, $p < .001$

APPENDIX E: BELIEF DIFFERENCES: MOBILE PHONE HANDSET, AGE, AND DRIVING PURPOSE

Differences in Beliefs According to Mobile Phone Handset : Hands-free and Hand-held Mobile Phone Owners

As stated earlier, results indicated that participants perceived that using a mobile phone while driving related primarily to calling rather than text messaging behaviours. Voice calling while driving can be done on a hands-free mobile phone, a legal behaviour, whilst text messaging while driving requires holding a mobile phone while driving, an illegal behaviour. Both forms of mobile phone use while driving, however, present a safety risk. As a large proportion of mobile phone use while driving is conducted on hand-held mobile phones, analyses were conducted to assess whether drivers with and without hands-free kits differed in their intention to use their mobile phone while driving and in their behavioural, normative and control beliefs regarding mobile phone use while driving.

Overall, participants who owned a hands-free kit had stronger intentions (M = 5.22; SD = 2.18) than those who owned a hand-held mobile (M = 3.43; SD = 2.33) to use a mobile phone while driving. To determine where these differences in intentions may lie within each group, separate MANOVA analyses were conducted firstly to identify the differences in beliefs of participants owning a hands-free kit with strong and weak intentions to use a mobile phone while driving; and secondly to identify the differences in beliefs of participants owning a hand-held mobile who have strong and weak intentions to use a mobile phone while driving. For participants who owned a hands-free mobile phone kit, there were significant multivariate effects found for behavioural, $F(6, 265) = 6.16$, $p < .001$; and control beliefs, $F(6, 269) = 6.03$, $p < .001$; but not for normative beliefs, $F(6, 267) = 3.25$, $p = .004$. For participants who owned a hand-held mobile, significant multivariate effects were obtained for behavioural, $F(6, 481) = 35.17$, $p < .001$; normative, $F(6, 486) = 17.91$, $p < .001$; and control beliefs, $F(6, 486) = 12.48$, $p < .001$.

Examination of the univariate effects (see Table E1) revealed that, within each group, participants owning a hands-free mobile phone kit with strong and weak intentions to use a mobile phone while driving and participants owning a hand-held mobile with strong and weak intentions to use a mobile phone while driving both differed on specific behavioural, normative, and control beliefs. Participants who owned a hands-free kit but had weak intentions to use it while driving were more likely to believe that they would be involved in a crash or be caught and fined by the police, than participants who owned a hands-free kit and had strong intentions to use their mobile phone while driving. Hands-free kit owners with strong intentions to use their mobile phone while driving were more likely than participants with weak intentions to use their mobile phone while driving to believe that their family members would approve of them using a mobile phone while driving. Consistent with their belief that they would be caught and fined by police, hands-free kit owners with weak intentions to use their mobile phone while driving were more likely to see police presence as a deterrent to engaging in this behaviour compared to hands-free kit owners with strong intentions to use their mobile phone while driving.

Of the participants who owned a hand-held mobile (and not a hands-free kit), those with strong intentions to use their mobile while driving were more likely to endorse the advantages of mobile phone use such as using time effectively and receiving information and also the disadvantages such as being distracted from driving and being caught and fined by the police, compared to participants who owned a hand-held mobile with weak intentions to use their mobile phone while driving. With

the exception of police, hand-held mobile phone owners with strong intentions to use their mobile phone while driving were more likely to believe that all identified normative referents would approve of this behaviour, than participants who owned a hand-held mobile with weak intentions to use a mobile phone while driving. Finally, hand-held owners with weak intentions to use their mobile phone while driving were more likely to perceive that risk of being fined, risk of having an accident, heavy traffic, and lack of a hands-free kit would prevent them from using a mobile phone while driving, compared to participants who owned a hand-held mobile with strong intentions to use a mobile phone while driving.

Table E1: Mean Differences in Beliefs of Participants Owning a Hands-free Kit and Owning a Hand-held Mobile with Strong and Weak Intentions to Use a Mobile Phone While Driving

	Hands-free Weak Int	Hands-free Strong Int	Hand-held Weak Int	Hand-held Strong Int
Behavioural belief	*n* = 133	*n* = 139	*n* = 286	*n* = 202
Using time effectively	4.54	5.09	2.42	4.54***
Being distracted from driving	4.06	3.48	3.69	4.67***
Being involved in a crash	3.07	2.43†	3.08	3.66
Receiving information (e.g., directions, important news)	4.04	3.95	2.71	4.51***
Receiving assistance in an emergency	3.65	3.17	3.27	3.38
Being caught and fined by the police	3.07	1.83***	3.05	3.74***
Normative belief	*n* = 134	*n* = 140	*n* = 287	*n* = 206
Friends	3.84	4.39	2.40	3.95***
Family members	3.45	4.31†	2.05	3.14***
Partner/boyfriend/girlfriend	3.58	4.29	2.18	3.63***
Work colleagues	3.78	4.61	2.44	3.86***
Other drivers	3.21	3.77	2.05	3.13***
Police	2.43	3.11	1.62	2.09
Control belief	*n* = 137	*n* = 139	*n* = 289	*n* = 204
Risk of fines	4.61	4.12	5.34	4.42***
Demanding driving conditions (e.g., weather, changing lanes)	5.40	4.94	5.81	5.50
Risk of an accident	5.20	4.78	5.77	5.07***
Police presence	5.66	4.42***	5.75	5.80
Lack of hands-free kit	4.44	5.25	5.01	3.72***
Heavy traffic	4.59	4.47	5.42	4.78†

*** $p < .001$ † $p = .001$

Note. Scaled from 1 = *extremely unlikely* to 7 = *extremely likely*.

Discussion

Interestingly, strong and weak intending drivers with hands-free kits only differed on four (out of a possible 18) beliefs, whilst strong and weak intending drivers with hand-held mobiles differed on the majority of behavioural, normative and control beliefs. Separating drivers into those with hands-free kits and those without hands-free kits (hand-held mobile) allows for a better understanding of factors influencing each of these driver groups.

Behavioural Beliefs

Strong and weak intending drivers with hands-free kits were the only driver group in the study to significantly differ on whether being involved in a crash was a likely outcome of using a mobile phone while driving. Specifically, drivers with hands-free kits who reported strong intentions to use a mobile phone while driving believed they were significantly less likely to be involved in a crash than weak intenders. Additionally, strong intending drivers with a hands-free kit reported the lowest likelihood that they would be involved in a crash if they used their mobile phone while driving than any other group in the study. This result indicates that drivers with hands-free kits who have strong intentions to use a mobile phone while driving believe that using a hands-free mobile provides a relatively safe option for using a mobile phone while driving. Although there is a significant body of research finding that using a hands-free mobile is not a significantly safer option than using a hand-held mobile while driving (e.g., McCartt, Hellinga, & Bratiman, 2006; Svenson & Patten, 2005; Wiesenthal & Singhal, 2005); it appears that drivers who use a hands-free kit may not realise that using a hands-free mobile phone while driving still presents a safety risk. Thus, campaigns designed to reduce overall mobile phone use while driving could highlight research finding that both hands-free and hand-held mobile use while driving negatively impacts on driving performance and increases crash risk.

Drivers who had strong and weak intentions to use either type of handset while driving were the only groups in the study to differ on the likelihood of being caught and fined by the police if they used their mobile phone while driving. Specifically, strong intending drivers with hands-free kits reported they were significantly less likely, than weak intending drivers, to get caught and fined by the police if they used their mobile phone while driving. In contrast, strong intending drivers who did not own a hands-free kit were significantly more likely, than weak intending drivers without a hands-free kit, to report they would be fined by the police if they used a mobile phone while driving. As drivers who use a hand-held mobile while driving are performing an illegal behaviour, a higher risk of apprehension is to be expected amongst drivers who do not own hands-free kits. However, some strong intending drivers with hands-free kits reported that there was risk of apprehension possibly reflecting the fact that 50% of drivers with a hands-free kit did not use it at all times.

Drivers with hands-free kits did not significantly differ on the remaining four behavioural beliefs, whilst drivers without hands-free kits followed a similar pattern to other group comparisons in the study by differing on an additional three behavioural beliefs. Strong intending drivers with hand-held mobiles were more likely to report that using a mobile phone while driving would result in them using time effectively, receiving important information, and being distracted from driving than weak intending drivers who use a hand-held mobile phone while driving.

Strong intending drivers with hand-held mobiles reported the highest levels of agreement that using a mobile phone while driving would result in their being distracted from driving, being involved in a crash, and being caught and fined by the police, amongst any other comparison groups in the study. Thus, drivers who use hand-held mobiles while driving acknowledge the risks arising from this behaviour. However, this awareness does not stop them from intending to use a hand-held mobile phone while driving.

Drivers with hand-held mobiles who reported strong intentions to use a mobile phone while driving agreed that advantages would result from them using their mobile phone while driving. These results suggest that drivers who use hand-held mobiles while driving may try to justify the behaviour by focussing on potential positive outcomes. It may be that challenging the value of these positive outcomes could encourage drivers to rethink their behaviour. Thus, campaigns could ask whether the potential risks of using a hand-held mobile while driving outweigh potential advantages.

Normative Beliefs

In contrast to the other comparisons of normative beliefs in the study, strong and weak intending drivers with hands-free kits only significantly differed on one normative belief, perceived approval from family members. Strong intenders reported significantly more approval from family members than weak intenders. Overall, drivers with hands-free kits reported the highest levels of approval from all referent groups, apart from friends, than any other groups in the study. Thus, drivers with hands-free kits believe that the majority of people would approve of their using a hands-free mobile while driving.

In contrast, drivers with hand-held mobiles reported the lowest levels of perceived approval from referent groups in the study indicating that drivers who use a hand-held mobile phone while driving are aware of the disapproval of others. However, it was strong, rather than weak, intending drivers with hand-held mobiles who reported that more people, apart from the police, would approve of their using a mobile phone while driving. These results are similar to other normative belief comparisons throughout the study. Thus, perceptions of disapproval from other people do not prevent drivers with a strong intention to use a hand-held mobile while driving from engaging in this behaviour. Drivers with weak intention to use a hand-held mobile while driving reported significantly more disapproval than drivers with strong intention. Thus, incorporating themes of disapproval from important others may reduce the perceptions of approval amongst people with strong intentions to use their mobile phone while driving.

Control Beliefs

Strong and weak intending drivers with a hands-free kit only differed on one control factor, police presence, with weak intending drivers reporting that a police presence was significantly more likely to prevent them using a mobile phone while driving than strong intenders. This result may relate to the finding that although many drivers own a hands-free kit they do not use it all the time. No other groups in the study differed on this belief. Strong and weak intending drivers with hands-free kits did not differ on any other control beliefs, suggesting that drivers believe that having a hands-free kit overcomes the effect of external factors, such as demanding driving conditions and heavy traffic, when they are using their mobile phone while driving. Thus, drivers who use a hands-free mobile phone may need to be reminded that all mobile phone use while driving presents a significant safety risk and that driving conditions should be considered prior to using their phone.

Strong intending drivers without a hands-free kit had the lowest level of agreement, than any other group in the study, that lack of a hands-free kit would prevent them from using a mobile phone while driving. Thus, drivers with strong intentions to use a hand-held mobile while driving appear to be a distinct sub-set of drivers who will determinedly use their mobile phone while driving irrespective of the illegality of the behaviour. As such, targeted campaigns are required for this group of drivers.

As would be expected due to the illegality of the behaviour, drivers without a hands-free mobile reported that a police presence would prevent them from using a mobile phone more than any other group in the study. Interestingly, however, the belief that police presence would prevent mobile

phone use did not significantly differ between strong and weak intending drivers without a hands-free kit with both groups reporting police presence was a deterrent. Thus, a strong police presence is likely to reduce hand-held mobile phone use amongst drivers. Drivers who owned a hand-held mobile with strong intentions to use mobile phone while driving were less likely, than weak intending drivers, to believe that a risk of being fined, risk of an accident, demanding driving conditions, heavy traffic, and lack of a hands-free kit would prevent them from using a their mobile phone while driving than low intending drivers without a hands-free kit. These results suggest that drivers who own a hand-held mobile and who intend to use a mobile phone at high levels believe they control whether or not they use their mobile phone while driving. Increasing awareness of the risks associated with hand-held mobile phone use while driving may be an effective strategy to reduce this behaviour.

Additionally, strong intending drivers without a hands-free kit believed they were more likely to be caught and fined by the police than low intending drivers (behavioural beliefs), however, they were less likely to report that the risk of fines (control belief) would prevent them from using their hand-held mobile phone while driving. This contradictory finding suggests that the current fines for using a hand-held mobile while driving do not deter drivers who have a strong intention to engage in this behaviour. As weak intenders were more likely to report the risk of fines prevented them from using a hand-held mobile while driving, increasing the fines may be an effective strategy to reduce mobile phone use while driving amongst those without a hands-free kit.

Differences in Beliefs According to Age: Younger and Older Participants

Youth aged 25 years and under are the most prolific users of mobile phones in Australia (Galaxy Research, 2004) and were found to use a mobile phone while driving more than older drivers. Additionally, younger drivers are over-represented in crash statistics, possibly due to their relative driving inexperience (Catchpole, Cairney, & Macdonald, 1994). Analyses were conducted to determine whether drivers aged 17 to 25 years (younger) would differ in their intentions to use a mobile phone while driving to drivers aged 26 years and over (older). Additionally, comparisons of the behavioural, normative and control beliefs were conducted between drivers who had strong and weak intentions to use a mobile phone while driving within each driver age grouping of 17 to 25 years and 26 years and over.

Overall, younger participants (17-25 years) had stronger intentions ($M = 4.48$; $SD = 2.21$) than older participants ($M = 3.92$; $SD = 2.50$) to use a mobile phone while driving. To determine where these differences in intentions may lie within each age grouping, separate MANOVA analyses were conducted firstly to identify differences in beliefs of younger participants with strong and weak intentions to use their mobile phone while driving; and secondly, to identify the differences in beliefs of older participants who have strong and weak intentions to use a mobile phone while driving. Significant multivariate effects for behavioural, $F(6, 205) = 8.88$, $p < .001$; normative, $F(6, 204) = 4.28$, $p < .001$; and control beliefs, $F(6, 207) = 6.36$, $p < .001$; were found for younger participants with strong and weak intentions to use a mobile phone while driving. Similarly, for older participants, significant multivariate effects were obtained for behavioural, $F(6, 523) = 53.92$, $p < .001$; normative, $F(6, 532) = 23.77$, $p < .001$; and control beliefs, $F(6, 530) = 4.40$, $p < .001$.

Table E2: Mean Differences in Beliefs of Younger (17-25 years) and Older Participants (26 years and over) with Strong and Weak Intentions to Use a Mobile Phone While Driving

	Younger Weak Int	Younger Strong Int	Older Weak Int	Older Strong Int
Behavioural belief	*n* = 81	*n* = 131	*n* = 265	*n* = 265
Using time effectively	2.94	4.35***	2.51	5.27***
Being distracted from driving	4.27	4.39	3.42	4.30***
Being involved in a crash	3.62	3.49	2.85	3.11
Receiving information (e.g., directions, important news)	3.54	4.52***	2.48	4.44***
Receiving assistance in an emergency	3.96	3.64	3.00	3.36
Being caught and fined by the police	3.90	3.34	2.63	2.98
Normative belief	*n* = 81	*n* = 130	*n* = 269	*n* = 270
Friends	3.41	4.42***	2.30	4.15***
Family members	2.43	3.17	2.20	3.91***
Partner/boyfriend/girlfriend	2.81	3.94***	2.22	3.96***
Work colleagues	2.98	4.10***	2.43	4.36***
Other drivers	2.58	3.30	2.12	3.54***
Police	2.10	1.90	1.76	2.73***
Control belief	*n* = 81	*n* = 133	*n* = 270	*n* = 267
Risk of fines	5.46	4.08***	5.20	4.39***
Demanding driving conditions (e.g., weather, changing lanes)	5.85	5.26	5.71	5.31
Risk of an accident	5.98	4.88***	5.63	4.97***
Police presence	5.86	5.62	5.65	5.21
Lack of hands-free kit	4.72	3.49***	5.01	4.75
Heavy traffic	5.05	4.23	5.41	4.78†

*** $p < .001$ † $p = .001$ *Note*. Scaled from 1 = *extremely unlikely* to 7 = *extremely likely*.

As shown in Table E2, examination of the univariate effects revealed that, within each group, younger participants with strong and weak intentions to use a mobile phone while driving and older participants with strong and weak intentions to use a mobile phone while driving, differed on specific behavioural, normative and control beliefs. Younger participants with strong intentions to use a mobile phone while driving were more likely to focus on the advantages of performing this behaviour such as using time effectively and receiving information, compared to younger participants with weak intentions to use a mobile phone while driving. Younger participants with strong intentions were also more likely than younger participants with weak intentions to perceive normative approval from friends, their partner/boyfriend/girlfriend, and work colleagues for using a mobile phone while driving. Risk of fines, risk of an accident and lack of a hands-free kit were less likely to be perceived as barriers to using a mobile phone while driving by younger participants with strong intentions to perform this behaviour, than younger participants with weak intentions.

Older participants with strong intentions to use a mobile phone while driving were more likely to endorse the advantages of using time effectively and receiving information and the disadvantage of being distracted from driving than older participants with weak intentions to use a mobile phone while driving. Older participants with strong mobile phone use intentions while driving also perceived wide ranging normative approval from all identified referents for performing this behaviour compared to older participants with weak intentions. Older participants with weak intentions to use a mobile phone while driving were more likely to believe that the risk of being fined, the risk of having an accident, and heavy traffic would prevent them from using a mobile phone while driving, than participants with strong intentions to perform this behaviour.

Discussion

Drivers aged 17 to 25 years were less likely to have a hands-free mobile phone kit than older drivers and were more likely to text while driving than older drivers. Using a hand-held mobile phone while driving reduces manual dexterity (McCartt et al., 2006) and text messaging while driving significantly increases the amount of time drivers look away from the road, subsequently reducing awareness of changing driving conditions (Hosking et al., 2005). Young drivers have less exposure to a variety of driving conditions reducing their ability to respond to difficult driving situations and, as such, have a higher level of crash risk than older drivers (Catchpole et al., 1994). As mobile phone use while driving reduces overall driving performance, the finding that younger drivers are more likely to intend to use a mobile phone while driving, particularly for text messaging, is of concern.

Drivers aged 26 years and over who had strong and weak intentions to use a mobile phone while driving had the same pattern of belief-based differences as most other comparison groups in the study. Strong and weak intending younger drivers, however, differed on fewer beliefs than any other comparison group. The lack of similarity between belief-based differences of drivers aged 17 to 25 years and other comparison groups in the study suggests that younger drivers are a distinct driver group. For this reason, discussion in this section will focus on beliefs specific to drivers aged 17 to 25 years.

Behavioural Beliefs

Similar to the other comparisons, drivers with strong, rather than weak, intention to use a mobile phone while driving agreed strongly that advantages (using time effectively, receiving information) would arise from using a mobile phone while driving, irrespective of age. Strong and weak intending drivers in both age groups did not significantly differ on whether using a mobile phone while driving would result in their being involved in a crash, receiving assistance in an emergency, or being caught and fined by the police, consistent with other comparisons in the study, apart from type of handset. Thus, as with other driver groups, the advantages arising from using a mobile phone while driving influenced people to use their mobile phone while driving.

Strong and weak intending drivers aged 26 years and over differed on whether using a mobile phone while driving would result in their being distracted from driving whereas strong and weak intending drivers aged 17 to 25 years did not differ in this belief. Interestingly, strong and weak intending young drivers reported similar levels of awareness of the potential for distraction when using a mobile phone while driving as strong intending drivers aged 26 years and over. Additionally, younger drivers, irrespective of level of intention, reported a stronger likelihood that using a mobile phone while driving could result in their being involved in a crash than older drivers. Thus, young drivers, particularly, are aware of the risks arising from using a mobile phone while driving. This finding may be due, in part, to younger drivers being more likely to text while driving than older drivers. Awareness of the risks, however, does not influence young people's behaviour.

Although drivers aged 17 to 25 years were aware of the potential negative outcomes of using a mobile phone while driving, they still used their phones while driving at relatively high levels. It has been found that young people, aged 14 to 20 years, have a strong perception of the risks associated with using a mobile phone while driving; however, it is believed that they may minimise the risks once they obtain a licence (Martha & Griffet, in press). Alternatively, it may be that when young people obtain a licence and use their phone while driving, they are more accepting of the risks of the behaviour (Sarkar & Andreas, 2004), particularly if they have an over developed confidence into their driving skills (Dejoy, 1989). Incorporating information regarding the safety risks of using a mobile phone while driving within learner driver training instruction may make younger drivers less likely to minimise these risks once they obtain their licence.

Normative Beliefs

Similar to other comparisons, drivers aged 26 years and over with strong intentions to use a mobile phone while driving reported higher levels of approval from most groups for their use of a mobile phone while driving, than drivers with weak intentions. In contrast, strong and weak intending younger drivers only differed on three referent groups. Strong intending drivers aged 17 to 25 years reported that friends, partners, and work colleagues were more likely to approve of them using their mobile phone while driving, than weak intending young drivers. Overall, strong intending young drivers reported the highest levels of approval from friends for using a mobile phone while driving in the study. There was no difference in perceived approval from family members, other drivers, and police, between strong and weak intending young drivers with relatively low levels of perceived approval reported.

As stated previously, younger drivers are more likely to use a mobile phone for text messaging than older drivers and, as such, may be more aware of disapproval for this behaviour. Mobile phone use is a highly valued method for young people to remain in contact with their social network (Ling, 2004), possibly accounting for the strong perception amongst younger drivers that friends and partners would approve of their using a mobile phone while driving. As young people, aged 25 and under, are strongly influenced by normative pressure from friends and peers to use their mobile phone (Walsh, White, & Young, 2007), reference to disapproval from friends and partners may be an effective strategy to reduce young people's use of mobile phones, particularly for text messaging, while driving.

Control Beliefs

Similar to most other comparisons, drivers with weak intention to use a mobile phone while driving reported that the risk of fines and risk of an accident would be more likely prevent them from using a mobile phone while driving, than strong intending drivers, irrespective of age. The lack of a hands-free kit did not differentiate strong and weak intending drivers aged 26 years and over, possibly because older drivers were more likely to own a hands-free kit than younger drivers. Drivers aged 17 to 25 years who had weak intentions to use a mobile phone while driving reported lack of a hands-free kit would be more likely to prevent them from using a mobile phone while driving than strong intending young drivers. Thus, the lack of hands-free kit did prevent some young drivers from using a mobile phone while driving. Strong intenders, however, indicated they would continue to use a mobile phone while driving in spite of not having a hands-free kit. As such, this behaviour may be difficult to overcome.

Young people highly value mobile phone use and believe it provides significant advantages in their lives (Walsh & White, 2006) increasing the likelihood that young drivers will continue to use hand-held mobile phones while driving. Hands-free kits are relatively expensive and most young people are on limited incomes. Cost has previously been found to limit some young people's mobile phone use (Walsh & White, 2006) and it may be that many young people cannot afford a hands-free kit.

Whilst, further research could investigate whether the cost of hands-free kits adversely affects young drivers, overcoming affordability issues may reduce the level of hand-held mobile phone use amongst young people. Providing young drivers with a discount for purchasing a hands-free kit may encourage the use of hands-free kits amongst young drivers. Alternatively, increasing awareness of the potential for being fined for using a hand-held mobile phone may cause young people with strong intentions to use their mobile phone while driving to consider whether they can afford the risk of being fined if they are caught.

Differences in Beliefs According to Driving Purpose: Business and Personal Purposes

Mobile technology has enabled business drivers to use their car as a mobile office (Eost & Flyte, 1998). Whilst business drivers may appreciate the advantage of being easily contactable (Walsh & White, 2006) when they use their mobile phone, the likelihood of an accident is increased. Thus, mobile phone use while driving creates a risk to safe driving practices in work contexts (Salminen, 2000). As previous observational research has revealed that drivers of commercial vehicles are more likely to use a mobile phone while driving than drivers of private vehicles (Glendon & Sutton, 2005), analyses were conducted to identify whether those driving mostly for business purposes and those driving mostly for personal purposes differed in their intention to use a mobile phone. Additionally, differences in the behavioural, normative, and control beliefs of those with strong and weak intentions to use a mobile phone while driving were examined, within each driver grouping (mostly business purposes drivers and mostly personal purpose drivers).

Overall, business drivers had stronger intentions ($M = 4.59$; $SD = 2.40$) than personal drivers ($M = 3.25$; $SD = 2.26$) to use a mobile phone while driving. To determine where these differences in intentions may lie within each driver group, MANOVA analyses were conducted firstly, to identify the differences in beliefs of those driving mostly for business purposes with strong and weak intentions to use a mobile phone while driving; and secondly, to identify the beliefs differentiating between those driving mostly for personal purposes with strong and weak intentions to use a mobile phone while driving. For participants who mostly drove for business purposes, there were significant multivariate effects found for behavioural beliefs, $F(6, 462) = 32.61$, $p < .001$; normative beliefs, $F(6, 469) = 15.62$, $p < .001$; and control beliefs, $F(6, 470) = 4.55$, $p < .001$. Analyses of participants who drove mostly for personal purposes, also revealed significant multivariate effects for behavioural, $F(6, 284) = 20.20$, $p < .001$; normative, $F(6, 283) = 8.69$, $p < .001$; and control beliefs, $F(6, 284) = 7.64$, $p < .001$.

Examination of the univariate effects (see Table E3) revealed that, within each group, participants driving for mostly business purposes with strong and weak intentions to use a mobile phone while driving and participants driving mostly for personal purposes who held strong and weak intentions to use a mobile phone while driving, differed on specific behavioural, normative, and control beliefs.

Participants who drove primarily for business purposes and had strong intentions to use a mobile phone while driving were more likely to consider using time effectively and receiving information as advantages of mobile phone use while driving; however, these participants were also more likely to believe they would be distracted from driving if they used their mobile phone while driving compared to those driving primarily for business purposes with weak intentions to use a mobile phone while driving. Those driving for mainly business purposes with strong intentions to use a mobile phone while driving were more likely to perceive that all identified normative referents, with the exception of police, would approve of them using a mobile phone while driving, than those driving for mostly business purposes with weak intentions to use a mobile phone while driving. Participants driving for mostly business purposes with strong mobile phone use intentions were also

less likely to perceive the risk of fines or an accident as factors preventing them from using their mobile phone while driving compared to those driving mainly for business purposes with weak intentions to use a mobile phone while driving.

Compared to participants driving for mostly personal purposes who had weak intentions to use their mobile phone while driving, participants with strong intentions were more likely to focus on the advantages of using a mobile phone while driving such as using time effectively and receiving information. Participants driving mainly for personal purposes with strong intentions to use a mobile phone were more likely to perceive normative approval for using a mobile phone while driving from all identified referents, except the police, than those driving mostly for personal purposes with weak intentions to use a mobile phone while driving. Finally, those driving mostly for personal purposes with strong intentions to use their mobile phone while driving were less likely to perceive risk of fines and lack of a hands-free kit as factors preventing mobile phone use while driving compared to those who drove mostly for personal purposes and held weak intentions to perform this behaviour.

Table E3: Mean Differences in Beliefs of Mostly Business and Mostly Personal Drivers with Strong and Weak Intentions to Use a Mobile Phone While Driving

	Business Weak Int	**Business Strong Int**	**Personal Weak Int**	**Personal Strong Int**
Behavioural belief	*n* = 176	*n* = 293	*n* = 179	*n* = 112
Using time effectively	2.82	5.17***	2.35	4.46***
Being distracted from driving	3.43	4.21***	3.78	4.61
Being involved in a crash	2.96	3.17	3.04	3.37
Receiving information (e.g., directions, important news)	2.74	4.50***	2.72	4.38***
Receiving assistance in an emergency	3.13	3.37	3.34	3.70
Being caught and fined by the police	2.90	3.07	2.92	3.17
Normative belief	*n* = 178	*n* = 298	*n* = 180	*n* = 110
Friends	2.71	4.34***	2.40	3.95***
Family members	2.48	3.92***	2.06	3.00***
Partner/boyfriend/girlfriend	2.53	4.12***	2.23	3.51***
Work colleagues	2.78	4.48***	2.36	3.70***
Other drivers	2.35	3.65***	2.07	2.93***
Police	2.10	2.63	1.57	2.04
Control belief	*n* = 180	*n* = 297	*n* = 180	*n* = 111
Risk of fines	5.18	4.33***	5.36	4.14***
Demanding driving conditions (e.g., weather, changing lanes)	5.58	5.23	5.94	5.45
Risk of an accident	5.56	4.88†	5.86	5.16
Police presence	5.54	5.26	5.85	5.58
Lack of hands-free kit	4.72	4.51	5.21	3.80***
Heavy traffic	5.14	4.54	5.55	4.73

*** $p < .001$ † $p = .001$ *Note*. Scaled from 1 = *extremely unlikely* to 7 = *extremely likely*.

Discussion

Comparing mainly business and mainly personal drivers' self-reported levels of mobile phone use while driving reveals that mostly business drivers used their mobile phone for answering or making calls twice as much as mostly personal drivers. Similar levels of sending or reading text messages while driving were reported by the different driving purpose groups. As people who drove mostly for business reported stronger intentions to use a mobile phone while driving, than mostly personal purpose drivers, it appears that using a mobile phone while driving is a pre-planned and expected part of many business drivers' daily driving behaviour.

Behavioural Beliefs

The behavioural beliefs which differentiated those driving for mostly business purposes with strong and weak intentions to use their mobile phone while driving followed the same pattern as the general and older driving groups. Specifically, strong intending mostly business purpose drivers were more likely to report that using a mobile phone while driving would result in their using time effectively, receiving information, and being distracted from driving compared to weak intenders. Similar to mostly business purpose drivers, strong intending mostly personal purpose drivers were more likely to believe that advantages would result from their using a mobile phone while driving than weak intending mostly personal purpose drivers. Being distracted from driving, however, did not differentiate between those driving for mostly personal purposes with strong and weak intentions to use their mobile phone.

Strong intending mostly business purpose drivers rated the advantages of using a mobile phone while driving (using time effectively and receiving information) more highly than any other group in the study. Thus, mostly business purpose drivers, who use their mobile phone while driving, view this behaviour as being highly beneficial to their work performance. As such, mostly business purpose drivers may believe that the advantages of using a mobile phone while driving outweigh the risks of this behaviour increasing the likelihood that they will continue to use a mobile phone while driving. Additionally, a favourable cost/benefit ratio is likely to make drivers resistant to efforts to ban or limit mobile phone use while driving if they perceive the safety gains do not compensate for potential losses to productivity (Cohen & Graham, 2003).

Normative Beliefs

As with most other groups, both mostly business and mostly personal purpose drivers who had strong intentions to use their mobile phone while driving believed more strongly, than weak intenders, that the majority of people would approve of their engaging in this behaviour. The only normative belief that did not differ between strong and weak intenders for either driver type was whether police would approve of their using a mobile phone while driving. Strong and weak intenders in both driving purpose groups reported low levels of approval from police towards mobile phone use while driving.

As would be expected, people who drove mainly for business purposes and who had strong intentions to use a mobile phone while driving reported the highest levels of approval from work colleagues for their using a mobile phone while driving in the study. This finding indicates that, if using a mobile phone while driving is an approved behaviour amongst the workplace, drivers are more likely to engage in the behaviour. Less than a quarter of employers had policies restricting mobile phone use while driving, potentially reinforcing the belief amongst business drivers that work colleagues approved of them using a mobile phone while driving. Mobile phone while driving creates an additional safety risk for business drivers (Salminen & Lahdeniemi, 2002) who are already at higher risk of an accident than the general driving population (Hijar et al., 2002). As such, employers who wish to promote safe driving practices may want to minimise mobile phone

use while driving. The strong perception of normative approval from work colleagues found in this study reveals that employers will need to actively discourage mobile phone use while driving for any campaigns to reduce mobile phone use amongst business drivers to be effective. One strategy would be for employers to implement policies restricting mobile phone use while driving so the people who drive for business purposes are aware that their employer disapproves of the behaviour.

Control Beliefs

Similar to most other group comparisons, people who drove mainly for either business or personal purposes and who had strong intentions to use their mobile phone while driving reported that the risk of a fine would not prevent them from using their mobile phone while driving. Additionally, strong and weak intenders in both driving purpose groups did not significantly differ on whether demanding driving conditions, police presence, or heavy traffic would prevent them using their mobile phone while driving. The finding that only two beliefs differed between the mostly personal and mostly business purpose driving groups for drivers with strong and weak intentions to use their mobile phone while driving indicates that most preventative factors are equally influential on mobile phone use amongst people who drive for mostly business or mostly personal purposes.

Whilst risk of an accident differentiated strong and weak intending mostly business purpose drivers, this belief did not differentiate between strong and weak intending drivers who drove mainly for personal purposes. Specifically, drivers who drove mostly for business purposes and who had strong intentions to use their mobile phone while driving were more likely, than weak intenders, to report that the risk of an accident would not prevent from using their mobile phone while driving. This finding is similar to all the other groups in the study, apart from drivers with a hands-free kit. In contrast, people who drove mostly for personal purposes, and who had strong or weak intentions to use their mobile phone while driving, did not significantly differ on whether the risk of an accident would prevent them using their mobile phone while driving. Both strong and weak intending personal purpose drivers rated this risk relatively highly. This result suggests that people who drive for personal purposes are aware of the safety risks associated with using a mobile phone while driving and that this awareness impacts on their decision regarding whether to use their mobile phone while driving. In contrast, people who drive for mostly business purposes and who have strong intentions to use their mobile phone while driving may minimise this risk.

Strong and weak intending mostly business purpose drivers did not differ on whether the lack of a hands-free kit would prevent them using their mobile while driving, whilst strong and weak intending mostly personal purpose drivers did differ on this belief. People who drove mainly for personal purposes and who had weak intentions to use their mobile phone while driving were more likely, than strong intenders, to report that the lack of hands-free kit would prevent their using a mobile phone while driving. Thus, similar to younger drivers and the general driving groups, some strong intending personal purpose drivers will use their mobile phone while driving whether they have a hands-free kit or not.

Lack of a hands-free kit was not a strong preventer of mobile phone use while driving amongst both strong and weak intending business purpose drivers. As stated earlier, people who drove mostly for business purposes rated the advantages of using a mobile phone (behavioural beliefs) most highly out of all comparison groups. Thus, it appears that business people seek to obtain the advantages of using a mobile phone while driving, irrespective of how much they use their phone while driving and what type of handset they have.

Overall, people who drove for mostly business purposes, in this study, reported using a mobile phone while driving at much higher levels than people who drove for mostly personal purposes. As heavy mobile phone users are at much greater risk of an accident than occasional mobile phone users (Laberge-Nadeau et al., 2003) the large amount of mobile phone use while driving amongst people who drive for mostly business purposes places these people at higher risk than people who

drive for mostly personal purposes. Mostly business purpose drivers were only slightly more likely to use a hands-free kit than mostly personal purpose drivers. Although there is no significant difference in overall safety benefit when using a hands-free or hand-held mobile while driving, hand-held mobile phone use is more likely to reduce manual dexterity while driving (McCartt et al., 2006). Results in this study found that approximately a quarter of employers provided a hands-free kit for their employees to use while driving. If employers are unwilling to discourage mobile phone use while driving or to implement strategies restricting mobile phone use while driving amongst their employees (normative beliefs), then encouraging employers to provide their employees with hands-free kits may reduce some of the negative effects of using a mobile phone while driving for business drivers who are already an at risk driver group.

APPENDIX F: THE EFFECT OF DRIVING CONDITION AND DRIVING MOTIVATION ON MOBILE PHONE USE WHILE DRIVING: REPEATED MEASURES ANOVAS

Table F1: Intention to Make a Call

		Driving Condition: Moving		Driving Condition: Stationary		
Motivation	Running late	3.33	(S1)	3.88	(S3)	3.61
	Not in a hurry	3.36	(S2)	3.78	(S4)	3.57
		3.34		3.83		

Note. Scaled from 1 = *extremely unlikely* to 7 = *extremely likely*.

Examination of the means across the four different scenarios demonstrated that drivers intentions to make a call were highest when they were stationary at traffic lights and running late (see Table F1). Analyses revealed that it was, again, driving condition and not motivation which influenced intentions to make a call evidenced by the significant main effect of driving condition on intentions to make a call, Wilk's $\Lambda = .89$, $F(1, 769) = 99.80$, $p < .001$, partial $\eta^2 = .12$ and no main effect of motivation on intentions to make a call, Wilk's $\Lambda = 1.00$, $F(1, 769) = .77$, $p = .380$, partial $\eta^2 = .00$. No significant interaction effect of driving condition by motivation on intentions to make a call were demonstrated, Wilk's $\Lambda = .99$, $F(1, 779) = 4.63$, $p = .032$, partial $\eta^2 = .01$.

Table F2: Intention to Receive a Call

		Driving Condition: Moving		Driving Condition: Stationary		
Motivation	Running late	3.84	(S1)	4.36	(S3)	4.10
	Not in a hurry	4.01	(S2)	4.39	(S4)	4.20
		3.92		4.37		

Note. Scaled from 1 = *extremely unlikely* to 7 = *extremely likely*.

Drivers intentions to receive a call were highest when they were stationary at traffic lights and not in a hurry, evidenced by the higher mean in this condition (see Table F2). A Repeated Measures ANOVA revealed that is was again driving condition influencing intentions to receive a call evidenced by the significant main effect of driving condition on intentions to receive a call, Wilk's $\Lambda = .90$, $F(1, 782) = 87.48$, $p < .001$, partial $\eta^2 = .10$. There was no main effect of motivation on intentions to receive a call, Wilk's $\Lambda = .99$, $F(1, 782) = 7.25$, $p = .007$, partial $\eta^2 = .01$ and no significant interaction between driving condition and motivation, Wilk's $\Lambda = .99$, $F(1, 782) = 4.35$, $p = .037$, partial $\eta^2 = .01$.

Table F3: Intention to Send a Text Message

		Driving Condition: Moving		Driving Condition: Stationary		
Motivation	Running late	2.34	(S1)	2.77	(S3)	2.56
	Not in a hurry	2.42	(S2)	2.86	(S4)	2.64
		2.38		2.82		

Note. Scaled from 1 = *extremely unlikely* to 7 = *extremely likely*.

For sending a text message, drivers demonstrated higher intentions to perform this behaviour when they were stationary at traffic lights and not in a hurry, as shown by the higher mean for this condition in Table F3. Analyses revealed that similar to calling behaviours, it was driving condition rather than motivation which influenced driver intentions to send a text message, evidenced by the significant main effect of driving condition on intentions to send a text message, Wilk's $\Lambda = .89$, $F(1, 785) = 92.94$, $p < .001$, partial $\eta^2 = .11$, but no main effect of motivation on intentions to send a text message, Wilk's $\Lambda = .99$, $F(1, 785) = 6.74$, $p = .010$, partial $\eta^2 = .01$. No significant driving condition by motivation interaction on intentions to send a text message was demonstrated, Wilk's $\Lambda = 1.00$, $F(1, 785) = .01$, $p = .927$, partial $\eta^2 = .00$.

Table F4: Intention to Read a Text Message

		Driving Condition: Moving		Driving Condition: Stationary		
Motivation	Running late	2.87	(S1)	3.42	(S3)	3.15
	Not in a hurry	2.99	(S2)	3.55	(S4)	3.27
		2.93		3.49		

Note. Scaled from 1 = *extremely unlikely* to 7 = *extremely likely*.

Examination of the means across the four conditions showed that drivers had higher intentions to read a text message when they were stationary and not in a hurry (see Table F4). Similar to the four previous behaviours, analyses revealed that only driving condition but not motivation influenced intentions to read a text message with a significant main effect found for driving condition, Wilk's $\Lambda = .88$, $F(1, 784) = 109.42$, $p < .001$, partial $\eta^2 = .12$ but not motivation, Wilk's $\Lambda = .98$, $F(1, 784) = 16.11$, $p = .010$, partial $\eta^2 = .02$. There was no significant interaction effect of driving condition by motivation on driver intentions to read a text message, Wilk's $\Lambda = 1.00$, $F(1, 784) = .01$, $p = .905$, partial $\eta^2 = .00$.