An examination of the factors that influence drivers' willingness to use hand-held mobile phones

Mark Rozario[1], Ioni Lewis[2], and Katherine M. White[1]

[1] School of Psychology and Counselling, Queensland University of Technology (QUT), Kelvin Grove Campus, Kelvin Grove 4059, Australia.

[2] Centre for Accident Research and Road Safety – Queensland (CARRS-Q), Queensland University of Technology (QUT), Kelvin Grove Campus, Kelvin Grove 4059, Australia.

* Correspondence relating to this article should be forwarded to Dr Ioni Lewis, CARRS-Q, Queensland University of Technology, Kelvin Grove Campus, Kelvin Grove 4059, Australia. E-mail: i.lewis@qut.edu.au; Phone: +61 7 3138 4966; Facsimile: + 61 7 3138 0112.

Abstract

Hand-held mobile phone use while driving is illegal throughout Australia yet many drivers persist with this behaviour. This study aims to understand the internal, driver-related and external, situational-related factors influencing drivers' willingness to use a hand-held mobile phone while driving. Sampling 160 university students, this study utilised the Theory of Planned Behaviour (TPB) to examine a range of belief-based constructs. Additionally, drivers' personality traits of neuroticism and extroversion were measured with the Neuroticism Extroversion Openness-Five Factor Inventory (NEO-FFI). In relation to the external, situational-related factors, four different driving-related scenarios, which were intended to evoke differing levels of drivers' reported stress, were devised for the study and manipulated drivers' time urgency (low versus high) and passenger presence (alone versus with friends). In these scenarios, drivers' willingness to use a mobile phone in general was measured. Hierarchical regression analyses across the four different driving scenarios found that, overall, the TPB components significantly accounted for drivers' willingness to use a mobile phone above and beyond the demographic variables. Subjective norms, however, was only a significant predictor of drivers' willingness in situations where the drivers were driving alone. Generally, neuroticism and extroversion did not significantly predict drivers' willingness above and beyond the TPB and demographic variables. Overall, the findings broaden our understanding of the internal and external factors influencing drivers' willingness to use a hand-held mobile phone while driving despite the illegality of this behaviour. The findings may have important practical implications in terms of better informing road safety campaigns targeting drivers' mobile phone use which, in turn, may contribute to a reduction in the extent that mobile phone use contributes to road crashes.

An examination of the factors that influence drivers' willingness to use hand-held mobile phones

Using a hand-held mobile phone for calling or text messaging while driving is illegal in Australia (Pennay, 2008), many states across the United States (Cellular News, 2008), and the United Kingdom (Clayson, 2007). Mobile phone use while driving can result in impairments to drivers' judgments (e.g., visual environment, lateral position) and decision-making skills (e.g., reaction time) (Young, Regan, & Hammer, 2003), thus, impairing driving performance and increasing crash risk (Virginia Tech Transportation Institution [VTTI], 2009). This deleterious association between mobile phone use, driving performance and increased crash risk has been supported in a number of studies (e.g., Alm & Nilsson, 1995; Brookhuis, de Vries, & de Waard, 1991; McKnight & McKnight, 1993) with evidence indicating that drivers who use their mobile phones are approximately four times more likely to be involved in a crash than when they were not using it, regardless of age or driving experience (Redelmeier & Tibshirani, 1997). In a very recent, large-scale study conducted by the Virginia Tech Transportation Institute (2009), which was based on the observation of drivers (via in-vehicle cameras) for several million kilometers, the risk of crashing or near-crashing incidents was found to be up to 23 times more likely when drivers manually manipulate their mobile phones for calls or text messaging.

Somewhat surprisingly, despite the heighten crash risk associated with mobile use while driving, self-report studies have suggested that drivers persist with engaging in this behaviour. In a large-scale study conducted by Pennay (2008) on behalf of the Australian Transport and Safety Bureau (ATSB), 61% of the 1592 participants admitted to having used their mobile phone while driving. This figure was also a notable increase from 55% in 2006. In the effort to curb this increasing trend (Pennay, 2008), it is important to understand the factors that contribute to drivers' willingness to utilise their mobile phone while driving.

Knowledge of such factors underpinning the enactment of the behaviour may be used to ultimately inform interventions that will better target this unsafe, risky driving behaviour. Consistent with this notion, the current study seeks to further understanding of the factors that do influence drivers' willingness to use their mobile phones while driving. Of note, hand-held mobile use as opposed to hands-free mobile use is of specific focus in this paper given that the former behaviour remains illegal within all Australian jurisdictions.

In order to achieve an enhanced understanding of factors influencing drivers' hand-held mobile phone use while driving, the current study will examine a range of key internal (individual/person-related) and external (environmental/situational) psychosocial factors. More specifically, key constructs from the Theory of Planned Behaviour together with the personality traits of extroversion and neuroticism will constitute the internal factors examined. In relation to the external or situation-based factors examined, the influence of driving when in the presence or absence of passengers as well as the time urgency of the driving situation will be examined for the extent such factors heighten driver stress and, in turn, influence the likelihood of using a mobile phone while driving.

Internal factors influencing drivers' mobile phone use

Self-report based studies have found that mobile phones provide individuals with a variety of positive functions including; an ability to remain in contact with others (Walsh & White, 2006), providing a sense of security, such as contacting others during emergencies, and the ability to perform work duties outside of the office, such as emailing clients (Lissy, Cohen, Park, & Graham, 2000). These findings imply that drivers' mobile phone use is influenced by their positive beliefs towards the behaviour and the perceived positive functions such use may serve. It may, therefore, be beneficial to draw on a major attitude-behaviour model, the Theory of Planned Behaviour (TPB), to assist in our understanding of people's mobile phone use decisions.

Theory of Planned Behaviour. The Theory of Planned Behaviour (TPB; Ajzen, 1988, 1991) is a well-validated model that consists of the target behaviour being predicted by intentions which, in turn, are influenced by three main components; attitudes, subjective norms, and perceived behavioural control (PBC). The target behaviour is the act that the individual is intending to perform. Attitudes are the individual's overall appraisal toward performing the behaviour. Subjective norms are the individual's perceived influence of significant others approving of the individual performing the behaviour (or normative influence). PBC is an individual's confidence in his/her ability to execute the behaviour (or perceptions of control). PBC is also expected to influence behaviour directly. These three TPB components are determined by an individuals' behavioural, normative, and control beliefs. Having more favourable attitudes, greater perceived pressure from important others to perform the behaviour, and greater control perceptions will, then, strengthen one's intentions, and subsequently, the likelihood of the behaviour being performed (Ajzen, 1991; see also Francis et al., 2004).

There is much support for the TPB in predicting behaviour across a variety of domains (see Armitage & Conner, 2001, for a review) including mobile phone use while driving (Walsh, White, Watson, & Hyde, 2007; Zhou, Wu, Rau, & Zhang, 2009). For instance, Walsh, White, Hyde, and Watson (2008) found that the TPB significantly accounted for 32% of the variance in intentions to use a mobile phone while driving above and beyond participants' demographic characteristics. A key benefit of the TPB framework is that, by identifying the predictors of intentions toward performing a behaviour, intervention programs can be informed to target the underlying contributing factors in order to reduce the occurrence of the behaviour. One such TPB-based intervention underpinned a Scottish Road Safety Campaign (Stead, Tagg, MacKintosh, & Eadie, 2004). In this campaign, persuasive advertisements were developed which specifically targeted drivers' attitudes, subjective

norms, and PBC. This TPB-based campaign successfully led to significant (desired) changes in drivers' attitudes and beliefs about speeding.

It is important to note that, while these TPB-based studies predicted successfully individuals' planned intentions of mobile phone use while driving, Walsh et al. (2007) suggested that mobile phone use while driving, in particular, may be a behaviour which is not always planned and, thus, may not always be accurately accounted for by an individual's intentions. As a result, the prediction of individuals' willingness to use a phone rather than their intentions to do so may be more applicable in cases where the behaviour is more spontaneous (see Gibbons, Gerrard, Blanton, & Russell, 1998).

Behavioural willingness. Behavioural willingness features within the Prototype Willingness Model (PWM; Gibbons et al., 1998). The PWM has significant conceptual overlap with the TPB. Behavioural willingness is described as being more prevalent than intentions in situations when the opportunity to perform the behaviour presents itself (spontaneous action), aside from whether the individual planned/intended to perform the behaviour. The PWM suggests that individuals' willingness to perform a behaviour increases as a result of their attitudes (less risk perceived), subjective norms (perceptions that significant others will carry out the behaviour) and prototypes (degree of liking or similarity to the image of a peer who engages in the behaviour). Consistent with Walsh et al.'s (2007) view that mobile phone use is often a more spontaneous rather than planned behaviour, the current study, will focus upon drivers' willingness to use a mobile phone rather than their stated intentions.

An additional conceptual issue to consider in relation to the TPB and its denoted components, is that it has been argued that such components, on their own, do not always robustly account for internal, stable behaviours, performed regularly (e.g., on a weekly basis) (Ouellette & Wood, 1998). These habitual behaviours may instead be explained by other

internal stable psychosocial factors, such as personality traits. For example, Rhodes, Courneya, and Jones (2004) found that the personality trait of activity, measured by eight unipolar markers on how active an individual is, significantly accounted for an additional 4% of the variance in exercise behaviour above and beyond the TPB components. These findings suggest that encompassing the predictive validity of personality factors along with the TPB constructs could assist in explaining the internal factors contributing to drivers' willingness to engage in mobile phone use, especially if use has become habitual in nature.

Personality traits. Personality traits are the multi-dimensional categories of an individual's pattern in displaying action and emotion (McCrae & Costa, 1995) which are explained through multiple traits (e.g., McCrae & John, 1992; Metsapelto & Pulkkinen, 2003). One comprehensive model explaining personality is the Neuroticism Extraversion Openness-Five Factor Inventory (NEO-FFI; Costa & McCrae, 1989) which contains the five subscales of Neuroticism, Extroversion, Openness, Conscientiousness, and Agreeableness. The NEO-FFI assesses two of the more frequently discussed personality traits in driving research; namely, extroversion and neuroticism (see Dorn & Matthews, 1992; Lajunen & Summala, 1995; Matthews, Dorn, & Glendon, 1991). Neuroticism is an enduring tendency to experience negative emotional states while extroversion denotes primarily the extent to which a person is outgoing and active (Costa & McCrae, 1992b).

In the road safety literature, the personality traits of neuroticism and extroversion have been commonly researched. For instance, studies have found that individuals high on extroversion were more likely than introverted individuals to take risks and, thus, were at higher risk of crashing (Lajunen, 2000; Taubman-Ben-Ari, Mikulincer, & Gillath, 2004). Additionally, and of particular relevance to the current study, Bianchi and Phillips (2005) found that extroversion was predictive of problematic mobile phone use in general, everyday driving situations, such that participants higher in extroversion made more calls while

driving. On the other hand, neuroticism research sampling university student drivers revealed that, as neuroticism increased, so did driver aggression and dislike for driving with such factors representing components of driver stress (Lajunen & Summala, 1995). Previous research has shown driver stress to be correlated significantly with both neuroticism and extroversion, such that higher neuroticism correlated with increased stress while lower extroversion correlated with higher stress (Dorn & Matthews, 1992; Matthews, Dorn, & Glendon, 1991; Wickens & Wiesenthal, 2005). Based on these findings, the current study will incorporate the personality traits of neuroticism and extroversion in order to assess their role in predicting drivers' willingness to use a mobile phone across scenario-based driving situations differing in their level of perceived stress.

External factors influencing drivers' mobile phone use

The stress elicited from the driving environment (e.g., traffic jam) is largely situationally-influenced (Stokols, Novaco, Stokols, & Campbell, 1978) and is known to induce stress responses, such as anger and frustration, in drivers (see Gulian, Debney, Glendon, Davis, & Matthews, 1989). Two commonly-researched situational factors that are known to impact upon drivers' on-road behaviour are time urgency and passenger presence. Hennessy and Wiesenthal's (1999) examined the effects of time urgency and traffic congestion on driver stress and found that high urgency significantly increased driver stress in both the high and low traffic congestion conditions. Research in relation to passenger presence and driver stress has found that the number of passengers influences risky driving behaviour (Chen, Baker, Braver, & Li, 2000; Oesch, 2009). In a study more specific to drivers' mobile phone use, Walsh et al. (2007) found that drivers were more likely to use their mobile phones when driving alone than when with friends. While a number of explanations for this finding may be proposed including there being a greater need to keep in contact with others via mobile phones when one is driving alone (as would be consistent with

some of the perceived positive functions of mobile phone use as discussed previously), it is also possible that drivers may perceive driving alone as being less stressful given that they would be more able to focus on the driving task when not being distracted by their passengers. The deleterious effect of passengers, particularly having two or more same age passengers (most likely friends of the driver) on drivers' driving performance has been demonstrated (Lam, Norton, Woodward, Connor, & Ameratunga, 2003). Indeed, a number of studies have found that, especially for younger drivers, passenger presence increases crash risk compared with when driving alone (Lam, 2003; Lee & Abdel-Aty, 2008; Lin & Fearn, 2003; Preusser, Ferguson, & Williams, 1998; Williams, Ferguson, & McCartt, 2007).
As such, the scenario-based driving situations, intentionally designed for the purposes of this study, will be based on the two external factors of passenger presence and time urgency.

The current study

The overall goal of the current study was to enhance understanding of the factors influencing drivers' willingness to use a hand-held mobile phone. Specifically, the study had three main aims relating to the need to understand more about the internal and external factors underpinning hand-held mobile phone use while driving. The first aim of this study was to test the utility of the TPB framework (TPB; Ajzen, 1988, 1991) in predicting drivers' willingness to use their mobile phones. The second aim was to explore the extent to which the personality traits of neuroticism and extroversion could predict drivers' mobile phone use beyond the TPB constructs. The final aim was to analyse the extent that external factors relating to the driving situation (i.e., passenger presence and time urgency) were associated with driver stress and, in turn, influenced drivers' mobile phone use. To investigate the research aims, four driving scenarios, differing in their descriptions of passenger presence (i.e., alone versus with friends as passengers) and time urgency (low versus high), were devised and the extent to which drivers' reported feeling stressed in each driving scenario as

well as their willingness to use their mobile phones, hand-held, was investigated. The extent to which the TPB and personality traits predicted mobile phone use across these different scenarios, of differing levels of situation induced stress, was also explored.

Research hypotheses

Hypothesis 1. It was hypothesised that stress levels will be a function of the four different scenarios in which the external factors of time urgency (low versus high) and passenger presence (i.e., alone versus with friends as passengers) were manipulated such that: (a) driver stress level in the high urgency scenarios (i.e., running late) will be higher than those in the low urgency scenarios (i.e., going well for time); and (b) driver stress level in the 'with friends' scenarios will be higher than those in the alone scenarios.

Hypothesis 2. Based upon the TPB, it is hypothesised that, within each driving scenario, drivers' attitudes, normative influence, and control perceptions will explain an increase in willingness to use a mobile phone above and beyond the demographic variables of age and sex[1] based on having: a) more favourable attitudes towards mobile phone use; b) greater influence of normative pressure (subjective norms) towards mobile phone use; and, c) greater perceived behavioural control towards mobile phone use.

Hypothesis 3. It is hypothesised that, within each scenario, personality factors will influence drivers' willingness to use a mobile phone above and beyond the TPB and demographic variables such that: a) neuroticism will emerge as a negative predictor of behavioural willingness such that drivers reporting higher levels of neuroticism will be less willing to use a mobile phone while driving; and b) extroversion will emerge as a positive predictor of behavioural willingness such that drivers reporting higher levels of extroversion will be more willing to use a mobile phone while driving.

Method

[1] To control for the effects of the demographic variables of age and sex, these characteristics were entered as step one within each of the regression models.

Participants

This study consisted of two phases; the first phase was a small pilot study which informed the second, main phase of the study. In both phases, eligible participants were required to be the holder of a current driver's licence and own a mobile phone. In the first phase, or pilot study, 15 participants (9 females, 6 males) were recruited using a snowballing technique. Participants' ages ranged between 20 and 52 years (M = 29.20 years, SD = 9.00 years). In the second phase, or main study, 160 participants (85 females, 75 males) were recruited. Participants were students enrolled in a psychology unit at two major urban Australian universities. Participants' ages ranged between 17 to 48 years (M = 21.94 years, SD = 5.52 years). Overall, in relation to drivers' past mobile phone usage, 96 (60%) participants reported 'usually' or 'almost always' using a hand-held mobile phone while driving. First-year psychology participants who participated in the second phase of the study received course credit for their participation.

Design and materials

Pilot study questionnaire. In the first phase of the study, based on past research (e.g., Hennessy & Wiesenthal, 1999; Walsh et al., 2008), a repeated measures design was implemented to investigate the external, situational characteristics capable of inducing driver stress. In particular, this pilot phase sought to identify the factors that best distinguished between inducing low and high levels of stress. For example, the scenario descriptions for 'low' and 'high' time urgency read "… you are going well for time" and "…you are in a hurry", respectively, while the scenario descriptions for 'absent' and 'with friends' regarding the passenger presence factor read "…you are driving alone" and "...you are driving with friends", respectively. Inspection of the means associated with the level of driver stress reported, revealed that the external, situational factors of time urgency (low versus high) and passenger presence (absent versus driving with friends as passengers) were each associated

with inducing the greatest distinction in levels of stress induced. Specifically, low time urgency evoked lower levels of reported stress than high time urgency while driving alone was associated with lower stress scores than driving with passengers. As such, these two external factors were retained for the main study questionnaire.

Main study questionnaire. The second or main phase of this study adopted a 2 (time urgency: low versus high) X 2 (passenger presence: alone versus with friends as passengers) repeated measures, within-group design based on the pilot study findings. The scenario order was counterbalanced across conditions and checks revealed that scenario order did not significantly affect drivers' mean willingness scores (i.e., the study's dependent variable).

In order to obtain the most likely setting for participants to use their mobile phone, key factors (i.e., traffic density, weather condition), based on prior research (Walsh et al., 2008), were held constant across the four scenarios to the following description: "It's a weekday and the weather is fine, and you are driving in medium traffic density. Please answer these questions based on Scenario...". The time urgency variable description varied to read either: "…going well for time" or "…you are running late". The passenger presence variable description varied to read either: "…you are driving alone" or "…you are driving with a group of friends". Details of the full scenario descriptions, as presented to participants, are provided in Appendix A.

Unless otherwise stated, all questions in each scenario were measured on a 7-point Likert scale ranging from 1 (*strongly disagree*) to 7 (*strongly agree*). For each scenario, the level of stress induced with using a mobile phone was assessed using one item, "This situation is stressful to me". The dependent variable of willingness to use a mobile phone use was measured by the item, "If this scenario occurs in the next 3 months, how willing would you be, while driving, to use your mobile phone". To ensure that participants provided responses in relation to hand-held mobile phone use, immediately preceding the presentation

of the scenarios, participants were provided the following information, “In Scenarios A-D, you are to imagine yourself as the driver. Please note that in your vehicle, the hands-free set is faulty and not available for use. As such, you have access to your mobile only when hand-held, even though in reality you may opt to use the hands-free device. Thus, for this study, it is important that you consider your responses to each of the four different scenarios as though you only have access to your hand-held mobile when responding”.

The TPB-based questions used were based on the target behaviour (mobile phone use), target (mobile phone), action (usage of phone), time (while driving), and context (various driving environments), as stipulated by Fishbein and Ajzen (1975). As noted above, the target behaviour of general mobile phone use was based on the dependent measure occurring while driving over the next three months. This time period reflected a reasonable interval for the behaviour to have occurred potentially a number of times. The measures of attitudes, subjective norms, and PBC were tailored to suit the driving environment scenarios and mobile phone usage conditions. Drivers' attitudes toward using the mobile phone were measured with two items. The two items used the question stem, "How much do you agree with the following statements that you using your mobile phone while driving in the next 3 months is…?”. The first item was reversed-scored ranging from 1 (*desirable*) to 7 (*undesirable*), while the second item ranged from 1 (*harmful*) to 7 (*beneficial*). A reliability analysis revealed moderate, significant correlations for the two-item attitudes scale across the four scenarios (*r’*s ranged from .60-.69). Single item measures were utilised for the subjective norms (i.e., “People who are important to me want me to use my mobile phone while driving”) and PBC (i.e., “For me, using my mobile phone while driving is easy”).

The Extroversion and Neuroticism personality traits were measured by the extroversion and neuroticism subscales of the NEO-FFI (Costa & McCrae, 1989). Each scale consists of 12 items, rated on a 5-point Likert Scale ranging from SA (*strongly agree*) to SD

(*strongly disagree*). The 2-week previous research testing reliability of these scales is high (0.86-0.90; Robins, Fraley, Roberts, & Trzesniewski, 2001) and internal consistency ranges from 0.62 to 0.81 (Costa & McCrae, 1992a). In the present study, both scales were highly reliable, Neuroticism (α = .81) and Extroversion (α = .83).

Procedure

Prior to the commencement of data collection, ethics approval was gained from the University Human Research Ethics Committee. Pilot study participants were unable to participate in main study. In both phases of the study, participants were informed that their participation was voluntary and that withdrawal from the study was possible without penalty. Completed questionnaires were placed in a large envelope to maintain anonymity. The main study was advertised in first-year lectures and also by word of mouth. Student participants completed the questionnaire in groups (maximum of 20 participants at a time).

Results

Descriptive Statistics

Table 1 provides the means and standard deviations of the study's independent variables as well as the dependent variable of driver willingness to use a hand-held mobile phone while driving. Table 1 indicates that drivers' in this study's sample were tending towards higher levels of reported willingness to use a hand-held mobile phone while driving with mean scores falling approximately at or above the mid-point of the scale (i.e., 3.5 on the 7-point scale).

Insert Table 1 about here

Table 2 shows the bivariate correlations between the demographic variable of age[2], TPB components (attitudes, subjective norms, and PBC), personality traits (neuroticism and extroversion), and drivers' willingness to use a mobile phone, hand-held, across the four driving scenarios. Across all scenarios, and as expected based on the TPB, attitudes, subjective norms, and PBC had significant positive correlations with drivers' willingness to use a mobile phone. Additionally, in scenarios 2 (with friends and low urgency) and 4 (with friends and high urgency), age had a significant, but low, negative correlation with drivers' willingness to use a mobile phone. Finally, inspection of the correlations between neuroticism and willingness as well as extroversion and willingness reveal that, with the exception of only one correlation (i.e., between neuroticism and willingness in scenario 1 which was a non-significant, low negative correlation) all correlations were low and positive, although none of these correlations attained significance.

Insert Table 2 about here

Study hypotheses

Hypotheses 1a and 1b constituted manipulation checks of the extent to which the driving scenarios, devised for the study, did in fact evoke differing levels of stress according to the manipulated variables of time urgency (low versus high) and passenger presence (absent versus with friends). A *t* test was performed which compared the marginal means of the low (scenarios 1 and 2) and high (scenarios 3 and 4) time urgency situations in terms of level of driver stress reported. The *t* test revealed, as hypothesised (1a) that those in the high time urgency situations reported significantly higher levels of stress ($M = 4.80$, $SD = 1.42$) than those in the low time urgency scenarios ($M = 2.15$, $SD = 1.20$), $t(157) = -3.35$, $p = .001$.

[2] As a dichotomous variable, sex was not included within these correlational analyses.

A further *t* test was performed which compared the marginal means of the driving when alone (scenarios 1 and 3) and driving with friends as passengers (scenarios 2 and 4) in terms of the level of driver stress reported. As expected (hypothesis 1b), those scenarios where the driver was driving alone were associated with significantly lower levels of reported stress (M = 3.34, SD = 1.15) than the scenarios where the driver was driving with friends as passengers (M = 3.62, SD = 1.20), $t(157) = -2.12$, $p<.001$. These findings suggest that the driving scenario manipulations of time urgency and passenger presence were successful.

Regression analysis predicting drivers' willingness to use a mobile phone from the TPB components and personality traits

Four hierarchical regressions were carried out, for each driving environment, to test the extent to which the TPB components of attitudes, subjective norms, and PBC (Step 2) predicted willingness to use a mobile phone while driving, above and beyond the variance explained by drivers' demographic variables of sex and age (Step 1). The personality traits (neuroticism and extroversion) were also analysed (Step 3) to test the extent to which they predicted drivers' willingness to use a mobile phone while driving above and beyond the demographic and TPB variables. A summary of the regression analyses predicting willingness from the demographic variables, TPB components, and personality traits across all four scenarios can be found in Table 3.

Insert Table 3 about here

Alone and low urgency. In this scenario, the overall model significantly accounted for approximately 38.9% (36% adjusted) of the total variance in drivers' willingness to use a mobile phone, $F(7,150) = 13.62$, $p < .001$. In Step 1, sex and age were entered and accounted for 1% of the variance in willingness to use a mobile phone while driving, which was not

significant, $F(2,155) = 1.14$, $p = .324$. At this step, neither age nor sex was a significant predictor ($\beta = .04$, $p = .655$ and $\beta = -.11$, $p = .171$, respectively). In Step 2, the TPB variables of attitudes, subjective norms, and PBC when entered, accounted for a significant, additional 37% of the variance, above and beyond the variance accounted for by the demographic characteristics, $F(3,152) = 30.85$, $p < .001$. Of the variables in the model at Step 2, both attitudes ($\beta = .23$, $p = .003$) and PBC ($\beta = .46$, $p < .001$) were significant predictors of drivers' willingness. In Step 3, the personality traits (neuroticism and extroversion) were entered and accounted for less than 1% of the variance in drivers' willingness to use a mobile phone above and beyond the variance explained by the demographic and TPB predictors. This variance was not significant, $F(2,150) = 0.14$, $p = .866$. As shown in Table 3, at the final step of the model, with all variables entered, the only significant positive predictors of drivers' willingness to use a mobile phone were attitudes ($\beta = .23$, $p = .043$) and PBC ($\beta = .45$, $p < .001$). The positive beta weights suggested that having stronger attitudes and greater PBC was associated with an increased willingness to use a mobile phone when driving alone while under low urgency.

With friends and low urgency. In this scenario, the overall model significantly accounted for 33.7% (30.7% adjusted) of the total variance in drivers' willingness to use a mobile phone, $F(7,151) = 10.98$, $p < .001$. In Step 1, sex and age were entered, accounting for 3% of the variance in willingness to use a mobile phone while driving which was not significant, $F(2,156) = 2.16$, $p = .119$. At this step, only age was a significant predictor ($\beta = -.16$, $p = .047$). In Step 2, the TPB variables of attitudes, subjective norms, and PBC when entered, accounted for a significant, additional 31% of the variance, above and beyond the variance accounted for by the demographic characteristics, $F(3,153) = 23.79$, $p < .001$. Of the variables in the model at Step 2, age was no longer a significant predictor ($\beta = -.10$, $p = .134$), however, attitudes ($\beta = .22$, $p = .003$), subjective norms ($\beta = .29$, $p < .001$) and PBC ($\beta = .25$, p

=.001) were significant predictors of drivers' willingness. In Step 3, the personality traits (neuroticism and extroversion) were entered and accounted for less than 1% of the variance in drivers' willingness to use a mobile phone above and beyond the demographic and TPB predictors. This variance was not significant, $F(2,151) = 0.86$, $p = .917$. As shown in Table 3, at the final step of the model, with all variables entered, the significant predictors of drivers' willingness to use a mobile phone were attitudes ($\beta = .22$, $p = .003$), subjective norms ($\beta = .29$, $p < .001$), and PBC ($\beta = .25$, $p < .001$). The positive beta weights suggested that having stronger attitudes, a stronger perception of normative influence, and greater PBC was associated with drivers having an increased willingness to use a mobile phone when driving with friends while under low urgency.

Alone and high urgency. In this scenario, the overall model significantly accounted for 35.7% (32.7% adjusted) of the total variance in drivers' willingness to use a mobile phone, $F(7,150) = 11.90$, $p < .001$. In Step 1, sex and age were entered accounting for 1% of the variance in willingness to use a mobile phone while driving which was not significant, $F(2,155) = 0.87$, $p = .422$. At this step, neither age nor sex was a significant predictor ($\beta < -.01$, $p = .983$ and $\beta = -.11$, $p = .193$, respectively). In Step 2, the TPB variables of attitudes, subjective norms, and PBC when entered and accounted for a significant, additional 34% of the variance, above and beyond the variance accounted for by the demographic characteristics, $F(3,152) = 26.90$, $p < .001$. Of the variables in the model at Step 2, both attitudes ($\beta = .33$, $p < .001$) and PBC ($\beta = .36$, $p < .001$) were significant predictors of drivers' willingness. In Step 3, the personality traits (neuroticism and extroversion) were entered and accounted for less than 1% of the variance in drivers' willingness to use a mobile phone above and beyond the demographic and TPB predictors. This variance was not significant, $F(2,150) = .36$, $p = .699$. As shown in Table 3, at the final step of the model, with all variables entered, the significant predictors of drivers' willingness to use a mobile phone

were attitudes (β = .34, p <.001) and PBC (β = .36, p <.001). The positive beta weights suggested that having stronger attitudes and greater PBC was associated with an increase in drivers' willingness to use a mobile phone when driving alone while under high urgency.

With friends and high urgency. In this scenario, the overall model significantly accounted for 34.9% (31.8% adjusted) of the total variance in drivers' willingness to use a mobile phone, $F(7,150) = 11.47$, $p < .001$. In Step 1, sex and age were entered, accounting for a significant 4% of the variance in willingness to use a mobile phone while driving, $F(2,155) = 3.39$, $p < .05$. At this step, only age was a significant predictor (β = -.20, p =.011). In Step 2, the TPB variables of attitudes, subjective norms, and PBC when entered, accounted for a significant, additional 31% of the variance, above and beyond the variance accounted for by the demographic characteristics, $F(3,152) = 23.75$, $p < .001$. Of the variables in the model at Step 2, age remained a significant predictor (β = -.15, p =.024), and attitudes (β = .26, p <.001), subjective norms (β = .26, p <.001) and PBC (β = .26, p =.001) were also all significant predictors of drivers' willingness. In Step 3, the personality traits (neuroticism and extroversion) were entered and accounted for less than 1% of additional variance in drivers' willingness to use a mobile phone above and beyond the demographic and TPB predictors. This variance was not significant, $F(2,150) = 0.11$, p = .897. As shown in Table 3, at the final step of the model, with all variables entered, the significant predictors of drivers' willingness to use a mobile phone were attitudes (β = .26, p <.001) , subjective norms (β = .26, p <.001), and PBC (β = .26, p =.001). The positive beta weights suggested that having stronger attitudes, a stronger perception of normative influence, and greater PBC was associated with drivers' increased willingness to use a mobile phone when driving with friends while under low urgency. Finally, age was also found to be a significant negative predictor of drivers' willingness to use a mobile phone (β = -.15, p =.025), such that, as age increases, driver

willingness to use a mobile phone when driving with friends while under high urgency decreases.

Discussion

The goal of the current study was to enhance understanding of a range of internal and external factors influencing drivers' willingness to use a hand-held mobile phone. Overall, the study's findings supported the predictive efficacy of the TPB. Specifically, it was found that, after controlling for the demographic characteristics of age and sex, the TPB components significantly accounted for drivers' willingness to use a hand-held mobile phone while driving. The findings also revealed that the personality traits of extroversion and neuroticism did not significantly explain drivers' willingness to use a mobile phone above and beyond the demographic and TPB predictors. Finally, the results also revealed that the different driving scenarios were associated with varying levels of induced driver stress and, in particular, drivers reported more stress when driving with friends (as passengers present) than when driving alone as well as when under high rather than low urgency situations.

In relation to hypothesis set 1 (which constituted a manipulation check of the stress evoked across the driving scenarios), the overall pattern of results indicated that drivers' stress varied as a function of the different driving environments with support found for both hypotheses 1a and 1b. Furthermore, these findings were consistent with prior research findings of higher stress levels when under high time urgency than low urgency (Hennessy & Wiesenthal, 1999; Hennessy, Wiesenthal, & Kohn, 2000) and in the presence of other passengers than when alone (e.g., Lam et al., 2003; Walsh et al., 2007).

In relation to Hypothesis 2, support for the predictive efficacy of the TPB across the four driving scenarios was found. Specifically, the results revealed that, across all scenarios, drivers' attitudes and PBC were significant positive predictors of drivers' willingness to use a mobile phone such that more favourable attitudes and greater control perceptions resulted in

increased drivers' willingness to use a mobile phone. These results were in accordance with predictions that more favourable attitudes and greater perceived control (Hypotheses 2a and 2c) resulted in increased driver willingness to use a mobile phone. The results were also consistent with prior empirical evidence, based on driver intentions rather than willingness, which demonstrated that more favourable attitudes and greater PBC predicted intentions to make or receive calls while driving (Walsh et al., 2007, see also Zhou et al., 2009).

In relation to the subjective norm component of the TPB, an interesting pattern of results emerged in that subjective norms were found to be a significant, positive predictor of driver willingness only in the driving scenarios in which drivers were described as driving with friends rather than either of the scenarios in which the driver was said to be driving alone. The positive beta weight indicated that, perceiving greater normative influence, when driving with friends, was associated with an increase in drivers' willingness to use a hand-held mobile phone. It is possible that the normative influence of mobile phone use tends to be more contingent upon the physical presence of passengers. Thus, overall, hypothesis 2b was not supported fully. However, the findings do provide important insight in the potential determinants of engaging in illegal (i.e., hand-held) mobile phone use and, perhaps most importantly, identify that interventions may need to target the normative pressure that drivers perceive when driving with friends if they are to contribute to deterring drivers from engaging in this behaviour.

In examining the role of the personality traits of neuroticism and extroversion on drivers' willingness to use a mobile phone, the results showed that the personality traits did not significantly predict drivers' willingness to use a mobile phone above and beyond the TPB and demographic variables. Specifically, findings showed that neuroticism was not a significant predictor of drivers' willingness to use a mobile, thus, providing no support for hypothesis 3a. This result is consistent with prior research findings where neuroticism levels

did not significantly predict general mobile phone usage (Bianchi & Phillips, 2005). The results also showed that extroversion did not significantly predict willingness to use a mobile phone use, thus, providing no support for hypothesis 3b and departing from previous empirical findings which showed that extroversion levels significantly predicted individuals' general mobile phone use (Bianchi & Phillips, 2005) and engagement in risky driving behaviour (Taubman-Ben-Ari, Mikulincer, & Gillath, 2004). A possible explanation for the neuroticism and extroversion findings of the current study could be that, as has been argued elsewhere (e.g., Ajzen, 2009), personality constructs while not explicitly denoted with the TPB framework, are captured within the other TPB components. Thus, personality constructs may function to influence attitudes, normative influence, and control perceptions rather than influence behavioural outcomes directly (Ajzen, 2009).

Generally, the demographic variables of age and sex were not significant predictors of drivers' willingness to use a mobile phone. The only exception to this conclusion was in the driving 'with friends' while under high urgency scenario where age was a significant, negative predictor indicating that, as drivers' age, they are less willing to use a mobile phone while driving in this situation. This result is consistent with recent findings of younger participants having significantly higher mobile phone use than older participants (Brusque & Alauzet, 2008; Walsh et al., 2008). However, it is to be noted that the failure to find a more consistent pattern of the influence of age across the driving scenarios could have been due to the sample's age range which was inadvertently limited to younger drivers (i.e., mean age of 21.9 years).

From the current study, the findings that drivers' reported stress increased when the scenarios detailed situations of driving under high time urgency and when driving with friends contributes to contemporary understanding of these two factors in the context of driving decisions. By incorporating the TPB framework and the measurement of drivers'

willingness, the current study significantly and consistently accounted for 29%-36% the variance in drivers' willingness to use a mobile phone across all scenarios (comparable to Armitage and Conner's (2001) meta-analytic results), while addressing the methodological issue of accounting for drivers' spontaneous mobile phone use (Walsh et al., 2007). The subjective norm findings were in accordance with prior research (Chen et al., 2006; Oesch, 2009) and expand on the need to consider the physical presence of passengers when examining drivers' mobile phone use.

Despite the contribution of the present study, the findings should be interpreted in light of its limitations. Methodological limitations include the fact this study only sampled university students and had an inadvertently limited age range consisting of younger drivers. This sample limited the external validity of the study, thus, challenging its generalisability to the driving population which includes many non-students and older adults (Australian Bureau of Statistics, 2008). Further, single-item subjective norms and PBC scales were used. Also, the use of a repeated measures design may have inadvertently heightened participants' awareness regarding the study's purpose and, as such, potentially biased participants' responses. However, to the extent that this study aimed to explore the effect of subtle changes in driving context on an individual's willingness, the repeated measures design, in this instance, was most appropriate (and powerful) design for answering our research question. Finally, only the neuroticism and extroversion personality traits were examined in this context. Examining just these traits precluded the possibility that other personality traits may account for drivers' willingness to use a mobile phone.

Future research could address the limitations of the current research by, for instance, sampling a broader age range of adults and adopting a between groups design. Additionally, because drivers' mobile phone use is a more spontaneous behaviour, other traits measuring risky behaviour such as sensation-seeking (Pedersen & McCarthy, 2008; Richer & Bergeron,

2009) and impulsiveness (Dahlen, Martin, Ragan, & Kuhlman, 2005; Taubman-Ben-Ari, 2007) could be examined for their respective contribution to understanding drivers' mobile phone use. Beyond addressing these limitations, future research could investigate the different effects of passenger presence (i.e., sex and quantity of passengers) on drivers' mobile phone use since these effects have been found to influence risky driving (Chen et al., 2000; Oesch, 2009; Regan & Mitsopoulos, 2001). Furthermore, it may be useful, given the predictive efficacy of the TPB in relation to drivers' willingness to use their mobile phones, to explore the ability of the TPB components to predict a drivers' use of particular strategies to avoid engaging in this illegal behaviour, such as pulling over to use one's mobile phone. The TPB could underpin exploration of the factors influencing the extent to which drivers would adopt these alternative, safe behaviours and, most importantly, would provide insight into how such alternative strategies may be promoted (e.g., by heightening perceptions of control over being able to pull over or by promoting the benefits of pulling over to use one's mobile phone).

This study's finding may have notable practical implications in terms of informing future intervention campaigns. Specifically, the findings suggest that in order to curb mobile phone use while driving (irrespective of whether driving alone or with friends and whether driving under low or high time urgency situations), interventions which focus on challenging the perceived benefits of using one's mobile while driving (challenging attitudes) and/or emphasising to drivers that they have control over choosing to use their mobile phone or not (heightening control perceptions) may be potentially effective approaches. Further, these campaigns should also encourage passengers to be aware of the impact they have on drivers and to act responsibly and voice their disapproval regarding drivers' mobile phone use or, alternatively, offer to use the mobile phone on the driver's behalf.

In summary, with current trends indicating drivers' increasing use of mobile phones while driving, the present study has provided important insight into a range of internal and external factors influencing drivers' willingness to use a mobile phone illegally (i.e., hand-held). In particular, the current study provided support for the predictive efficacy of the TPB in relation to predicting drivers' willingness to use their mobile phone while driving across a range of scenario-based driving situations. The insight provided by the current study may be practically useful in that it may, ultimately, assist the development of interventions that better target the factors shown to influence a drivers' decision to utilise their mobile phone, hand-held, while driving. This insight is significant given the heightened crash risk associated with drivers' mobile phone use.

References

Ajzen, I. (1988). *Attitudes, personality and behavior*. Milton Keynes, UK: Open University.

Ajzen, I. (1991).The theory of planned behavior. *Organizational behavior and human decision processes*, *50*, 179–211.

Ajzen, I. (2009). Frequently asked questions [about the TPB]. Retrieved December 4 2009, from: http://www.people.umass.edu/aizen/faq.html

Alm, H., & Nilsson, L. (1995). The effects of a mobile telephone task on driver behaviour in a car following situation. *Accident Analysis & Prevention, 27*, 707-715.

Armitage, C. J., & Conner, M. (2001). Efficacy of the theory of planned behaviour: A meta-analytic review. *British Journal of Social Psychology, 40*, 471-499.

Australian Bureau of Statistics (2008). *Australian Social Trends*, Cat. no. 4102.0, Canberra; Australian Bureau of Statistics, Canberra.

Bianchi, A., & Phillips, J. G. (2005). Psychological predictors of problem mobile phone use. *CyberPsychology & Behavior, 8*, 39-51.

Brookhuis, K. A., de Vries, G., & de Waard, D. (1991). The effects of mobile telephoning on driving performance. *Accident Analysis & Prevention, 23*, 309-316.

Brusque, C., & Alauzet, A. (2008). Analysis of the individual factors affecting mobile phone use while driving in France: Socio-demographic characteristics, car and phone use in professional and private contexts. *Accident Analysis & Prevention, 40*, 35-44.

Cellular News (2008). *Countries that ban cell phones while driving*, Retrieved June 6 2009, from http://www.cellular-news.com/car_bans

Chen, L., Baker, S., Braver, E., & Li, G. (2000). Carrying passengers as a risk factor for crashes fatal to 16- and 17year-old drivers. *Journal of the American Medical Association*, 283, 1578-1582.

Clayson, M. D. (2007). *Illegal to use a handheld cell phone whilst driving*, Retrieved May 15 2009, from http://ezinearticles.com/?Illegal-To-Use-a-Handheld-Cell-Phone-Whilst-Driving&id=488517

Costa, P. T., & McCrae, R. R. (1989). *The NEO-PI/NEO-FFI manual supplement*. Odessa, FL: Psychological Assessment Resources.

Costa, P. T., & McCrae, R. R. (1992a). *Revised NEO Personality Inventory (NEO-PIR) and NEO Five-Factor Inventory (FFI) professional manual*. Odessa, FL: Psychological Assessment Resources.

Costa, P. T., & McCrae, R. R. (1992b). The five-factor model of personality and its relevance to personality disorders. *Journal of Personality Disorders, 6,* 343–359.

Dahlen, E. R., Martin, R. C., Ragan, K., & Kuhlman, M. M. (2005). Driving anger, sensation seeking, impulsiveness, and boredom proneness in the prediction of unsafe driving. *Accident Analysis & Prevention, 37*, 341-348.

Dorn, L., & Matthews, G. (1992). Two further studies of personality correlates of driver stress. *Personality and Individual Differences, 13*, 949-951.

Fishbein, M. I., & Ajzen, I. (1975). *Belief, attitude, intention, and behavior: An introduction to theory and research*. Reading, MA: Addison-Wesley.

Francis, J. J., Eccles, M. P., Johnston, M., Walker, A., Grimshaw, J., Foy, R., Kaner, E. F., Smith, L., & Bonetti, D. (2004) *Constructing questionnaires based on the theory of planned behaviour. A manual for health services researchers*, University of Newcastle.

Gibbons, F. X., Gerrard, M., Blanton, H., & Russell, D. W. (1998). Reasoned action and social reaction: Willingness and intention as independent predictors of health risk. *Journal of Personality and Social Psychology, 74*, 1164-1180.

Gulian, E., Debney, L. M., Glendon, A. I., Davies, D. R., & Matthews, G. (1989). Coping with driver stress. In F.J. McGuigan, W.E. Sime & J.M. Wallace (Eds.), *Stress and tension control* (pp. 173-186). New York: Plenum.

Hennessy, D. A., & Wiesenthal, D. L. (1999). Traffic congestion, driver stress and driver aggression. *Aggressive Behavior, 25*, 409-423.

Hennessy, D. A., Wiesenthal, D. L., & Kohn, P. M. (2000). The influence of traffic congestion, daily hassles, and trait stress susceptibility on state driver stress: An interactive perspective. *Journal of Applied Biobehavioral Research, 5,* 162-179.

Lajunen, T. (2000). Personality and accident liability: Are extraversion, neuroticism and psychoticism related to traffic and occupational fatalities? *Personality and Individual Differences, 31*, 1365-1373.

Lajunen, T., & Summala, H. (1995). Driving experience, personality, and skill and safety-motive dimensions in drivers' self assessment. *Personality and Individual Differences, 19*, 307-318.

Lam, L. T. (2003). Factors associated with young drivers' car crash injury: comparisons among learner, provisional, and full licensees. *Accident Analysis & Prevention, 35*(6), 913-920.

Lam, L. T., Norton, R., Woodward, M., Connor, J., & Ameratunga, S. (2003). Passenger carriage and car crash injury: a comparison between younger and older drivers. *Accident Analysis & Prevention, 35*(6), 861-867.

Lee, C., & Abdel-Aty, M. (2008). Presence of passengers: Does it increase or reduce driver's crash potential? *Accident Analysis & Prevention, 40*, 1703-1712.

Lin, M.-L., & Fearn, K. T. (2003). The provisional license: Nighttime and passenger restrictions--a literature review. *Journal of Safety Research, 34*(1), 51-61.

Lissy, K., Cohen, J., Park, M., & Graham, J. D. (2000). Cellular phones and driving: Weighing the risks and benefits. *Harvard Center for Risk Analysis, 86*, 1–6.

Matthews, G., Dorn, L., & Glendon, A. I. (1991). Personality correlates of driver stress. *Personality and Individual Differences, 12*, 535-549.

McCrae, R. R., & Costa, P. T. (1995). Trait explanations in personality psychology. *European Journal of Personality, 9*, 231–252.

McCrae, R. R., & John, O. (1992). An introduction to the five-factor model and its applications. *Journal of Personality, 60,* 174-214.

McKnight, A. J., & McKnight, A. S. (1993). The effect of cellular phone use upon driver attention. *Accident Analysis & Prevention, 25*, 259-265.

Metsapelto, R., & Pulkkinen, L. (2003). Personality traits and parenting: Neuroticism, extraversion and openness to experience as discriminative factors. *European Journal of Personality, 17,* 59-78.

Oesch, S. L. (2009, Feburary 10). *Passenger and nighttime restrictions for young drivers.* Paper presented before the Maryland House Committee on Environmental Matters on House Bill 303, Heart Diseases and Stroke, Virginia, United States.

Ouellette, J. A., & Wood, W. (1998). Habit and intention in everyday life: The multiple processes by which past behavior predicts future behavior. *Psychological Bulletin, 124,* 54–74.

Pedersen, S., & McCarthy, D. M. (2008). Person-environment transactions in youth drinking and driving. *Psychology of Addictive Behaviors, 22*, 340-348.

Pennay, D. (2008). *Community attitudes to road safety: Community attitudes survey wave 20*, (Road Safety Report 3). Canberra: Australian Transport Safety Bureau.

Preusser, D. F., Ferguson, S. A., & Williams, A. F. (1998). The effect of teenage passengers on the fatal crash risk of teenage drivers. *Accident Analysis & Prevention, 30*(2), 217-222.

Redelmeier, D. A., Tibshirani, R. J. (1997). Association between cellular-telephone calls and motor vehicle collisions, *The New England Journal of Medicine, 336*, 453-458.

Regan, M. A., & Mitsopoulos, E. (2001). *Understanding passenger influences on driver behaviour: implications for road safety and recommendations for countermeasure development*. Report No. 180. Monash University Accident Research Centre, Victoria, Australia.

Rhodes, R. E., Courneya, K. S., & Jones, L. W. (2004). Personality and social cognitive influences on exercise behavior: Adding the activity trait to the theory of planned behavior. *Psychology of Sport and Exercise, 5*, 243-254.

Richer, I., & Bergeron, J. (2009). Driving under the influence of cannabis: Links with dangerous driving, psychological predictors, and accident involvement. *Accident Analysis & Prevention, 41,* 299-307.

Robins, R. W., Fraley, R. C., Roberts, B. W., & Trzesniewski, K. H. (2001). A longitudinal study of personality change in young adulthood. *Journal of Personality, 69,* 617-640.

Stead, M., Tagg, S., MacKintosh, A. M., & Eadie, D. R. (2004). Development and evaluation of a mass media theory of planned behaviour intervention to reduce speeding. *Health Education Research*, 20, 36-50.

Stokols, D., Novaco, R. W., Stokols, J., & Campbell, J. (1978). Traffic congestion, type A behavior, and stress. *Journal of Applied Psychology, 63,* 467-480.

Taubman-Ben-Ari, O., Mikulincer, M., & Gillath, O. (2004). The multidimensional driving style inventory-scale construct and validation. *Accident Analysis & Prevention, 36*, 323-332.

Taubman-Ben-Ari, O. (2007). Motivational sources of driving and their associations with reckless driving cognitions and behavior. *European Review of Applied Psychology, 58*, 51-64.

Virginia Tech Transportation Institution (2009). *New Data from VTTI Provides Insight into Cell Phone Use and Driving Distraction*, Retrieved September 17 2009, from http://www.vtti.vt.edu/PDF/7-22-09-VTTI-Press_Release_Cell_phones_and_Driver_Distraction.pdf

Walsh, S. P., & White, K. M. (2006). Ring, ring, why did I make that call? Beliefs underlying Australian university students' mobile phone use. *Youth Studies Australia, 25*, 49-57.

Walsh, S. P., White, K. M., Hyde, M. K. & Watson, B.C. (2008). Dialling and Driving: Factors Influencing Intentions to Use a Mobile Phone While Driving. *Accident Analysis and Prevention, 40*, 1893-1900.

Walsh, S. P., White, K. M., Watson, B., & Hyde, M. K. (2007). *Psychosocial factors influencing mobile phone use while driving*. Canberra: Australian Transport Safety Bureau, Report no. RSRG 2007-06.

Wickens, C. M., & Wiesenthal, D. L. (2005). State driver stress, traffic congestion, and trait stress susceptibility. *Journal of Applied Biobehavioral Research, 10*, 83-97.

Williams, A. F., Ferguson, S. A., & McCartt, A. T. (2007). Passenger effects on teenage driving and opportunities for reducing the risks of such travel. *Journal of Safety Research, 38*, 381-390.

Young, K., Regan, M., & Hammer, M. (2003). *Driver distraction: a review of the literature*, Monash University Accident Research Centre, Report No. 206. Monash University Accident Research Centre, Melbourne.

Zhou, R., Wu, C., Rau, P.-L. P., & Zhang, W. (2009). Young driving learners' intention to use a handheld or hands-free mobile phone when driving. *Transportation Research*

Part F: Traffic Psychology and Behaviour, 12(3), 208-217.

Table 1

Descriptive Statistics of Driver's Willingness to Use a Mobile Phone, Sex, Age, Attitudes, Subjective Norms, PBC, Neuroticism, and Extroversion Across the Four Scenarios

	Scenario 1 Alone and Low Urgency	Scenario 2 With Friends and Low Urgency	Scenario 3 Alone and High Urgency	Scenario 4 With Friends and High Urgency
Drivers' Willingness[a]	4.32(1.87)	3.36(1.80)	3.92(1.90)	3.22 (1.90)
Sex[b]	Males (n = 75)	Females (n = 85)	-	-
Age[b]	21.94 (5.52)	-	-	-
Attitudes[a]	3.02(1.51)	2.71(1.49)	2.66(1.51)	2.65(1.78)
Subjective Norms[a]	2.19(1.39)	2.19(1.45)	2.20(1.41)	2.16(1.36)
PBC[a]	4.09(1.74)	3.87(1.76)	3.59(1.74)	3.67(1.75)
Neuroticism[b]	33.29(7.83)	-	-	-
Extroversion[b]	42.71(6.57)	-	-	-

[a] Scales ranged from (1) *strongly disagree* to (7) *strongly agree,* where higher scores indicated more of the construct.

[b] Descriptive statistics provided are based on the study's overall sample.

Table 2

Bivariate Correlations of the Demographic Variables, TPB Measures, Personality Traits, and Drivers' Willingness to Use a Mobile Phone to Use a Mobile Phone Across all Four Scenarios

Scenario 1 Alone and Low Urgency	1	Scenario 2 With Friends and Low Urgency 2	3	4	5	6	7
1. Drivers' Willingness		-.16*	.38***	.44***	.42***	.02	.04
2. Age	-.12		-.12	.08	-.02	-.02	-.04
3. Attitudes	.46***	-.06		.30***	.34***	-.09	.10
4. Subjective Norms	.24**	-.03	.38***		.35***	.09	.01
5. PBC	.58***	-.08	.48***	.27***		-.01	.13
6. Neuroticism	-.07	-.02	-.08	.13	-.07		-.33***
7. Extroversion	.14	-.04	.16*	-.003	.16*	-.33**	

Scenario 3 Alone and High Urgency	1	Scenario 4 With Friends and High Urgency 2	3	4	5	6	7
1. Drivers' Willingness		-.21**	.41***	.40***	.42***	.05	.03
2. Age	-.11		-.10	-.02	-.07	-.02	-.04
3. Attitudes	.48***	-.10		.21**	.32***	-.07	.07
4. Subjective Norms	.20*	-.02	.22**		.28***	.14	-.003
5. PBC	.50***	-.06	.40***	.26***		-.07	-.07
6. Neuroticism	.02	-.02	-.05	.16*	-.06		-.33***
7. Extroversion	.06	-.04	.06	-.01	.09	-.33***	

*$p < .05$. **$p < .01$. ***$p \leq .001$.

Table 3

Regression Analyses Predicting Willingness to Use a Mobile Phone While Driving from the Demographic Variables, TPB Components, and Personality Traits Across all Four Scenarios

	Scenario 1 Alone and Low Urgency	*B*	β	r^2	Δ r^2
Step 1	Sex	.13	.09	.01	.01
	Age	-.04	-.06		
Step 2	Attitudes	.29	.23**	.39	.37***
	Subjective Norms	.04	.04		
	PBC	.49	.45***		
Step 3	Neuroticism	-.01	-.03	.39	.001
	Extroversion	.004	.01		
	Scenario 2 With Friends and Low Urgency	*B*	β	r^2	Δ r^2
Step 1	Sex	.09	.07	.03	.03
	Age	-.05	-.10		
Step 2	Attitudes	.27	.22**	.34	.31***
	Subjective Norms	.37	.29***		
	PBC	.26	.25***		
Step 3	Neuroticism	-.004	-.02	.34	.001
	Extroversion	-.01	-.03		
	Scenario 3 Alone and High Urgency	*B*	β	r^2	Δ r^2
Step 1	Sex	.01	.04	.01	.01
	Age	-.04	-.05		
Step 2	Attitudes	.42	.34***	.35	.34***
	Subjective Norms	.06	.03		
	PBC	.39	.36***		
Step 3	Neuroticism	.02	.06	.36	.003
	Extroversion	.01	.02		

	Scenario 4 With Friends and High Urgency	*B*	β	r^2	Δ r^2
Step 1	Sex	-.22	-.03	.04	.04*
	Age	-.07	-.15*		
Step 2	Attitudes	.31	.26***	.35	.31***
	Subjective Norms	.37	.26***		
	PBC	.28	.26***		
Step 3	Neuroticism	.01	.03	.35	.001
	Extroversion	.002	.01		

Note. Beta values provided are at the final step where all variables had been entered into the regression model.

*$p < .05$. **$p < .01$. ***$p \leq .001$.

Appendix A

Driving scenario descriptions provided to participants in the study

(**Scenario 1)**
It is a weekday and the weather is fine, and you are driving in medium traffic density. You are driving **alone**, heading home and **going well for time (i.e., you are not in a hurry).**
(**Scenario 2)**
It is a weekday and the weather is fine, and you are driving in medium traffic density. You are driving **with a group of friends**, heading home and **going well for time (i.e., you are not in a hurry).**
(**Scenario 3)**
It is a weekday and the weather is fine, and you are driving in medium traffic density. You are driving **alone**, heading home. **However, you are running late (i.e., you are in a hurry).**
(**Scenario 4)**
It is a weekday and the weather is fine, and you are driving in medium traffic density. You are driving **with a group of friends**, heading home. **However, you are running late (i.e., you are in a hurry).**