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Extension of the theory of planned behaviour incorporating an improved measure of emotion: An application to speeding

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Extension of the Theory of Planned Behaviour Incorporating an Improved Measure of
Emotion: An Application to Speeding

Chloe Jones

A report submitted in Partial Fulfilment of the Requirements for the Award of Bachelor of
Arts (Psychology) Honours, Faculty of Computing, Health and Science,

Edith Cowan University.

Submitted (October, 2010)

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Extension of the Theory of Planned Behaviour Incorporating an Improved Measure of
Emotion: An Application to Speeding

Abstract

Speeding is related to crashes. The motivational factors underlying speeding must be identified to inform road safety. The Theory of Planned Behaviour (TPB) suggests that behavioural intention is predicted by attitude, subjective norm and perceived behavioural control. The present research was an attempted extension of the Theory of Planned Behaviour (TPB), in a speeding context. It was identified that the scales used in the TPB are not appropriately capturing emotion, and that the lack of emotion measures may be responsible for unaccounted for variance in intention. Questionnaires were developed based on Ajzen's (2006) and Bradley and Lang's (1999) methods. It was hypothesised, based on Bradley and Lang's (1999) theory that the incorporation of an additional measure of emotion utilising arousal, would account for increased variance associated with intention to speed. This was not supported, with arousal accounting for an additional 0.01% of variance. Furthermore it was hypothesised that past behaviour would account for increased variance associated with the intention to speed, which was supported. Past behaviour accounted for an additional 6.5% of intention variance. The traditional TPB model accounted for 53.2% of variance in speeding intention, with the proposed extended model accounting for a further 8.5% of variance in speeding intention. Past behaviour, attitude and perceived behavioural control were identified as the most influential predictors of intention. The thesis was concluded by outlining the theory, practice and policy implications, based upon the results. The methodological issues were considered and it was proposed that further research is needed examining emotion, arousal and their links to behavioural intention.

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Extension of the Theory of Planned Behaviour Incorporating an Improved Measure of Emotion: An Application to Speeding

The examination of intention to speed is important to road safety, as speeding is often perceived as normalised and tolerable behaviour (Parker, Manstead, Stradling, Reason, & Baxter, 1992; Stradling et al., 2008), with drivers tending to cite appropriate speed as higher than the posted speed limit (Silcock, Smith, & Knox, 2000), despite awareness that excessive speed heightens the likelihood of having a crash, increases the severity of the resultant crash and increases the potential of injury if a crash occurs (Aarts & Van Schagen, 2006; Brown & Cotton, 2003; Fernandes, Job & Hatfield, 2005; Fuller, Bates, et al., 2008; Fuller, Hannigan, et al., 2008; Mountain, Hirst & Maher, 2005; Stradling, et al., 2008). Worldwide, the collective road death toll has surpassed thirty million deaths, and currently over 1.2 million people are killed in road accidents each year (Richter, Berman, Friedman, & Ben-David, 2006). A further 50 million are injured in road accidents each year, costing approximately \$518 billion (Richter et al., 2006). In Western Australia alone, speed was involved in 35% of crashes resulting in death, 16% of crashes leading to hospitalisation, and 16% of other crashes in 2006 and remains the leading cause of death and severe injury on the roads (Office of Road Safety, 2008).

Definition of Speeding

Speeding may be defined as driving at a speed that is faster than appropriate given the existing conditions including weather, light, and traffic or state of the vehicle, driver experience and ability (Silcock et al., 2000). Any of these, or in combination, increase task demand characteristics, exceed the capability of the driver, leading to the greater likelihood of error or crash involvement (Silcock et al., 2000). Speeding may also be defined as driving at speeds in excess of the posted speed limit (Silcock et al., 2000); although illegal it does not

ensure that the task demand characteristics will defy driver capability (Fuller, Bates, et al., 2008).

Acceptance and Prevalence of Speeding

In a large scale Australian study, 75% of drivers suggested that exceeding the speed limit was tolerable, half found it tolerable to exceed a 60km/h speed limit by 5km/h and 40% believed enforcement would permit exceeding a 100km/h speed limit by 10km/h (Mitchell-Taverner, Zipparo, & Goldsworthy, 2003). Research has revealed that speeding is common, with 60% of Australian drivers admitting to speeding on occasion (Mitchell-Taverner et al., 2003). Similarly, speed limit compliance was evidenced to decline in Western Australia from 2005 to 2007, with only 57% and 56% acting in accordance with speed limits in the Perth Metropolitan region and rural regions respectively (Office of Road Safety, 2009).

Examination of 1005 British drivers self reported speeding revealed that the behaviour clustered into three categories. Firstly 52 % of drivers were classified as speed limit compliant, secondly 33% as moderate speeders, and lastly 14% were representative of excessive speeders (defined as exceeding the limit by 20 mp/h), with 7% exceeding the limit by 20 mp/h on all roads examined (built up, non built up, dual carriageway) (Stradling et al., 2008). Similarly an examination of 852 Queensland drivers self reported speed, indicated that 26% of drivers could be classified as speed limit compliant, 59% as moderate speeders and 15% as excessive (20 km/h or more over the limit) (Soole, Watson, & Lennon, 2009) . It is apparent that speeding behaviour is a local, national and international issue for road safety (Stradling et al., 2007).

Impact of Excessive Speed

Drivers and the traffic literature alike tend to regard exceeding the legal speed limit by 20km/h as excessive (Stradling et al., 2007). The Western Australian Police highlighted the seriousness of speeding 20km/h over the limit, when in 2008 they cited higher crash risk as

reason for imposing greater penalties for speeding by 19km/h (Office of Road Safety, 2008). It is important to examine speeding 20 kilometres over the limit given that it increases the likelihood of crashing by thirty two times (Office of Road Safety, 2008) and excessive speeders have been found to be involved in crashes one and a half times more than speed limit compliant drivers (Stradling et al., 2008).

Motivation and Intention to Speed

Road traffic research often focuses on personality traits, demographic information, and situational factors to investigate speeding behaviour, rather than examining predictors that are motivational in nature and can be potentially changed (Conner, Lawton, Parker, Chorlton, Manstead & Stradling, 2007). For instance, research suggests, drivers derived from a general population perceive other drivers speeding behaviour to be undertaken due to time pressure, lack of police enforcement, underestimation of risks associated, speed limit unreliability, and overestimation of driving capability (Kanellaidas, Golias, & Zarifopoulos, 1995). Whereas examination of a student population identified different reasons for other drivers speeding behaviour, namely ego gratification, thrill (excitement/ risk taking), time pressure, inattention, and disdain of driving (Gabany, Plummer, & Grigg, 1997). It is acknowledged that speeding can occur unintentionally (McKenna, 2005), for example, to maintain progress in conjunction with the rest of the traffic (Lawton, Conner, & Parker, 2007). Such underlying reasons for speeding may be widespread in the population and somewhat acceptable instrumental violations, which are dependent on the individual circumstances, but are unlikely to result in excessive speeding (Lawton et al., 2007). Excessive speeding is considered a deliberate act, based on motivation; therefore the factors underlying speeding intention must be examined to determine potential aspects that may be amenable to change (Fuller, Hannigan et al., 2008). It is posited that if the underlying motivations for speeding were known, road safety campaigns and interventions could potentially target these to increase speed limit compliance in the

general population (Fuller et al., 2008). One parsimonious model has examined these motivational influences;

Underlying Predictors of Speeding Intention: The Theory of Planned Behaviour

The Theory of Planned Behaviour (TPB) has been utilised for the examination of a range of traffic violations and driving behaviours including speeding (De Pelsmacker & Janssens, 2007; Newnam, Watson, & Murray, 2004). The examination of the TPB in a speeding context is potentially useful given that it allows for the identification of variables predictive of speeding, can account for the associations between demographic information and behaviour, and can locate variables that could be potentially targeted in road safety campaigns and interventions (Elliot, Armitage, & Baughan, 2004). However, further examination of the TPB is needed as suggestions have been raised that the accounted for variance in intention may be increased by the inclusion of emotion (Manstead & Parker, 1995).

The TPB has surfaced as a prominent, empirically sound and significant theory in the study of human behaviour (Ajzen, 1991; Ajzen, 2002), emerging as the successor of the Theory of Reasoned Action, in order to overcome inadequacies in the previous model, including the inability to account for behaviours not under complete volitional control (Ajzen, 1991). It is commonly employed to enable prediction of an individual's intentions to undertake specific behaviours and can also provide understanding of such behaviour (Ajzen, 1991; Ajzen, 2002). The TPB assumes that all human behaviours are led by underlying beliefs; however, these do not always have predictive potential, but merely contribute to the depth of understanding regarding the establishment of the components (Ajzen, 1991; Ajzen, 2002) and examinations of the function of beliefs as the basis of the three components comprising intention have only gained mild success (Ajzen, 1991). In the TPB intentions are a

function of underlying attitude, subjective norm (SN) and perceived behavioural control (PBC), represented in diagrammatic form in Figure 1.

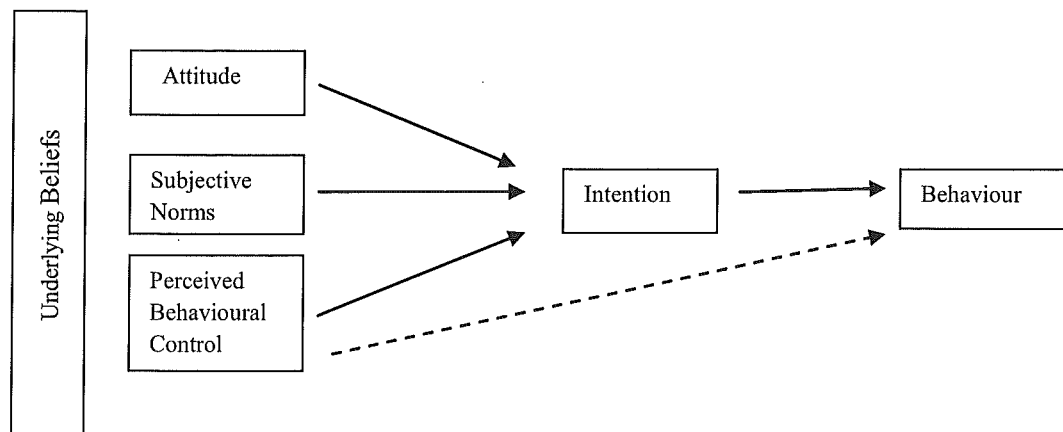


Figure 1 Theory of Planned Behaviour

Intention

The TPB postulates that an individual's intention to execute a behaviour, that is the embodiment of motivation, their willingness to attempt, and extent to which they are prepared to exert themselves, is the immediate precursor of actual behaviour (Ajzen, 1998). The greater the strength of the intention to undertake behaviour, the greater the likelihood the behaviour will occur (Ajzen, 1991; Ajzen, 2002). Intention is predictive of behaviour if it is under complete volitional control, insofar as the individual can independently choose to engage or refrain from behavioural execution (Ajzen, 1991; Ajzen, 2002). An individual's intentions are guided by attitude, SN and PBC and the TPB postulates that the more favourable the attitude to a behaviour, the more favourable the SN for the behaviour, and the higher the PBC, the greater the individual intention to execute the examined behaviour (Ajzen, 1998; Ajzen, 2002b). Intention is postulated to reflect behaviour appropriately, with large associations often evidenced between intentions and behaviour (Ajzen, 1991; Armitage & Conner, 2001)

Perceived Behavioural Control

PBC is defined as the perceived ease or difficulty of executing a specific behaviour, in which aspects that potentially hamper the capability of performing behaviour are considered (Ajzen, 1998). PBC differs across circumstances and behaviours (Ajzen, 1991). PBC has two main components; firstly self efficacy is the anticipated capability of executing the behaviour. Self efficacy encompasses the internal control factors, such as ease and difficulties anticipated to be involved such as individual weakness, degree of skills and emotions and is indicative of self belief in being able to execute the behaviour. Secondly, controllability reflects an external control factor, and encompasses the perception that the execution of behaviour is entirely up to the individual. It encompasses the perceived probability that they could undertake the behaviour if they so chose based upon resources, opportunities, and potential barriers (Ajzen, 1991; Ajzen, 2002; Ajzen, 2002b; Ajzen & Fishbein, 2004). PBC has a direct and indirect relationship with behaviour, firstly mediated through intention, and secondly, given an individual's accurate appraisal of PBC, it can be utilised as an alternative for actual control and be used in accordance with intention to enhance behavioural prediction (Ajzen, 1991; Ajzen, 2002; Ajzen, 2002b).

Subjective Norm

The SN reflects the perceived social demand to execute or refrain from a particular behaviour (Ajzen, 1998). Subjective norm consists of injunctive norms, the perception of whether salient others would or would not endorse the nominated behaviour, although this is not necessarily consistent with the actual beliefs of important others. In addition subjective norm incorporates the motivation to comply with important referents, presumably influenced by the rewards or punishments anticipated to be received from referents dependent on the behavioural outcome (Ajzen, 2002; Ajzen & Fishbein, 2004; Burnkrant, 1988). Generally SN

is considered the weakest of the TPB predictors (Armitage & Conner, 2001), liable for non significant contributions in half of TPB examinations (Ajzen, 1991),

Attitude

Attitudes are evaluative judgements that represent the beliefs about the outcome associated with behaviour execution, which may be favourable or unfavourable (Ajzen, 1998). The formation of a positive attitude is due to greater perceived advantages than disadvantages of a given behaviour (Ajzen & Fishbein, 2000). Generally attitude is the most significant predictor of behavioural intention in the TPB, stronger than the influence of SN or PBC (Ajzen, 1991; Trafimow & Finlay, 1996). Generally a positive attitude, with supportive subjective norms, increases prediction (Ajzen & Fishbein, 1994). Attitude has two components; the cognitive component of attitude refers to the thoughts and judgements that individuals have in regards to, and prompted by the attitude object, or the potential of executing behaviour (Ajzen, 1991). Alternatively, the emotional component of attitude refers to the emotions, drives or feeling individuals have in regards to, and prompted by, the attitude object, or the potential of executing behaviour (Arvola et al., 2008; Breckler & Wiggins, 1989; French et al., 2005; Giner-Sorolla, 2004; Keer, Van Den Putte & Neijens, 2010). The cognitive component of attitude is measured in the TPB by examining the extent to which an outcome would be *valuable- worthless or harmful- beneficial*, similarly the emotional component of attitude is measured by examining the extent to which the outcome would be *pleasant-unpleasant or enjoyable- unenjoyable* (Ajzen, 2006).

Attitude measures utilised in the TPB rely on general evaluations in which no differentiation between the emotional and cognitive components of attitude are made (Ajzen, 2006), and it is apparent that both components are measured using valence (Giner-Sorolla, 2004). This is despite suggestions that emotion and cognition contribute to unique intention variance, which considered together are superior predictors of behaviour, and despite that

emotion has been found to contribute to intention over and above the contribution of cognition (Arvola et al., 2008; Breckler & Wiggins, 1989; French et al., 2005; Giner-Sorolla, 2004; Kraft, Rise, Sutton, & Roysamb, 2005; Lawton, Conner & McEachan, 2009; Trafimow & Sheeran, 1998; Trafimow et al., 2004). Valence in psychological research is defined as the extent to which an emotional experience is *good-bad*, *pleasant-unpleasant* indicative of a dimension of emotion in terms of its positivity or negativity (Colombetti, 2005), consistent with semantic differential scales used in the TPB examination of attitude. It is postulated that the good/ bad nature of feelings lead to positive or negative evaluations (Colombetti, 2005). In addition the positive or negative emotions can be guided by negative and positive evaluations regarding an item, or outcome, as good or bad (Colombetti, 2005). It is suggested that the traditional method used to examine the emotional component of attitudes is not sufficiently capturing emotion associated with behavioural execution (Conner & Armitage, 1998).

Support for the Theory of Planned Behaviour

The TPB has received support in social behavioural domains, with meta-analyses indicating that the traditional TPB variables (attitude, SN and PBC) explain an accumulated 39-50% of variance in intentions, and intentions and PBC collectively explain 20-40% of variance in behaviour (Ajzen, 1991; Armitage & Conner, 2001; Connor & Armitage, 1998, Elliot, Armitage, & Baughan, 2007; Elliot & Thomson 2010; Sutton, 1998). A meta-analysis of 185 studies suggested attitude and SN accounted for 33% to 50% of intention variance, with the addition of PBC enhancing predicted variance by 5% to 12% (Armitage & Conner, 2001). Furthermore the intention-behaviour correlation was 0.47, with the TPB accounting for 27% of variance in behaviour (Armitage & Conner, 2001). Research indicates that the TPB generally explains a substantial amount of variance of actual behaviour, corresponding to large to medium effect sizes, supporting the abilities of the TPB and providing support for

intention as a potential for altering behaviour (Armitage & Conner, 2001; Conner et al., 2007).

Although the effect sizes of current TPB studies are considered large (exceeding 25%, as defined by Cohen (1998), supporting the predictive utility of the TPB (Elliott & Thomson, 2010) and its sufficiency in prediction considering the limits imposed by behavioural reliability (Ajzen, 1991), issues and ambiguities remain present (Ajzen, 2002). The TPB has been criticised for emphasising cognition as opposed to emotion, with the predictors in the TPB traditionally ascertained using cognitive measures, suggesting that behavioural intentions are reasoned and planned, whilst overlooking and not explicitly defining and examining emotion (Conner & Armitage, 1998; DePelsmacker & Janssens, 2007; Fishbein, 2001, French et al., 2005; Manstead & Parker, 1995; Mohiyeddini, Pauli, Bauer, & Whitelands). It appears that the role of emotion has been underestimated in the TPB, in which no differentiation has been made between evaluations and feelings (Manstead & Parker, 1997). Ajzen and Fishbein (2000) acknowledge that it is likely emotion is involved in TPB processes, and cite arousal as a potential influence (Ajzen & Fishbein, 2000). It has been suggested that incorporating an improved measure of emotion, in addition to valence type measures could enhance the TPB's predictive utility.

Inclusion of Additional Variables – Past Behaviour

Although not contained in the original model, Ajzen (2002) calls for past behaviour to be included in TPB research to enhance the predictive utility of the model (Ajzen, 2002), even though it does not add to the understanding of behaviour. It has been suggested that the exclusion of past behaviour may contribute to the disparity between attitude and ensuing behaviour (DePelsmacker & Janssens, 2007). The premise of the TPB allows for the insertion of further predictors if it can be demonstrated that they could account for a significant amount of intention variance after the standard variables are accounted for (Ajzen, 1991). Past

behaviour's influence on future behaviour is not mediated entirely by the TPB predictor variables (Ajzen, 2002) and has been found to be more predictive than the TPB variables in examining intention and behaviour (Ajzen, 1991; Conner & Armitage, 1991). Some theorists have suggested that past behaviour influences intention through the recurring execution of a behaviour creating a habit, which is automatically accessed without the conscious influence of attitude, subjective norm and PBC (Bentler & Speckhart, 1979; Conner et al., 2007). This proposition has received little support with suggestion that it is incorrect to treat past behaviour as representative of habit (Ajzen, 2002). Although it is acknowledged that past behaviour is likely to predict future behaviour, it is likely this is more reflective of internal and external dynamics and decision processes that contribute to previous and future behavioural execution, rather than evidence of habitual processing (Ajzen, 1991; Ajzen 2002). This notion was supported by Forward (2009) in which past behaviour was found to be highly correlated with the TPB variables, indicative of a reasoned process rather than an automatic one (Forward 2002).

Theory of Planned Behaviour in a Speeding Context

Support for utilising the TPB in road traffic research has been evidenced, with prior research confirming that the TPB variables of attitude, SN and PBC are individually rigorous predictors of the intention to speed. As evidenced in Table 1 the TPB has collectively explained similar amounts of variance in intentions evidenced in general meta-analyses of the TPB (Armitage and Baughan, 2007; De Pelsmacker & Janssens, 2007; Elliott, et al., 2003; Elliott, Manstead & Parker 1996; Newnam, Watson & Murray, 2004, Parker, Manstead, Stradling, & Reason, 1992; Parker, Manstead, Stradling, Reason, & Baxter, 1992; Stead, Tagg, MacKintosh & Eadie, 2005).

Perceived Behavioural Control

The examination of PBC is imperative to speeding, given that speeding has been demonstrated to be the hardest traffic violation to refrain from, compared to driving under the influence of alcohol, tailgating and risky overtaking (Parker, Manstead, Stradling & Reason, 1992). PBC has been evidenced to be the greatest predictor of speeding intention in a number of studies examining speeding intention (Elliott et al., 2003; Parker, Manstead, Stradling, Reason, & Baxter, 1992; Stead et al., 2005) and older drivers, and female drivers have reported greater perceived control over speeding than younger and male drivers (Parker et al., 1992). Stead et al. (2005) conducted a longitudinal examination of the influence of speeding campaigns on speeding intention, based on the TPB variables, with PBC evidenced as the most predictive of speeding intention across four surveys (Stead et al., 2005). Parker et al. (1992b) used hypothetical vignettes to examine 881 English drivers' intention to speed by 10 mp/h. Findings indicated PBC was the best predictor of speeding intention, accounting for an additional 14.5% of intention to speed than the traditional TPB model suggesting speeding is not under complete volitional control (Parker et al., 1992b). Findings from Gordon and Hunt (1998) indicate that PBC significantly contributed to speeding accounting for 9% and 17% of the variance of intention to speed on rural and urban roads respectively.

The PBC concept has been met with mixed findings in the literature. Some suggest that speeding intention is related to heightened perceptions of PBC (Forward, 2009; Forward, 2010; Stead et al., 2005) with speeders having an illusory perception of control over the driving task, inflated perceptions of self control, as well as overestimation of their driving capabilities (McKenna, 1991; Forward, 2009; Forward, 2010; Stead et al., 2005). It has been suggested that high PBC is always present in a driving context as the driver selects the speed driven (DePelsmacker & Janssens, 2007). Although, other research has evidenced negative correlations between PBC and intention, suggesting intenders perceive that they have less

control over speeding than do their non-intender counterparts (Elliott et al., 2003; Forward, 2009; Newnam et al., 2004; Parker et al., 1992b). Parker et al. (1992) offer a suggestion that, in order to protect self-esteem, intenders indicate they have minimal control over speeding behaviour (Parker et al., 1992).

Subjective Norm

The TPB's element of subjective norm is important in the study of speeding given that speeding is largely a normative act and attracts little stigma from society, emphasising the role norms play in rendering speeding acceptable (Stead et al., 2005). The SN component has been considered to have the least predictive utility of TPB predictors in a speeding context, although it has been found to be a significant predictor of speeding intention (Gordon & Hunt, 1998; Haglund & Aberg, 2000). The addition of subjective norm has been evidenced to account for 6% of speeding intention in a Swedish general population (Aberg, 1999). SN has been found to significantly contribute to speeding intention on a rural road, although it was the weakest of the TPB predictors, and failed to contribute to prediction of speeding intention on urban roads (Gordon & Hunt, 1998). Inconsistent with the majority of the literature, Parker et al. (1992) found subjective norm to be a superior predictor of intention to speed by 20 mp/h, compared with attitude, although this may be due to the relatively more weighted emphasis on SN than the norm in TPB studies and the use of descriptive rather than injunctive norms (Parker et al., 1992).

Speed choice may be influenced by important others including partners, friends and family, among others (Fleiter, Watson, Lennon & Lewis, 2006; Fuller et al., 2008; Paris & Van den Brouke, 2008). There has been suggestions that significant others' perceived opinions are likely to be important to speeding, given that is a social behaviour, which can potentially affect others (Conner et al., 2003; Parker et al., 1992). Fleiter et al (2006) examined the influence of significant others on speeding behaviour, with findings indicating

that the extent to which important others were perceived to support speeding was related to higher speeding frequency regardless of the age or gender of drivers examined (Fleiter et al., 2006), which has been replicated in other contexts (Fleiter, Lennon, & Watson, 2010; Forward, 2010)

Alternatively, suggestions have been made that significant others' views are not held with importance in regards to speeding, instead situational specific norms have more impact, such as the speed of other drivers emphasising the social context in which driving occurs (Fleiter et al., 2006; Gordon & Hunt, 1998). Haglund and Aberg (2000) examination of the influence of significant others found that significant others who disapproved of speeding behaviour, but were not a passenger in the car at the time of observational measure, did not significantly influence participants' speed choice, which may be responsible for the comparatively weak contribution of SN in TPB research (Haglund & Aberg, 2000). Further examination of norms is warranted, as knowledge of whether speeders are influenced to speed, can aid in the creation of more successful road safety interventions, perhaps through the examination of the potential of family and friends to minimise speeding behaviour (Fleiter et al., 2006).

Attitude

Attitudes towards speeding are pertinent given that attitudes towards speeding are less negative when compared to attitudes regarding other traffic violations and crimes (Fuller et al., 2008b). Positive attitudes are consistently related to speeding intention (Forward, 2009; Forward, 2009b; Haglund & Aberg, 2000; Parker et al., 1992) with positive attitudes produced from high expected paybacks and minimal losses, determined by the probability of resultant outcomes of speeding (Hatfield, Fernandes, Faunce, & Job, 2008). Speeding intenders perceive greater instrumental and emotional advantages of speeding and positive consequences, such as excitement, getting home quicker and keeping with the flow of traffic.

Intenders also minimise the likelihood of negative and disadvantageous outcomes when compared with non intenders such as likelihood of accidents, fines, or incidents with pedestrians (Forward, 2009; Parker et al., 1992; Stead et al., 2005). Given the nature of speeding it is likely that the positive outcomes associated with speeding are much more likely to occur than the negative, reinforcing positive attitudes (Lawton, Parker, Manstead & Stradling, 1997). Gordon and Hunt (1998) recorded the speeds of drivers on a rural road (100km/h speed limit) and urban road (50km/h speed limit) and randomly selected drivers to take part in a voluntary and confidential survey regarding speeding using a TPB framework. Findings highlighted attitude was the superior predictor compared to SN and PBC in predicting speeding intention, accounting for a significant 34% of the variance of intention to speed on a rural 100 km/hr road and a significant 23% of variance of intention to speed on an urban 50 km/h road (Gordon & Hunt, 1998). Aberg (1999) examination of 1816 licensed drivers from Sweden also evidenced attitude to be the greatest of the TPB predictors, accounting for 60% of speeding intention (Aberg, 1999). The association between positive attitude and speeding intention have been replicated in studies defining speeding by 15 km/h (Forward, 2009b) and 20 km/h (Forward, 2010) in general population samples and in the examination of speeding in private and organisational vehicles (Newnam, Watson, & Murray, 2004).

In a speeding context few studies have examined the separate emotional and cognitive attitudinal components (DePelsmacker & Janssens, 2007). However it has been evidenced that cognitive and emotional attitudes are significant predictors of speeding intention accounting for similar variance (Elliott & Thomson, 2010; Lawton, Conner & McEachan, 2009) and emotion has been evidenced to be a superior predictor of intention (Lawton, Conner & Parker, 2007). The fact that emotion influences speeding is logical given that it may not always lead to appropriate decisions, nor is it reflective of cognition and is often

implicated in risk taking behaviours not beneficial to individual health (Lawton, Conner & McEachan, 2009).

Past behaviour

Past behaviour has been evidenced to be the best predictor of intention to speed in some TPB research (Conner et al., 2007; Conner & Armitage, 1998; Elliott, Armitage & Baughan, 2003). Utilising a scenario approach, past behaviour was superior to the other TPB components in predicting intention to exceed the speed limit by 20 mp/h (Conner, Smith & MacMillan, 2003). Forward (2009) examined the intention to exceed the speed limit in an urban area by 15km/h in a sample of 275 drivers, using hypothetical vignettes. In addition to the traditional TPB predictors, Forward (2009) incorporated a measure of past speeding behaviour, in which participants had to indicate that they strongly agreed, or strongly disagreed with a statement suggesting they often exceed the speed limit by 15 km/h. Findings suggested that the traditional TPB variables accounted for 47% of the variance in intention to speed, with past behaviour accounting for an additional 17% of variance over and above the TPB variables, not only highlighting the consistency between past behaviour and intention, but also providing great support for the inclusion of past behaviour as a predictor of intention in TPB studies. Past speeding has consistently been evidenced to have a large correlation to intended speeding (Conner, Smith & Macmillan, 2003; Forward, 2009; Gordon & Hunt, 1998). It is apparent that the addition of past behaviour has improved the predictive utility of the TPB in previous studies (Table 1), and it is postulated that the inclusion of past behaviour would produce greater effect sizes (Sutton, 1998).

Table 1

Summary of Findings in Previous Research Applying TPB to Speeding Intention

Author	Accounted for Variance	Most Important Predictor
1. Parker et al. (1992b)	47.2% - 49%*	PBC
2. Gordon and Hunt (1998)	43-46%	Attitude/ PBC
3. Conner, Smith, and MacMillan (2003)	45%*	Past Behaviour
4. Newnam, Watson, and Murray (2004)	15%* - 27%*	Anticipated Regret
5. Stead et al. (2005)	47%- 53%	PBC
6. Conner et al. (2007)	76%*	Past Behaviour /Attitude
7. Forward (2009b)	47%- 71%*	Past behavior/ PBC
8. Elliott (2009)	42-44%	Attitude
9. Elliott and Thomson (2010)	55%-68%*	Past Behaviour/ Attitude
10. Forward (2010)	53%- 55%*	Attitude

* Denotes studies that used additional predictors in accordance with traditional TPB model

Overall Success of Applying TPB to Speeding

The TPB has extensively been applied to speeding successfully (Ajzen, 200) and has consistently explained approximately 28% to 66% of variance (Table 1) of intention to speed (Conner et al., 2007; Elliot & Thomson, 2010; Elliot et al., 2003, 2005, 2007; Newnam et al., 2004, Parker et al., 1992) and explained 27-67% of the variance of ensuing speeding

behaviour in past research (Conner et al., 2007; Elliott et al., 2003, 2007). Although these findings are considered to produce large effect sizes (Sutton, 1998), suggestions have been made that the TPB is underperforming, and that higher prediction levels could be achieved if certain conceptual and methodological issues were overcome (Sutton, 1998). The consistent use of hypothetical scenarios in TPB research limits the generalisability of speeding intention and it has been suggested that other methods should be used (Conner, Smith & MacMillan, 2003). The lack of an explicit measure of emotion is another criticism (Manstead & Parker, 1995), especially since emotion has been linked to speeding and risky behaviour in general (Boyer, 2006; Lawton, 1997). It appears that the traditional valence attitude measures using *unpleasant-pleasant* scales in the TPB do not enable the differentiation between the perceived advantages and disadvantages of speeding and the feelings associated with speeding (Manstead & Parker, 1995).

Inclusion of Additional Predictors: Emotion

The possible contribution of emotion to decision making, specifically those regarding risky behaviours has been recognised (Boyer, 2006). It has been suggested that positive emotion overrides negative cognition in the performance of risk taking behaviour (Lawton, Conner & McEachan, 2009). Furthermore, positive emotion in regards to risky driving behaviours, including speeding, has been found to be predictive of behaviour frequency, whereas negative emotion has not been found to reduce the frequency of behaviour (Lawton et al., 1997). It is likely this is a function of the driving environment, where positive emotions linked to exceeding the speed limit are likely to be anticipated and often occur, whereas negative emotions are likely to be anticipated but do not often occur (Lawton et al., 1997)

The TPB has been criticised for relying predominantly on cognitive, logical processes, without sufficiently taking into consideration emotion, impulsivity, or irrational reasoning regarding behaviour (Ajzen & Fishbein, 2004; Conner & Armitage, 2001; Manstead &

Parker, 1995). The direct link between emotion and behavioural intentions has long been recognised, with the Theory of Interpersonal Behaviour proposed by Triandis (1977), highlighting that emotion's (both positive and negative) association with intention is distinguishable from more cognitive decisional processes and should be treated as a separate component, rather than through the dichotomisation of other predictors (Triandis, 1977). Although both models were developed at a similar point in time, Ajzen and Fishbein's model has received more recognition, however the Triandis model has been found to have greater explanatory power (Bagozzi, 1992).

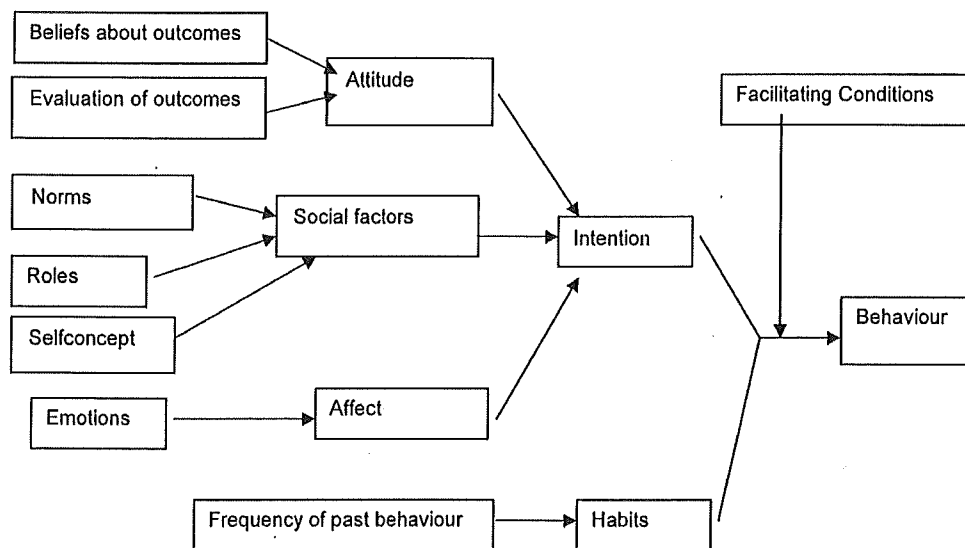


Figure 2 *Triandis Theory of Interpersonal Behaviour*

Incorporating an explicit measure of emotion should increase the TPB's predictive utility (Connor & Armitage, 1998; De Pelsmacker & Janssens, 2007; Lawton et al., 1997; Newman et al., 2004; Stead et al., 2005), enhancing prediction of intention, and surpassing the predictive utility of the traditional TPB variables (Conner & Armitage, 1998; Fishbein, 2001, French et al., 2005; Manstead & Parker, 1995; Mohiyeddini, Pauli, Bauer, & Whitelands, 2008). Additional predictors may be added to the TPB as separate constructs (Elliott &

Thomson, 2010), with suggestions that emotion should be viewed as a separate construct directly predicting intention (Keer et al., 2003; Mohiyeddinni, Pauli, & Bauer, 2008), consistent with Triandis' work (1977), given that emotion is believed to impact on intention directly (Yagil, 2001) and given that emotion has been found to influence decisions irrespective of subjective norm, PBC and attitudes (French et al., 2005; Keer et al., 2010; Richard, Van der Plight & De Vries, 1995).

Prediction of driver behaviour has previously been enhanced by including emotional variables such as moral norm, personal identity, anticipated regret and affective attitude to the traditional TPB framework supporting the incorporation of affective predictors of behaviour in the TPB (De Pelsmacker & Janssens, 2007; Elliot & Thomson, 2010; Hagger & Chatzisarantis, 2005; Lawton, Parker, Manstead & Stradling, 1997; Manstead & Parker, 1995; Newnam, et al., 2004; Parker, Stradling & Manstead, 1996; Parker et al., 1992). The increased variance in intention accounted for by TPB models using anticipated affective reactions has been evidenced (Newnam, Watson & Murray, 2004; Parker, Manstead, Stradling, Reason, & Baxter, 1992; Parker Manstead & Stradling, 1995, Parker et al., 1996). It has been suggested that the examination of anticipatory emotions, that is the emotional responses involved when thinking about speeding, rather than anticipated emotions regarding the outcomes likely to be experienced, may account for greater variance in intention due to the construct having less cognitive bias (Lawton, Conner, & Parker, 2007).

Speeding and Emotion

It is posited that emotions influence risky behaviour, with anticipation of heightened positive emotions and minimal negative emotions associated with higher levels of risk taking behaviour (Boyer, 2006). Suggestions have been made that decision to speed is guided by drivers emotions (Fuller Hännigan et al., 2008; Fuller Bates et al., 2008), and excessive speeding is emotionally motivated (Lawton et al., 1997). Speeding is linked to the expression

of emotion and using a vehicle for means of emotional stimulation, which in turn is predictive of traffic infringements and self reported violations (McKenna, 2006). Speeding may be considered an optimising violation in which emotional motivations to gain excitement, entertainment, emotional release and to optimise arousal; all contribute to speeding intention (Lawton et al., 1997; Stead et al., 2005). Qualitative examination of speeding, through the use of focus groups, has identified specific emotion based factors that instantly increase the risk threshold of speeding including positive emotions such as pleasure, adrenaline rushes, thrills and feelings of power, or negative emotions such as anger and annoyance (Fuller et al., 2008). Drivers intending to speed perceive speeding consequences to be more positive than those not intending to speed, such as speeding being enjoyable and emotionally gratifying, whilst minimising the likelihood of negative consequences (Forward, 2009). In addition examination of excessive speeders, in comparison to moderate speeders found that those exceeding the speed limit by a substantial amount were experiencing enjoyment more frequently and enjoyment was more central to their speeding (McKenna, 2005), whilst speed enjoyment was also related to accident rate (McKenna, 2007). Forward's (2009) examination of 275 drivers, found a strong association between agreement that speeding would make driving more pleasurable than complying with the speed limit and agreement that speeding should provide excitement, with that of speeding intention. In addition 26% of intenders believed excitement was important when driving, contrasted with 3% of non-intenders (Forward, 2009). The most appreciable difference between intenders and non-intenders is that intenders associate positive feelings with speeding and place greater importance on pleasure associated with speed (McKenna, 2005). Thus it appears these positive emotions must be examined further to identify aspects potentially amenable to change through interventions or campaigns (Forward, 2010).

Emotion Definition and Measurement

There is controversy surrounding the definition of emotion, however generally it is agreed that it involves feelings and physiological reactions (Lang, 2010). In emotional situations the recognition of these physiological reactions, such as heart pounding, sweat secretion, muscle contraction and facial expressions, among others, guide us to make inferences, and evaluate our responses to objects (Lang, 2010). Emotion can be considered motivational, in which the interpretation of emotional objects and possible outcomes can lead to specific behavioural activation (Bradley, 2000). Lang (2010) proposes motivation is an intertwining of evaluations of the pleasantness-unpleasantness and the arousal, and the intensity of that arousal (Lang, 2010). Furthermore the psychological examination of emotions has revealed two theoretically distinct dimensions; valence and arousal (Barrett; 2006; Cunningham, Raye & Johnson, 2004; Lewis, Critchley, Rotshtein & Dolan., 2007). The definition of valence in the psychology realm has been vague and the term has often been used to represent diverse meanings, but generally it is defined as the positive or negative evaluation of a specific emotion, or components of that emotion pertaining to the likes of emotions related to behaviours (Colombetti, 2005). Valence is measured using an evaluative appraisal with positivity and negativity are positioned at opposite ends of the scale, determining the magnitude of pleasantness and unpleasantness (Gianotti; Faber, Schuler, Pascual-Marqui, Kochi & Lehmann, 2007; Kensinger & Schacter; 2006; Lewis et al., 2007). This measure of valence appears consistent with measures used in the TPB's attitude measure (Giner-Sorolla, 2004).

Arousal is measured using a unipolar dimension, ranging from neutral to highly arousing, determining the magnitude of calmness, excitation and agitation (Kensinger & Schacter; 2006; Lewis et al., 2007). Arousal level influences the semantic evaluations, and can be considered an invigorating power that directs the avoidance or approach of behavioural

execution (Bradley, 2000). It has been suggested that emotion ought to be measured by the dimension of valence (representative of intensity to repulsion such as pleasure to displeasure) and dimension of arousal (representative of activation to deactivation such as excitement to calmness) (Bradley & Lang, 1999). However it is apparent that the TPB solely examines valence (Manstead & Parker, 1995), which may be a shortcoming given that variations in valence and arousal have been demonstrated in studies examining affective states (Robinson & Compton, 2006) and in physiological responses to affective material (Lang, Bradley, & Cuthbert, 1997). Predominant theories in psychology including cognitive dissonance, persuasion and attribution also highlight the importance of arousal dimension of experience (Robinson & Compton, 2006). Bradley and Lang (1999) have further suggested that arousal may be the principal dimension of emotion and the primary motivator of intention to execute behaviour, thus emotional components in the TPB may be inadequately measured by instruments focusing solely on valence.

Arousal and Speeding

High arousal, coupled with positive emotion is associated with the stimulation of physiological processes, which produces feelings of vigour, physically and mentally which provokes the seeking of sensations (Hirschman & Stern, 1999). Assumedly emotional arousal is linked to speeding given speeding's evidenced relationship with sensation seeking; the inclination to obtain diverse, new, intense feelings and experiences coupled with the readiness to take risks in order to do so (Arnett, Offer, & Fine, 1997; Fernandes, Hatfield, & Job, 2010; Jonah, Thiessen, & Au-Yeung, 2001; Yagil, 2001). Sensation seekers execute behaviours, such as speeding that heighten the stimulation they feel, to produce higher levels of, or to optimise arousal (Roberti, 2004). Behaviour that involves the possibility of costly outcomes, such as speeding, is likely to increase arousal levels (Furby & Beth-Marom, 1992). Those identified as having higher levels of sensation seeking have been found to have positive

attitudes regarding speeding (Yagil, 2001), admit to engaging in risky behaviours for means of arousal and pleasure (Jonah et al., 2001; Yagil, 2001), cite speeding as motivated by thrill and adventure (Yagil, 2001), have greater intentions to speed (Jonah et al., 2001), higher occurrence of speeding (Fernandes, Hatfield & Job, 2010), and excessive speeding (Yagil, 2001), as well as increased driving infringements and crashes compared to those with lower sensation seeking levels (Jonah, 1997; Yagil, 2001). Such characteristics of sensation seekers are comparable to Fuller et al.'s (2008) conceptualisation of a high risk threshold driver subcategory, in a review of the literature, in which those who take risks in order to seek excitement and other sensations, speed excessively and have higher crash rates (Fuller et al., 2008). Thus it appears that emotional arousal may underlie the intention to speed for excessive drivers in the population.

The present research aimed to test the TPB in a speeding context. It aimed to test the predictive utility of an extended version of the TPB to examine the intention to speed in excess of 20km/h over the legal limit. It is apparent that the current scales used in TPB are not appropriately capturing emotion (Manstead & Parker, 1995). A separate emotional predictor of arousal has yet to be incorporated in extensions of the TPB, and arousal has been linked to speeding (Yagil, 2001). An aim of this research was to examine whether an improved measure of emotion, utilising arousal, would enhance the prediction of intention to speed. In addition this current work sought to examine whether the addition of past behaviour would enhance the prediction of intention to speed. Firstly it was hypothesised, based on Bradley and Lang's (1999) theory that the incorporation of an additional measure of emotion utilising arousal, would account for increased variance associated with intention to speed, compared to the traditional valence TPB measures. In addition it was hypothesised based on previous research that past behaviour would account for increased variance associated with the intention to speed than the traditional TPB.

Method

Research design

This research employed a cross sectional survey design that investigated the speeding intention of individuals, which was the dependent variable. The independent variables were the TPB variables, attitude, SN and PBC, along with past behaviour age, gender and emotional arousal. Speeding intention was clearly defined in this research as 20 kilometres or more above the legal speed limit; therefore the intention variable was dichotomous.

Participants

One hundred and seventy six drivers who have, or have had, a provisional or full license participated in the study. A convenience sample was obtained via the distribution of the questionnaire on the social networking site Facebook, and further snowballing. Participants were 75 males and 99 females, with 3 participants failing to disclose demographic information. Participants were aged between 18 and 61 ($M = 30.80$, $SD = 12.63$). Examination of frequencies indicated that 94 participants were aged between 18 to 25 and 83 participants were aged 26 or over.

Materials

The materials utilised in this study were: A Qualtrics survey, "Intention to speed" questionnaire (Appendix A), and a participant information letter (Appendix B).

Questionnaire development

The questionnaire was devised to extend the Theory of Planned Behaviour, by measuring participant's attitudes, SN and PBC regarding intentions to speed, as well as incorporating past behaviour and arousal. In instances where cognitive and affective attitudinal components digress from one another positive affect is likely to influence intention better compared to negative cognition (Conner & Sparks, 2002; Lawton, Conner &

McEachan, 2009). Thus the present study explored if adding a subsequent emotion predictor would increase the prediction of speeding intention variance (Lawton et al., 1997).

The questionnaire was developed using the strategies promoted by Ajzen (2006). The arousal scales produced by Bradley and Lang (1999) were used to identify appropriate measures for measuring arousal in a speeding context. This was undertaken by the researcher and supervisor independently assessing the arousal scores from Bradley and Lang (1999) and choosing the words that revealed the highest arousal scores that were considered appropriate for the speeding context. The final words chosen were based on agreement between researcher and supervisor and were based on the most appropriate words that scored the highest arousal scores in Bradley and Lang (1999).

Intention to speed

Intention to speed was assessed using one item (*In the future I will exceed the speed limit by more than 20 kilometres an hour*) using a dichotomous scale (1= yes, 2 = no). The definition of speeding was guided by traffic and road safety research (Fuller, Hannigan et al., 2008; Letirand & Delhomme, 2005; Parker, Manstead, Stradling, & Reason, 1992; Soole, Watson & Lennon, 2009; Stradling, Gormley, Fuller, Broughton, Kinnear, O'Dolan & Hannigan, 2007) and suggestions that excessive speeding is emotionally motivated (Lawton et al., 1997). In addition exceeding the speed limit by 20 kilometres or more falls well below what is considered hoon behaviour (exceeding the speed limit by 45 kilometres) in Western Australia Hoon Legislation (Western Australia Police, 2010), thus assumedly individuals should be willing to disclose such speeding intention, specifically as the questionnaire was completed online and anonymously.

Attitude

Firstly traditional valence TPB attitude items were followed to measure attitude. A nine point scale was chosen, instead of the traditional seven point scale used in TPB research,

in order to maintain consistency with the Bradley and Lang (1999) procedure. Seven items using nine point semantic differential scales were used to examine cognitive (*Good-Bad, Beneficial-Harmful, Valuable-Worthless, Wise-Unwise, Responsible-Irresponsible*) and emotional (*Pleasant-Unpleasant, Enjoyable-Unenjoyable*) attitudes as suggested by Ajzen (2002c). Bipolar adjectives that describe attitude relevant to speeding behaviour were selected. Higher scores were reflective of negative attitudes towards speeding. The order of the end points were counterbalanced in the valence section to account for potential influences of boredom, practice and fatigue and to ensure participants had to respond precisely, which has been found to lead to greater prediction of intention (Ajzen, 1991; Parker et al., 1992b). The corresponding Self Assessment Manikin (SAM) for valence was incorporated from Bradley and Lang (1999). An overall valence measure consisted of the sum of these seven items.

Emotional Arousal

Although the road safety literature suggests that emotion is a useful predictor of speeding, no road safety researcher has managed to capture the emotional aspect of attitude. Emotionally phrased dimensions such as *pleasant-unpleasant* or *enjoyable-unenjoyable* have continually failed to demonstrate the emotional aspect of attitude. The questionnaire in this research incorporated Bradley and Lang's (1999) instructions regarding the completion of arousal questions, thereby moving the emotional measure away from attitude to a separate variable. Bradley and Lang's (1999) Affective Norms for English Words, (normative and standardised ratings of emotion, including arousal) and SAM arousal measures were used. These were chosen based on their simplistic presentation, and given that they are purported to avoid cognitive processing and allow for emotions to be described directly, they provide greater explanatory power than cognitive methods (Morris et al., 2002). Nine arousal items, measured using a nine point unipolar scale corresponding to Bradley and Lang's Self

Assessment Manikin (SAM) pictorial representation (Appendix) were used (Bradley & Lang, 1999). The questionnaire incorporated descriptions of speeding used in conjunction with SAM. Positive descriptive words were selected based on rating high arousal scores, as this serves as an indicator of emotion. The words chosen were; rollercoaster, $M = 8.06$, $SD = 1.71$; thrill, $M = 8.02$, $SD = 1.65$; win, $M = 7.72$, $SD = 2.16$; excitement, $M = 7.67$, $SD = 1.91$; sexy, $M = 7.36$, $SD = 1.91$; fun, $M = 7.22$, $SD = 2.01$; adventure, $M = 6.98$, $SD = 2.15$; and power, $M = 6.67$, $SD = 1.89$. Words were also chosen on the basis of how appropriate they were in a speeding context (Fuller et al., 2008) and positive words were chosen based on the presumed greater affiliation between positive emotions and speeding (Forward, 2010; Lawton et al., 1997). Anticipatory emotion was examined, rather than anticipated emotion, in accordance with Lawton et al.'s (2010) suggestion that anticipatory emotions are less bound to cognition than anticipated emotions. Higher scores reflect lower arousal associated with speeding statements.

Subjective Norms

These were assessed with three items, each rated on 9 point unipolar scales. Two items measured injunctive norms (*disapprove- approve, should-should not*) and one item measured motivation to comply (*I think that I should comply with the wishes of people who are important to me: should – should not*).

PBC

This was assessed using three items, two reflective of self efficacy (*For me to speed would be possible-impossible, easy-difficult*) and one item of confidence reflective of controllability (*If I was driving on a public road and I had the opportunity to speed I would most definitely-most definitely not*).

Past speeding

Past behaviour was incorporated in the current study as it has been demonstrated to account for 7% of unique intention variance in general meta-analyses (Conner & Armitage 1998; Conner et al., 2003). In this research it was assessed using one item with a dichotomous outcome (*I have in the past exceeded the speed limit by 20 km/h; yes, no*).

Demographics

The following demographics were collected; age and gender (1 = male, 2 = female)

Procedure

Upon obtaining ethics approval from the Ethics Committee within the Faculty of Computing, Health and Science, a convenience sample was obtained by distributing the questionnaire link to the 'Intention to speed' questionnaire (using Qualtrics survey software) on the social networking site, Facebook. A short description of the study was posted on the news feed to invite people to participate as well as the attached link. Volunteers following the link accessed the information letter, instructions to complete the questionnaire, the questionnaire, and the demographics sheet, with data collected stored within the Qualtrics survey software. A pilot study was conducted with ten participants prior to the release of the questionnaire, to ensure readability and clarity of the questionnaire. Only minor adjustments were made to the questionnaire based on the feedback provided.

Data Analysis

As the definition of speeding was explicitly a dichotomous outcome variable of intention (yes or no), a binary variable was advantageous to an interval variable. Logistic regression was the chosen analyses method, given its superiority in analysing dichotomous variables over other techniques (Peng, Lee, & Ingersoll, 2002). Logistic regression prevails over the inefficiencies of other methods as it does not assume that the predictor variables are normally distributed, or require linear relationships or equal group variance (Peng, So, Stage

& John, 2002; Tabachnick & Fidel, 1996). Logistic regression does not specify sample size needed, although within multivariate statistics the minimum sample size is often considered 100 participants, which was satisfied (Peng, Lee & Ingersoll, 2002; Tabachnick & Fidel, 1996).

Results

Data were analysed using PAWS version 18. Examination of cross tabulations indicated that 60 (34%) participants were speeding intenders and 116 (66%) non-intenders. Examination of the descriptive data evidenced high scores for all variables indicative of generally low arousal ($M = 51.68$, $SD = 15.42$) negative attitude towards speeding ($M = 50.20$, $SD = 11.65$), SN disapproval ($M = 23.35$, $SD = 4.08$) and high PBC ($M = 13.29$, $SD = 6.16$).

Internal Consistency

The question items used were summed, to tap the underlying predictors of the TPB. Cronbach's alpha was calculated to assess the extent to which the questionnaire items tapping each predictor used covary. The valence measure (TPB attitude) was a variable consisting of seven items, with Cronbach's alpha .917 indicative of high internal consistency. Cronbach's alpha was .93 for the eight item arousal measure indicative of high internal consistency. Cronbach's alpha for the three item SN measure was .401, indicative of an item with poor internal consistency. Further examination of the questionnaire item total statistics indicated that the removal of any items from the measure would not result in an appreciable difference, with low internal reliability irrespective of the combinations of items used. However the removal of the motivation to comply question '*I think that I should speed to comply with the wishes of people who are important to me: should, should not*' would increase the alpha to .483. The weak support for motivation to comply has been evidenced elsewhere (Forward, 2009). The Cronbach's alpha for the three item PBC measure was .784, indicative of acceptable internal consistency for research. Examination of the questionnaire item total

statistics indicated that the removal of the item '*If I was driving on a public road and I had the opportunity to speed I would: most definitely, most definitely not*' would increase the alpha to .793. Interestingly this was an item that was queried during the pilot study as to what constituted the opportunity to speed; it was assumed the inclusion of public road would remedy this.

Association between TPB Predictors and Speeding Intention

A Spearman's (r^s) correlation was conducted given that it is a non parametric test which is appropriate when data violate assumptions such as normal distribution. As shown in Table 2, all predictors were significantly correlated with speeding intention. A significant and moderate positive relationship was evidenced between arousal and intention ($r^s = .371$), $p < .001$, and subjective norm and intention ($r^s = .33$), $p < .001$. There was a medium to large significant positive correlation between past behavior and intention ($r^s = .46$), $p < .001$. Attitude was significantly and strongly positively related to intention ($r^s = .564$), $p < .001$), as was PBC ($r^s = .56$), $p < .001$), pertaining to large effects. These findings suggest intention to speed is related to: high arousal, approval from referents, past speeding, positive attitudes, and high PBC. A Mann Whitney U-Test was conducted, as it is the non parametric equivalent of an independent t-test. The distributions of each of the predictors across the intention to speed groups were all significant, suggesting that a statistically significant difference exists between predictors for intenders and non intenders.

Table 2

Spearman Correlations among TPB predictors and Speeding Intention

Predictor	1	2	3	4	5	6	7	8
1. Intention	1.00	.271**	.259**	.459**	.371**	.326**	.564**	.559**
2. Age	-	1.00	-.030	.182*	.233**	.095	.224**	.394**
3. Gender	-	-	1.00	.317**	.276**	.174*	.327**	.151*
4. Past Behaviour	-	-	-	1.00	.364**	.244**	.448**	.485**
5. Arousal	-	-	-	-	1.00	.136	.512**	.430**
6. SN	-	-	-	-	-	1.00	.440**	.289**
7. Valence	-	-	-	-	-	-	1.00	.641**
8. PBC	-	-	-	-	-	-	-	1.00

Note.** Correlation is significant at 0.01 level (2-tailed)

* Correlation is significant at 0.05 level (2-tailed)

Logistic Regression Analyses

Six logistic regression analyses were conducted, as shown in Table 3. Despite logistic regression prevailing over the assumptions of other methods, and despite suggestions that logistic regression does not have assumptions (Tabachnick & Fidel, 1996), there are assumptions specific to logistic regression (Field, 2009). Linearity assumes that there is a linear association between continuous predictors and the logit of the outcome variable (Field, 2009). Following the instructions, as outlined by Field (2009) it appeared that the linearity of the logit for the arousal dimension had been violated, which according to Garson (2006) may suggest that the logistic regression is underestimating the association between arousal and speeding intention, and hence may lack power through the production of type II errors, in which it is evidenced there is no association when there is (Garson, 2006). Field (2009) and

Garson (2006) however do not offer any means of meeting this assumption. Although, upon examination of the model incorporating arousal, in addition to the TPB, it is evidenced that the accounted for variance remained similar so assumedly arousal is not making a real contribution. Following Field's (2009) methods it was determined that the data satisfied the independence of errors and multicollinearity assumptions; hence the models should not be seen to be biased.

Model 1 incorporated the traditional TPB model (attitude, PBC, SN), Model 2 incorporated the traditional model and arousal, Model 3 incorporated the traditional model and age and gender, Model 4 incorporated the traditional model and past speeding, Model 5 incorporated the traditional model, past speeding, age and gender, and the final model incorporated all predictors examined. As shown in table 3, a good model of fit for predictors was achieved in all models and each model accounted for variance to a significant extent. Cox and Snell R^2 and Nagelkerke R^2 are representative of the variance explained by the model and are similar in function to Pearson's R^2 in parametric tests (Nagelkerke, 1991).

In Model 1 there was a good model of fit for all predictors $\chi^2 (3, N = 176) = 85.47, p = .000$, accounting for 53.2 % of the intention to speed. The significant variables in the traditional model were attitude ($p = .001$) and PBC ($p = .000$).

In Model 2 there was a good model of fit for all predictors $\chi^2 (4, N = 176) = 85.46, p = .000$. The addition of arousal accounted for a further .001% of variance in speeding intention, with attitude ($p = .006$) and PBC ($p = .000$) remaining the only significant predictors. There was a good model of fit for predictors in Model 3, $\chi^2 (5, N = 174) = 90.46, p = .000$. The addition of age and gender accounted for an additional 2.9% of variance in intention to speed over and above the traditional model, with attitude ($p = .004$) and PBC ($p = .000$) remaining the only significant predictors. There was a good model of fit for predictors in Model 4, $\chi^2 (4, N = 176) = 99.36, p = .000$. The addition of past speeding accounted for an additional 6.5% of

variance. Attitude ($p = .004$), PBC ($p = .000$) and past speeding ($p = .007$) were significant predictors, accounting for 59.7% of variance. There was a good model of fit for all predictors in Model 5, $\chi^2(6, N = 174) = 102.46, p = .000$. The addition of past speeding, age and gender to the traditional model accounted for an additional 8.4% of variance in speeding intention, with attitude ($p = .005$), PBC ($p = .004$) and past speeding ($p = .010$) remaining significant predictors, accounting for 61.6% of variance.

There was a good model of fit for all predictors in Model 6, $\chi^2(7, N = 174) = 102.65, p = .000$. The addition of arousal, past speeding, age and gender to the traditional TPB model accounted for a 8.5% increase in accounted for variance, with significant predictors remaining the same; attitude ($p = .005$), PBC ($p = .004$), past speeding ($p = .009$), overall indicative of the best model accounting for 61.7% of variance. The particular contributions of individual predictors (R^2), such as evidenced in linear regression methods, are unable to be determined using logistic regression with equivalent measures yet to be devised (Peng, Lee, & Ingersoll, 2002). The TPB does not provide the relative contribution to intention that attitude, SN and PBC will have, and instead suggesting that the influence will differ dependent on the specific behaviour and sample investigated (Ajzen & Fishbein, 2001).

Table 3

Accounted for Variance in Speeding Intention

Model	Cox & Snell R ²	Nagerlkerke R ²	Hosmer & Lemeshow	Significant Predictors
1. Traditional (Attitude, SN, PBC)	.385	.532	$\chi^2 (8) = 10.71, p = .219$	Valence ($p = .001$) PBC ($p = .000$)
2. Traditional + Arousal	.385	.533	$\chi^2 (8) = 10.76, p = .216$	Valence ($p = .006$) PBC ($p = .000$)
3. Traditional + Age, Gender	.405	.561	$\chi^2 (8) = 4.38, p = .822$	Valence ($p = .004$) PBC ($p = .000$)
4. Traditional + Past Speeding	.431	.597	$\chi^2 (8) = 8.69, p = .369$	Valence ($p = .004$) PBC ($p = .000$) Past Speeding ($p = .007$)
5. Traditional + Past speeding Age, gender	.445	.616	$\chi^2 (8) = 3.67, p = .886$	Valence ($p = .005$) PBC ($p = .004$) Past Speeding ($p = .010$)
6. Traditional + Arousal, Past Speeding, Age Gender	.446	.617	$\chi^2 (8) = 2.66, p = .954$	Valence ($p = .005$) PBC ($p = .004$) Past Speeding ($p = .009$)

Influence of Significant Predictors

The influence of individual predictors is demonstrated in Table 4, comparing the traditional model with the extended model in line with hypothesis. As shown in Table 4, the examination of beta weights suggests that PBC is the strongest predictor of speeding intention, followed by attitude in the traditional TPB model. In the final model, model 6, including the traditional TPB and all additional predictors, past speeding was the strongest predictor of speeding intention, followed by PBC, then attitude. Beta weights are a means of comparing the respective influence of the predictors on intention (Garson, 2006). Odds ratios also are a form of effect size and reflect the change in odds in accordance with a single change in the predictor. Odds higher than one indicate that as the independent predictor increases the odds of the outcome also increase (Field, 2009). As evidenced in Table 4, all predictors are greater than one.

Table 4

Relative Strength of the Independent Predictor Variables and Effect Size for Intention to Speed, Comparison of Traditional and Final Model

Predictor	Traditional TPB			Traditional + Additional		
	β	Odds Ratio	Confidence Interval	β	Odds Ratio	Confidence Interval
Attitude	0.84	1.07*	1.02-1.12	0.95	1.08*	1.02-1.14
PBC	1.38	1.25*	1.13-1.38	1.04	1.18*	0.96-1.20
SN	0.38	1.09	0.99-.122	0.29	1.07	1.07-.959
Arousal				-.01	0.99	0.96-1.02
Past speeding				1.31	17.06*	0.36-144
Age				0.51	1.04	0.99-1.09
Gender				-.02	.95	0.36-0.25

Note* Denotes significant variables in logistic regression analysis at .05

Classification of Intenders and Non Intenders

Classification of group membership is an aim for logistic regression. Measures should be seen to be sensitive (proportion of occurrences correctly predicted) and specific (proportion of non-occurrences correctly predicted) (Peng et al., 2002). Examination of Table 5 indicates that the traditional model is reasonably sensitive and highly specific, as are models 2 and 3. Examination of Model 4 shows that the addition of past behaviour to the model increases sensitivity (78.3%) and specificity (87.9%) rendering both high. It is apparent that the classification of group membership is highly specific (78.0%) and sensitive in the final two models (87.8%). It is apparent that non intenders were predicted better than intenders however this may be a function of the greater proportion of non intenders.

Table 5

The percentage of correctly classified cases, as intenders or non intenders

Model	Intenders	Non-Intenders	Overall Prediction
1.Traditional (SN, PBC, Attitude [Valence])	68.3%	87.1%	80.7%
2.Traditional + Arousal	66.7%	89.7%	81.8%
3.Traditional +Age, gender	66.1%	87.8%	80.5%
4.Traditional +Past speeding	78.3%	87.9%	84.7%
5.Traditional + Past speeding Age, Gender	78.0%	87.8%	84.5%
6.Traditional, Arousal, past Speeding, age, gender	78.0%	87.8%	84.5%

Discussion

The present study examined the predictive ability of an extended version of the TPB incorporating a measure of past speeding behavior and a measure of arousal. This is the first time that arousal has been explored as a potential predictor of intention in the TPB. The following sections concentrate on the support established for the TPB, the applied theoretical implications, as well as methodological considerations.

Support for the Theory of Planned Behaviour

The study found strong support for the TPB in predicting intention to speed by 20km/h. The traditional TPB model in the current study accounted for 53.2% of variance in speeding intention, which alone accounted for greater variance than models in many standard TPB studies; see Table 1 (Conner, Smith & MacMillan, 2003; Forward 2009; Forward, 2010; Gordon & Hunt, 1998; Newnam, Watson & Murray, 2004; Parker et al., 1992b; Stead et al., 2005). This provides support for the predictive validity of the traditional TPB model predictors, accounting for statistically significant variance in intention, pertaining to large

effect sizes as defined by Cohen (1988), exceeding 25%. This adds to a growing body of research on the successful application of the TPB to behavioural intentions (Ajzen, 2006). Examination of the logistic regression analyses suggests that PBC and attitude were the only significant predictors of intention to speed by 20 km/h; PBC was evidenced as the most important predictor, followed by attitude. The finding of PBC as the strongest predictor is consistent with previous research on speeding intention (Elliott et al., 2003; Forward, 2009; Gordon & Hunt, 1998; Parker, et al., 1992; Stead et al., 2005). Findings indicate PBC had a large positive correlation to speeding intention therefore it appears higher PBC is related to greater speeding intention as evidenced in Stead et al. (2005), Forward (2009) and Forward (2010), rather than feelings of low PBC associated with speeding intention as evidenced in Parker et al. (1992). This suggests speeding intention is related to feelings of control and capability over the driving task (Elliott et al., 2003; McKenna, 1991) in which capability and opportunities are in agreeance with performance of the behaviour (Ajzen, 1991).

The finding of attitude as a significant predictor is also consistent with findings from other studies (Forward, 2009; Forward, 2010; Gordon & Hunt, 1998; Haglund & Aberg, 2000; Newnam et al., 2004; Parker et al., 1992), as well as general examinations of the TPB (Ajzen, 1991; Armitage & Conner, 2001). Examination of correlations indicates that positive attitudes have a large positive association with speeding intention, similar to the correlation evidenced in examinations of exceeding the speed limit by 15 km/h (Forward, 2009b) and 20 km/h (Forward, 2010). Higher correlations were obtained compared to Newnam, Watson, and Murray (2004) and Parker et al. (1992). Therefore it appears speeding is linked to favourable attitudes towards speeding, indicating that intenders perceive more positive outcomes (Forward, 2009; Parker et al., 1992; Stead et al., 2005).

The weaker contribution of SN compared to the other TPB variables is common in TPB research (Aberg, 1999; Ajzen, 1991; Armitage & Conner, 2001; Gordon & Hunt, 1998)

and has previously been evidenced in speeding contexts (Forward, 2009; Gordon & Hunt, 1998). However the non-significant contribution of SN is contrary to previous findings in traffic research (Forward, 2010; Gordon & Hunt, 1998; Haglund & Aberg, 2000). The non-significant result is consistent with Forward (2009), and there have been suggestions that SN are not particularly influential on speeding intention (Haglund & Aberg, 2000). Examination of correlations appear to suggest that approval from important others is related to higher speeding intention, consistent with Fleiter et al. (2006), Parker et al. (1992) and Forward (2010). Given the poor internal consistency evidenced in the SN measure used it is possible that the influence of SN has been underestimated. Furthermore the SN component was found to be highly correlated with attitude, which may also be reason for its non-significance (Forward, 2009). In addition this study did not measure descriptive norms which may have limited the study as they appear to have some predictive benefit (Forward, 2009; Forward, 2010). Future studies may wish to incorporate these.

Support for Additional Variables

It was hypothesised, in line with Bradley and Lang (1999) that an additional measure of emotion, utilising arousal would account for increased variance associated with the intention to speed, however this was not supported. The addition of arousal only accounted for a non-significant 0.01% of variance in intention to speed in the current population sampled. It must be noted however that the TPB findings are very specific to the current sample and behaviour, therefore this does not necessarily indicate that arousal would not contribute under different circumstances, in different samples, or using different intentions (Ajzen, 2006).

The arousal measure violated the assumption of linearity, so it is possible that the influence of arousal may be underestimated (Garson, 2006). There was a positive moderate relationship between arousal and intention, suggesting that high arousal was related to

speeding intention, and examination of the Mann Whitney U Test indicated that intenders and non intenders significantly differ in arousal levels, which warrants further investigation. It is possible that the arousal measure did not tap emotion, given that questionnaire measures involve verbal comprehension and analytical skills in which individuals must be able to identify their attitudes, interpret feelings and determine the correspondence between such feelings, which is bound by cognitive processing (Morriss, Woo, Geason & Kim, 2002). However it has been posited that the use of Bradley and Lang (1999) self assessment manikin avoids and minimises cognitive processing and allows for emotions to be described directly, providing greater explanatory power than cognitive methods (Morris et al., 2002). It is also possible the positive words did not tap arousal, however the methods suggested by Bradley and Lang (1999) were closely followed, with words chosen reflective of high arousal scores. Furthermore these words were also relevant to speeding as outlined by the literature and qualitative examination of speeding intention (Fuller, 2008). Perhaps the use of negative emotion words may have been beneficial and future research may wish to examine this, as the potential of these has previously been indicated (Forward, 2009; Mesken et al., 2007). Suggestions have also been made that testing physiological reaction and the use of open ended questions may result in more accurate emotional appraisals. Future research may endeavour to examine such techniques to determine the relationship between speeding and emotion (Ajzen & Fishbein, 2001). It is apparent that further research is needed to explore emotion, its relation to intentions, and develop emotional measurement and methods.

The current study attempted to move away from traditional *pleasant-unpleasant scales*, toward the view of emotion as a separate construct predictive of intention. It is apparent that this study did not capture the potential of emotion to predict speeding intention. Further research and development of emotion measures is needed to examine the relationship between arousal and intention, and emotion and intention (Manstead & Parker, 1995).

Speeding is only a single behaviour, and due to the nature of the TPB, replication of the method used, in conjunction with Bradley and Lang (1999) methods may produce different results pertaining to different intentions. Future research may wish to examine arousal targeting a younger sample (in the present study 47% of participants were aged 26 or older), given that younger drivers have been associated with higher arousal levels (Fuller et al., 2008). It is also possible that the definition of speeding as exceeding the speed limit by 20km/h or more may not have captured emotional arousal; therefore replication with higher speed limits may prove useful.

The hypothesis that the inclusion of a past behaviour predictor would account for increased variance associated with the intention to speed was supported. Past behaviour accounted for an additional 6.5% of variance in intention to speed over and above the traditional model, and was evidenced as a statistically significant predictor of speeding intention. In addition past speeding was the most influential predictor in the final model. The superiority of past behaviour is consistent with past research (Conner, Smith, & MacMillan, 2004; Conner et al., 2007; Elliott et al., 2003; Forward, 2009). This finding adds to the growing body of literature to incorporate past behaviour as an extension of the traditional model (Armitage & Conner, 2001; Conner et al., 2003; Conner et al., 2007). Findings are comparable to a meta-analysis by Conner and Armitage (1998), evidencing past behaviour being responsible for 7% of variance and comparable to the additional 6% of intention to speed variance accounted for by past behaviour in a sample who had minor speeding convictions in Elliott and Thomson (2010). This is far less than the 17% contribution of past behaviour in the TPB suggested in Forward (2009) but this may be due to the definition of exceeding the speed limit by 15km/h in the latter study, which has been seen to be more acceptable behaviour in other research (Stradling et al., 2008). The correlation between past behaviour and intention was similar to Conner, Smith and MacMillan (2003) and lower than

those evidenced in Gordon and Hunt (1998) and Forward (2009). Past behaviour was correlated moderately to strongly to other predictors, indicating that repeated speeding is related to the TPB variables, representative of a deliberate process in accordance with Ajzen's (2006) comments, rather than reflective of unconscious processes such as habit (Forward, 2009). Forward (2009) suggests that a large contribution of past behaviour indicates that all of the important predictors for that behaviour have not been included in the model, warranting further investigation (Forward, 2009).

The non-significant contribution of age and gender in the current research is consistent with Conner et al. (2007), although past research has found age and gender effects (Fleiter et al., 2006; Forward, 2010; Harre, Field & Kirkwood, 2006). Age and gender accounted for an additional 2.9% of intention variance than the traditional model which is comparable to 1-4% contributions evidenced in other traffic studies (Forward, 2009; Forward, 2010; Parker et al., 1992). The non-significant influence of demographics suggests that the TPB variables have successfully mediated the effect of these (Conner et al., 2007; Elliott, Armitage & Baughan, 2004) which is indicative of reliable examination of the respective TPB components (Parker et al., 1992; Parker et al., 1992b)

Support for the Extended Theory of Planned Behaviour Model

The extended model (TPB predictors and addition of past speeding, arousal, age and gender) investigated in the current work provides a more comprehensive account of intention to speed, accounting for greater intention variance than the traditional model, satisfying the hypothesis. The extended model (model 6) accounted for 61.7% of the variance in intention to speed, which is an additional 8.5% of accounted for variance than evidenced using the traditional TPB model (53.2%). The accounted for variance was greater than achieved in many previous extensions of the TPB examining speeding intention, see Table 1, (Conner, Smith & MacMillan, 2003; Forward, 2010; Gordon & Hunt, 1998; Newnam, Watson &

Murray 2004; Parker et al., 1992b; Parker, 1997; Stead et al., 2003), although this was less than the accounted for variance (68%) evidenced in Elliott and Thomson (2010), however the latter was based on an offender sample. The extension of the TPB also accounted for less variance than evidenced in Conner et al (2007) (76%) although that investigation also incorporated moral norms and anticipated regret in an extended version.

In the present study 34% of participants intended to speed by 20 km/h, which is higher than the proportion of excessive speeders evidenced in previous studies (14%, Stradling et al., 2008; 15% Soole et al., 2009) and lower than the 52% of participants who intended to exceed the speed limit by 20 km/h in Forward (2010). The proportionately low number of intenders is consistent with previous TPB research (Forward, 2009), although this warrants replication. Generally the sample reflected negative attitudes, disapproval from referents, high perceived behavioural control, and low arousal; however this is likely due to the greater proportion of non intenders (66%) to intenders (34%).

It is evidenced in the classification rates that the questionnaire measure used was highly specific and sensitive, with the final model correctly classifying 78% of intenders and 87.8% of non intenders, with an overall success at predicting 84.5% of cases. These rates are impressive given that the questionnaire did not incorporate hypothetical scenarios as does much of the research (Newnam et al., 2004; Parker et al., 1992). This indicates that the questionnaire developed was successful at targeting the TPB predictors, and replication across behaviours and samples may prove useful.

Practical Implications

It appears that the TPB can effectively identify the predictors to be targeted in road safety measures and provide valuable information on the motivators of behavior (Parker et al., 1992). Potentially, use of this knowledge could facilitate the creation of more successful road safety countermeasures by producing measures specifically aimed at the underlying predictors

(Parker et al., 1992). It seems fathomable that desirable changes in attitudes, PBC and SN would lead to analogous changes in speeding intention and behaviour (Elliott, Armitage, & Baughan, 2003). Given attitudes are predictive of speeding intention in the TPB and speeding intention is linked to speeding behaviour, then targeting attitudes, to make them more favourable towards compliance, is likely to change intention and subsequent behaviour and be beneficial to road safety (Elliott, Armitage & Baughan, 2004). It is important to contest positive attitudes towards speeding and replace with negative attitudes, highlighting that speeding is risky and provides no real benefit (Elliott et al., 2004). Many campaigns and driver education programmes have targeted attitudes as a means to produce more compliance with the speed limits, although research suggests they do little to alter speeding intentions and behaviour (Elliott, Armitage & Baughan, 2003; McKenna, 2007). Past efforts to alter driver attitudes within a TPB framework have only been evidenced to produce minimal change in speeding intention and behaviour, (Parker et al., 1996; Stead et al., 2005) thus future research is needed to greater understand how the knowledge of the TPB predictors can be applied in real world settings (Elliott, Armitage & Baughan, 2004). Media campaigns (Stead et al., 2005) and video based interventions (Parker et al., 1996), may not be appropriate methods to modify attitudes to speeding, instead more individualised approaches may be warranted to produce strong attitudes toward compliance (Elliott, Armitage & Baughan, 2004). It may be that interventions in more class room based approaches, with student-teacher interaction, or intensive computer administered interventions in driver training initiatives, may be more effective at changing attitude in the long term, although further research is necessary (Elliott, Armitage & Baughan, 2004). It has been suggested that young driver programmes targeting TPB elements should be used, which have reported some success in enhancing attitudes towards speed limit compliance (Rosenbloom, Levi, Peleg & Nemrodov, 2009).

Given PBC was the best predictor in the traditional model; it seems interventions concentrating on the PBC element should be advantageous to produce intention/behaviour change. Perhaps PBC provides the basis for more successful attempts at increasing compliance with speed limits rather than the sole focus on attitudes (Elliott, Armitage, & Baughan, 2003). As high PBC is associated with successful execution of behaviour, high PBC associated with speed compliance must be emphasised (Elliott, Armitage, & Baughan, 2003). Targeting PBC is challenging to road safety researchers, given that drivers view themselves as experts, and often driving experience leads to perceptions of developed driving skills and enhanced perceptions of safe driving, making it difficult for interventions to alter PBC associated with speeding (McKenna, 2007). Elliott Armitage and Baughan (2003) suggest that attempts to improve PBC such as guided performance of behaviour and modelling of behaviour may be warranted to produce compliance with road safety.

In a practical sense the significant contribution of past behaviour in accounting for variance in intention to speed, does not hold any specific explanatory value, instead suggesting that speeding has been enacted before and will be enacted again (Ajzen, 2006). However the knowledge that speeding behaviour has occurred previously is imperative to know when designing measures, although combination measures would likely be needed to create conflict between previous behavior and current intentions (Forward, 2009). Although SN was not found to be a significant predictor of speeding in the current study it is suggested that SN should be targeted on a more societal level in which compliance is viewed as the norm rather than exceeding the speed limit, which appears to be the consensus in society (Forward, 2009).

Past research suggests that arousal should be associated with speeding (Jonah, 1997; Jonah et al., 2001; Yagil, 2001); however McKenna, (2006) indicates that it is easy to over interpret the relationship. Although thrill seeking and arousal have been associated with

excessive speed previously, and other risk taking tendencies, substantial speeding has been found to occur in society without such underlying motivators (McKenna, 2006).

Authors continue to contest the need for the use of, and targeting of emotion in speeding countermeasures (Lewis, Watson, & White, 2008; Lewis, Watson, & White 2008b). The findings seem to suggest that further research is needed to examine the relationship between emotion and speeding intention, and the impact that arousal may have as per suggestions by Bradley and Lang (1999).

Policy Implications

The current road safety system is geared toward deterrence and enforcement, despite speed management schemes doing little to reduce drivers speed (Mountain, Hirst, & Mather, 2004). Lower speed limits do not reduce crashes, without drivers complying with the speed limits (McKenna, 2007), and compliance remains low (Stradling et al., 2008; Soole et al., 2009). Producing compliance with the speed limit is necessary as legislation and enforcement cannot fulfill their full potential without it (McKenna, 2007). Road safety policy should be providing education regarding the motivational factors underlying speeding, rather than just enforcing education about road rules (Machin & Sankey, 2007). It is posited that more theoretical based road safety initiatives will likely be more effective and the TPB provides a strong foundation for this (Stead et al., 2005).

Methodological Considerations

While the current study has found support for the TPB and identified potential targets for road safety measures, some methodological issues must be considered when examining the results. Firstly speeding intention was based on self report, which may be susceptible to cognitive and affective self presentation biases, and attempts to act in accordance with social desirability (Ajzen & Fishbein 2001; Armitage & Conner, 2001). Given participants completed the questionnaires anonymously, and online, self presentation biases should be

minimised (Marcil, Bergeron, & Audet, 2001). Computer presented questionnaires have previously been seen to be more predictive of intentions using the TPB variables than hard copy paper and pencil versions (Ajzen, 1991). Self report is the norm in TPB research and has been found to be convenient and valuable in social research (Elliott et al., 2003). Furthermore previous research has indicated that strong and significant correlations exist between self reported and objective measures of speeding (Elliott et al., 2003; Haglund & Aberg, 2000). Despite this, future studies may wish to use behaviour measures, through observational means to examine the TPB and its association with actual speeding behaviour (Forward, 2009b), although these are not completely void of biases either (Conner & Armitage 1998; Conner et al., 2007)

It is possible that as the convenience sample was achieved through the social networking site Facebook, that results may reflect the nature of people who use social networking sites. However given that the age range was broad (18-61), there was considerable participants in each gender (75 males, 99 females) and intention rates seem to be similar to studies of general population samples (Stradling et al., 2008) this should be seen to offer some support for the generalisability of findings. This study may also be limited by the sample reflecting to a greater extent non intenders than intenders, although this is common in driving research, replication is warranted (Forward, 2009). Although the sample size was reasonable (176) participants, replication is needed to enhance generalisability of findings. Future research may wish to examine the TPB using an offender sample, or a sample based on high crash rates as this may derive a higher intention rate, and may also potentially account for more emotion (Elliott & Thomson, 2010; McKenna, 2006).

The current work may also be limited by only testing the TPB up until intention, therefore the intention-behaviour gap has not been accounted for in this research. Testing only up until intention is common in the literature (Ajzen, 1991; Armitage & Conner, 2001; Elliott

et al., 2003). Intention is believed to reflect speeding behaviour appropriately (Ajzen, 1991; Armitage & Conner, 2001; Elliott et al., 2003) and has potential for altering speeding behaviour (Armitage & Conner, 2001) considering that intentions generally account for between 20% to 40% of variance in the consequent behaviour (Conner & Armitage, 1998) and large intention-behaviour correlations have previously been evidenced (Armitage & Conner, 2001; Conner et al., 2007; Elliott et al., 2003; Haglund & Aberg, 2000).

This work was also unable to determine causality in regards to attitude and intention, which may be considered a limitation (Fernandes et al., 2007). However correlation and regression analysis are the norm in assessing and examining the TPB (Conner & Armitage, 1998). Traditionally the TPB does not demonstrate causality (Conner & Armitage, 1998). Future studies may wish to develop and design methods to improve the investigation of causal relationships within the TPB (Sutton, 2003).

Summary and Conclusions

In conclusion the present study highlighted the ability of an extended version of the TPB to predict intention to speed by 20 km/h. This study adds to the growing body of literature emphasising the predictive utility of the TPB model, specifically pertaining to speeding. It was hypothesised that incorporating an additional measure of emotion, in the form of arousal, would account for increased variance associated with intention to speed, which was not supported. The present study did not manage to capture the potential of emotion to predict speeding intention, however given the research on emotion and speeding, and overwhelming suggestions to incorporate emotion into the TPB, further research is warranted to develop emotion measures. These findings do contribute somewhat to the understanding of the role of emotion and future research may wish to examine arousal and its potential association with intention across behaviours and samples, given that Bradley and Lang (1999) suggest that arousal may be the primary motivator of intention to execute

behaviour. Furthermore this study provides support for the incorporation of past behaviour as an additional variable in extensions of the TPB model, specifically when examining speeding.

Furthermore the findings reiterate the strengths of attitude and PBC in the model, and the comparative weakness of SN (which may be a function of the measure used). It appears that the TPB can effectively identify the predictors to be targeted in road safety measures and provide valuable information on the motivators of behavior (Parker et al., 1992). In the present study past speeding behavior, PBC and attitude were identified as influential predictors of speeding intention. Potentially, use of this knowledge could facilitate the creation of more successful road safety countermeasures by producing measures specifically aimed at the underlying predictors (Parker et al., 1992). Road safety policy should endeavour to provide education regarding the motivational factors underlying speeding, rather than focusing on deterrence and enforcement (Machin & Sankey, 2007), and the TPB provides a strong foundation for this (Stead et al., 2005).

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For me to speed would provide excitement:

High

Low

I feel sexy when speeding:

High

Low

Speeding is fun:

High

Low

Speeding is an adventure:

High

Low

Speeding gives me power:

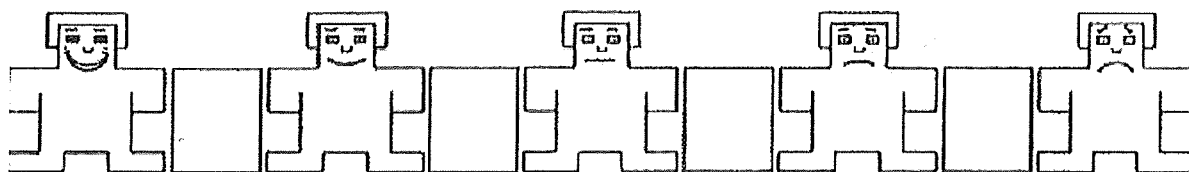
High

Low

In the future I will exceed the speed limit my more than 20 kilometres per hour

Yes

No



Please choose the option that best indicates your level of arousal to the following descriptions of speeding corresponding with the manikin above

Good

Bad

Beneficial

Harmful

Pleasant

Unpleasant

Enjoyable

Unenjoyable

Valuable

Worthless

	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Wise									Unwise
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Responsible									Irresponsible
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Please indicate what best represents your beliefs about speeding.

1. The people in my life whose opinions I value would approve/ disapprove of me speeding

ApproveDisapprove

<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
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2. Most people who are important to me think that I should speed

ShouldShould not

<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
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3. I think that I should speed to comply with the wishes of people who are important to me

ShouldShould not

<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
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4. For me to speed would be:

ImpossiblePossible

<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
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EasyDifficult

<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
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5. If I had the opportunity to speed on a public road, I would:

Most definitelyMost definitely not

<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
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I have in the past exceeded the speed limit by more than 20 kilometres per hour

Yes No

To enable us to ensure that we collect data from a wide range of participants please complete the following questions:

Age (in years): _____

Gender: Male Female

Appendix B

Information Letter

Extension of the Theory of Planned Behaviour Incorporating an Arousal Measure of Emotion: An Application to Speeding

Your involvement in the study will require you to complete a questionnaire on 'intention to speed' which should take approximately 5 minutes in total. The first part will assess your attitudes towards exceeding the speed limit by 20 kilometres, how you think other people would respond to your behaviour and your perceived control of behaviour

Your participation is voluntary and you can terminate the experiment at any point. The questionnaire information is deidentified and the information presented will be kept confidential. I would be pleased to answer any questions you may have. Your participation is greatly appreciated!

There is a possibility that this study will be published. If this is the case, then the deidentified data will be kept for five years following publication in a secure filing cabinet at the University. If you would like further information, you can contact us, our supervisors or an independent representative of Edith Cowan University on contact details provided below. The first part will assess your attitudes towards exceeding the speed limit by 20 km/h, how you

If further information is desired, please do not hesitate to contact myself, my supervisors or the independent representative of Edith Cowan University. Please see contact details below.

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