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Age, Gender and Deterrability: Are Younger Male Drivers More Likely to Discount the  
Future?

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### Abstract

Utilizing the Classical Deterrence theory and Stafford and Warr's (1993) reconceptualized model of deterrence, the current study examined whether age, gender, and discounting the future tendencies influence perceptions of being apprehended for speeding offences. Licensed motorists ( $N = 700$ ; 57% female) in Queensland (Australia) were recruited to complete a self-report questionnaire that measured perceptual deterrence, speeding related behaviors and discounting the future tendencies. Data were analyzed utilizing descriptive, bivariate and multivariate regressions. Significant (albeit weak) positive correlations were found between age and perceptions of apprehension certainty. Males were significantly more likely to report higher incidences of speeding (including while avoiding detection) compared to females. In contrast, females were more likely to perceive high levels of apprehension certainty and consider impending penalties to be more severe. At a multivariate level, discounting the future tendencies (in addition to being male, reporting lower levels of perceptual severity and swiftness, and more instances of punishment avoidance) were predictive of lower perceptual certainty levels. This study is one of the first to reveal that being male and having a tendency to discount the consequences of the future may directly influence drivers' perceptual deterrence levels.

*Keywords:* deterrence; age; gender; speeding; discounting the future

## Age, Gender and Deterrability: Are Younger Male Drivers More Likely to Discount the Future?

### **1. Introduction**

Younger drivers (aged 17-25 years) are over represented in crash-related injuries and fatalities. In Australia for instance, land transport accidents are the second leading cause of death (after suicide) (Australian Institute of Health and Welfare, 2016), with 227 young driver fatalities on Australian roads in 2015 (Bureau of Infrastructure, Transport, and Regional Economics [BITRE], 2016). It has been suggested that age and inexperience are two predominant factors contributing to the over representation of young drivers in road crashes (Deery, 1999). In regards to age, cognitive brain development and risk taking propensities are often proposed as the aetiology of younger motorists' aberrant behaviors. That is, younger individuals are more likely to experience difficulties recognizing and responding appropriately to risk (Albert & Steinberg, 2011), and these tendencies have been linked to the on-going development of the prefrontal cortex beyond the age of 18 (Lebel & Beaulieu, 2011). More specifically, the pre-frontal cortex is responsible for higher-order processes such as decision making, impulse control, and planning as well as effectively judging the negative consequences associated with their risk-taking behavior (Steinberg, 2007). A sizeable body of research has also indicated young male drivers voluntarily engage in high-risk behaviors and situations (Clarke, Ward, & Truman, 2005; Williams, 2003) and this has been proposed as a reason for their overrepresentation in crashes (Laapotti & Keskinen, 2004). In addition, research has also demonstrated that risk perception can have a significant influence on crash susceptibility, as participants who have crashed underestimate the risk of crashing (e.g., Dixit, Harrison, & Rutström, 2014) and that younger motorists have a higher level of risk aversion compared to older drivers in simulator research (Dixit, Harb, Martínez-Correa, & Rutström, 2015). As a result, graduated licensing systems in Australia often attempt to

compensate for such tendencies by enforcing strict rules (for newly licensed drivers) to reduce risks associated with some driving environments (e.g., curfews, passenger restrictions, mobile phone use constraints).

In regards to recognizing (and responding appropriately to risk), a sizeable body of scientific evidence also indicates that males are more likely to take risks compared to females (Apicella et al., 2008; Byrnes, Miller, & Schafer, 1999; Evans & Hampson, 2014). A number of factors have been proposed for this finding, including: increased testosterone levels (Apicella et al., 2008), under developed prefrontal cortex (Pharo, Sim, Graham, Gross, & Hayne, 2011; Powell, 2006), genetic variants (Amstadter et al., 2012), differential reactions to stress (Stankovic, Fairchild, Aitken, & Clark, 2014) as well as elevated responses to positive and negative reinforcement (Amstadter et al., 2012). Regardless of the aetiology, at a meta-analytic level, research continues to demonstrate gender differences exist in both direction and strength of correlations between engagement in risk taking behaviors and brain imaging data (Cazzell, Li, Lin, Patel, & Liu, 2012).

Within the current context, speeding is one of the primary causes of crashes among younger motorists (Cestac, Paran, & Delhomme, 2011; Lam, 2003). Previous research has reported that speeding behaviors not only increases the likelihood of a crash occurring, but also increases the severity of the crash (e.g., Liu, Oxley, Coben, & Young, 2012). Of concern is that speeding is still perceived (by some younger drivers) to be an acceptable form of behavior (Fleiter, Waston, Lennon, & Lewis, 2006). Not surprisingly compared to older drivers, young drivers are more likely to report speeding behaviors (Fleiter et al. 2006), particularly young male drivers (Horvath, Lewis, & Watson, 2012).

### **1.1. Classical Deterrence Theory**

While a range of road safety countermeasures have been introduced to reduce the problem of speeding, the majority are underpinned by deterrence mechanisms that remain

central to most criminal justice policies (Piquero, Paternoster, Pogarsky, & Loughran, 2011). Deterrence theory asserts that individuals will avoid committing offences if they fear the perceived negative consequences of an act (Homel 1988; Von Hirsch, Bottoms, Burney, & Wikstrom, 1999). Most commonly referred to as the Classical Deterrence theory, the framework was originally developed by two 18<sup>th</sup> century utilitarian philosophers named Bentham and Beccaria who proposed that offending behaviors are inversely related to the certainty, severity and swiftness of sanctions (Homel, 1988). Classical Deterrence theory consists of two processes; general deterrence and specific deterrence. General deterrence focuses on the community at large. For example, a driver may be less inclined to speed if he/she is aware of high police enforcement and/or observing others being apprehended and punished. In contrast, specific deterrence focuses on the direct experience of the individual after apprehension and punishment. For instance, a driver may be less inclined to speed if they have received a previous speeding sanction, and thus, may fear further punishment.

At an aggregate level, deterrence-based enforcement practices have proven effective at reducing the prevalence of offending behaviors, particularly drink driving due to random breath testing (Harrison, Newman, Baldock, & McLean, 2003; Henstridge, Homel, & Mackay, 1997; Watson et al., 2005; Wilson, Willis, Hendrikz, Le Brocque, & Bellamy, 2010). Researchers have postulated that the most powerful effect on offending behavior is produced by the perceived threat of certainty of apprehension (Decker, Wright, & Logie, 1993; Homel 1988; Nagin & Pogarsky 2001), as individuals are unlikely to engage in an aberrant behavior if they perceive the likelihood of apprehension as high. However, in regards to self-reported speeding behaviors, some counterintuitive results have been reported. Australian speeding-based studies have demonstrated that greater levels of perceived certainty of punishment actually predicted more frequent speeding (Fleiter et al., 2009; Fleiter & Watson, 2006). Similarly, speeding penalties are not always perceived as particularly harsh

(Fleiter et al., 2009) and the third aspect of Classical Deterrence (e.g., swiftness of sanctions) has historically received little attention (Babor et al., 2003; Nagin & Pogarsky 2001).

### **1.2. Stafford and Warr's Reconceptualization of Deterrence**

A number of theorists have expanded the scope of the Classical Deterrence theory, due to a general recognition that penalties are not applied within a social vacuum (Berger & Snortum, 1986; Sherman, 1993). While a range of non-legal sanctions have been proposed (e.g., social and internal factors), arguably one of the most prominent expansions of deterrence theory was proposed by Stafford and Warr (1993) who proposed four prominent deterrent processes: (i) direct experience of punishment, (ii) direct experience of punishment avoidance, (iii) indirect experience of punishment, and (iv) indirect experience of punishment avoidance. One notable feature of Stafford and Warr's (1993) reconceptualization of deterrence theory is that it distinguishes punishment (e.g., direct punishment for speeding behavior) from punishment avoidance (e.g., exceeding the posted speed limit without experiencing the associated negative consequences). This feature is particularly important in the road safety context given that the chance of being apprehended (or perceived probability of apprehension) for some driving-related offences remains relatively low in some circumstances.

There has been considerable support for Stafford and Warr's (1993) reconceptualization of deterrence (e.g., Armstrong, Wills, & Watson 2005; Fleiter & Watson, 2006; Fleiter, Watson, & Lennon 2013; Piquero & Paternoster, 1998). For instance, Piquero and Paternoster (1998) found that personal and indirect experiences were both predictors of self-reported intentions to drink and drink. Similarly, indirect and direct punishment avoidance showed significantly moderate-strong associations with self-reported drug driving behaviors (Armstrong et al., 2005). For speeding behavior, Fleiter and Watson (2006) reported that previous experiences of punishment avoidance was a significant predictor of

speeding behavior. In a more recent study, Fleiter et al. (2013) found that the extended deterrence variables proposed by Stafford and Warr (1993) accounted for an additional 15.1% of variance in the frequency of speeding behavior over and above that which could be explained by the classical deterrence factors of risk apprehension, certainty, severity and swiftness. This body of research indicates that a range of extended deterrence variables (particular punishment avoidance) may influence risky driving behaviors.

### **1.3. Age and Deterrence**

Despite the heavy focus on the effectiveness of deterrence principles, there has been a lack of research focusing on the differential impact of deterrent threats by age. Given the under-developed higher order cognitive abilities of younger adults (Steinberg et al., 2008) and that this population group are more susceptible to engage in speeding behaviors compared to older adults (e.g., Fleiter et al., 2006), this may be considered a significant oversight. More specifically, are younger drivers less influenced by the threat of future sanctions? To the best of the authors' knowledge, only two published studies have examined the impact of deterrent threats by age (Bushway, DeAngelo, & Hansen 2013; Sampson & Cohen, 1988). Sampson and Cohen (1988) investigated the deterrent effects of police presence on crime and found that the threat of police deterred adults more than juveniles in relation to criminal activity. A more recent study by Bushway et al. (2013) examined the effect of age on speeding behavior in relation to the reduction of speed enforcement resources in Oregon, U.S.<sup>1</sup> (e.g., a lower probability of being apprehended for speeding behavior). The study revealed that compared to the pre-layoff period, there was an increase in speeding behavior across all age groups in the post-layoff period. Furthermore, there was some evidence suggesting that older and more egregious offenders may have been more aware of the changes in enforcement, suggesting that deterrent threats may be affected by age. These

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<sup>1</sup> There was a 35% reduction in the size of the State police force due to a budget crises.



two studies highlight that deterrence may be influenced by age, and thus, support the need for additional research in this under studied area.

#### **1.4. Discounting the Future**

While deterrence-based approaches continue to be heavily utilized in the road safety arena, a consistent problem is that the framework does not account for a large proportion of the variance associated with self-report offending behaviors in regression models (Freeman, Armstrong, Truelove, & Szogi, 2015). That is, it appears that a range of additional factors may be influencing the relationship between perceptions of punishment and subsequent offending behaviors. While criminological theorists have continued to expand deterrence knowledge by incorporating a range of additional personal and environmental factors within deterrence frameworks such as social bonding, morality, respect for the law, deviance and emotional arousal (Piquero et al., 2011), this scientific effort is not reflected in the road safety literature (Freeman et al., 2015).

In addition to age, researchers have postulated that individual differences in cognition styles, such as discounting the future tendencies, may be an important variable that influences perceptual deterrence (Piquero et al., 2011). Discounting the future refers to an individual's propensity to discount the future consequences or rewards associated with their current behavior (Nagin & Pogarsky, 2004). In regards to the current context, the focus is on discounting the consequences of future penalties, which has been considered to be underpinned by false beliefs and erroneous perceptions about the future (Cosenza & Pogarsky, 2004). Previous research has reported that higher penalty discounting tendencies are associated with engagement in a range of problem behaviors, such as: shop lifting and car theft (Nagin & Pogarsky, 2004), gambling (Cosenza & Nigro, 2015), financial losses (Blackburn & El-Dereby, 2013) impulsivity (Bickel, Yi, Kowal, & Gatchalian, 2008) and even climate change (Davidson, 2014). In regards to age and neurological development, a

sizeable body of research has revealed relationships exist between processes associated with brain regions and consideration of the past as well as anticipation of future events (Buckner & Carroll, 2007). In regards to gender, preliminary research suggests that males (compared to females) are more likely to discount negative future consequences (Nagin & Pogarsky, 2004). However, in regards to road safety, the issue of discounting tendencies has been entirely overlooked, which may be argued to be a significant oversight given: (a) the widespread phenomena of discounting tendencies within humans and (b) the heavy reliance on deterrence frameworks to promote a certain and severe future sanction that follows rule violations. As such, the current study aims to examine the relationship between self-reported speeding, perceptual deterrence, demographic characteristics (e.g., age and gender) as well as discounting tendencies. More specifically, this study focuses on three main research questions:

1. Does age and gender influence levels of perceptual deterrence, and in particular, perceptions of apprehension certainty for speeding offences?
2. Which perceptual deterrent constructs (e.g., classical deterrence versus the reconceptualized model) have the greatest influence upon self-reported speeding behavior?
3. Is the influence of perceptual certainty of apprehension diluted by discounting the future tendencies?

## **2. Method**

### **2.1. Participants**

The study involved 700 participants and comprised of 398 (57%) females and 302 (43%) males. Participants were aged between 17-85 years ( $M_{age} = 28.93$ ,  $SD = 13.74$ ) and held either an Australian open or provisional driver's license. Learner drivers were excluded from the study. On average participants had held their driving license for 11.00 years ( $SD =$

13.01). Of the 700 participants, a small proportion of participants ( $n = 45$ ) reported that they had lost their license, with the majority of these participants losing their license due to speeding or driving under the influence of alcohol.<sup>2</sup> The majority of participants ( $n = 430$ ) were recruited from the general population (via email, social media, snowball sampling, or in public areas within the Brisbane City Business District), with 270 participants recruited on-campus at the Queensland University of Technology.”

## 2.2. Measures

**2.2.1. Demographic Information:** A questionnaire was developed to obtain a range of demographic information, including: age, gender, exposure to the road, self-reported speeding behavior, crash and demerit point history, etc. Speeding behaviors were measured on a 7-point Likert-style scale (1 = *never*, 7 = *always*) and the average was used for the following two questions: “How often do you exceed speed limits by more than 10km/h on a highway” and “How often do you exceed speed limits by more than 10km/h in a town”. A conservative estimate of speeding was utilized for the current study in order to reduce ambiguity regarding what constitutes speeding behaviors (e.g., more than 10km/h above the speed limit).

**2.2.2. Classical Deterrence.** A five-item questionnaire was used to assess the three factors of the Classical Deterrence theory, and were based on similar deterrence-based research that has focused on drink driving (Freeman et al., 2006; Freeman & Watson, 2009). Using a 7-point Likert Scale (1 = *Strongly disagree*, 7 = *Strongly agree*), an objective and subjective item assessed perceived certainty, “The chances of getting caught for speeding are high” (objective) and “If I were to speed, I’d worry that I would get caught” (subjective) ( $r = .276, p < .001$ ), two items assessed perceived severity of sanctions, “The penalty I would

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<sup>2</sup> In Australia, blood alcohol limits are: under 0.05/100mg for open license holders and zero for learner and provisional license holders.

receive for speeding would cause a considerable impact on my life” ( $r = .683, p < .001$ ) and “A penalty for speeding would be severe to me” and one item assessed perceived swiftness, “The time between getting caught for speeding and receiving a penalty would be very short.”

**2.2.3. Stafford and Warr Reconceptualized Deterrence (1993).** One item was used for each of Stafford and Warr’s (1993) constructs and were modelled on previous drink driving deterrence-based research (Freeman & Watson, 2006): direct punishment avoidance: “I speed regularly without being caught”, indirect punishment avoidance: “My friends often speed without being caught”, indirect punishment: “My friends have been caught and punished for speeding”. Participants rated these items on a 7-point Likert Scale (1 = *Strongly disagree*, 7 = *Strongly agree*). Direct punishment was measured via the following yes/no question, “Have you ever received a speeding ticket”.

**2.2.4. Discounting the future.** Using a 7-point Likert Scale (1 = *Strongly disagree*, 7 = *Strongly agree*), two items were developed by the authors to specifically measure discounting future speeding-related penalties: “I don’t care if I get caught for speeding as I will find a way to deal with the penalty in the future” and “I don’t worry about speeding fines because I will find the money to pay for them in the future” ( $r = .721, p < .001$ ).

### 2.3. Procedure

Participants were recruited in person, via email, via the university’s online recruitment system for undergraduate students as well as a snowball sampling technique over a three month period. Participants were required to complete either an online version of the questionnaire or pen-and-paper copy. On average, the questionnaire took approximately 20 minutes to complete, and first year psychology students received course credit (0.5%) and all other participants received a \$10 Coles/Myer gift card.

### 2.4. Analysis

Frequencies and descriptive statistics examined self-reported speeding behavior and perceived deterrence. Two one-way repeated measure analyses were then undertaken to explore if there were any significant differences between the Classical Deterrence theory constructs. A series of independent group *t*-tests were conducted to examine the extent to which gender influenced self-reported deterrence responses. Bivariate correlations between age, deterrence, and discounting the future were undertaken to explore the relationships between these variables, prior to a linear regression analysis that examined the predictors of perceived certainty of apprehension. Bonferroni adjustments were utilized for all multiple comparisons. Data screening revealed that assumptions of linearity, homogeneity of variance and normality were not extensively breached, and thus, parametric tests were subsequently utilised.

### 3. Results

#### 3.1. Self-report measure of speeding behavior

Table 1 depicts participants' self-report speeding behavior. Overall, 22.9% of respondents reported driving *often*, *nearly always*, or *always* over the speed limit, with 37.1% of respondents reported that they *sometimes* drove over the speed limit. A more refined investigation was undertaken by environment. When asked, "how often do you exceed the speed limit by more than 10km/h on a highway", 8.2% of the sample reported *often*, *nearly always*, or *always*, and 19.7% of respondents reported that they *sometimes* exceed the posted speed limit by more than 10km/h on a highway. A smaller percentage of respondents (5.3%) reported driving *often*, *nearly always*, or *always* 10km/h in a town, with 11.6% of respondents reporting that they *sometimes* exceed the posted speed limit by more than 10km/h in a town.

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Table 1 about here

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A series of ANOVAs were then conducted to assess if participants were more likely to speed on highways compared to towns, if there were any gender differences in self-reported speeding behavior, and to examine if younger drivers (aged 17-25 years) were more likely to report speeding behavior than those aged 26 years or older. Bonferroni corrections were utilized to control for alpha inflation. A one-way repeated measure ANOVA revealed that participants were significantly more likely to report speeding on highways ( $M = 2.19$ ,  $SD = 1.20$ ) than in towns ( $M = 1.87$ ,  $SD = 1.08$ ),  $F(1, 690) = 73.90$ ,  $p < .001$ . In terms of gender, a one-way between groups analysis revealed that males ( $M = 2.25$ ,  $SD = 1.19$ ) were significantly more likely to report speeding behavior than females ( $M = 1.90$ ,  $SD = 0.89$ ),  $F(1, 694) = 19.24$ ,  $p < .001$ . Furthermore, drivers aged 17-25 years ( $M = 2.13$ ,  $SD = 1.13$ ) were significantly more likely to report speeding behavior compared to those individuals aged 26 years and over ( $M = 1.92$ ,  $SD = 0.87$ ),  $F(1,691) = 6.97$ ,  $p = .008$ .

**3.1.1. Previous speeding tickets.** Almost half of the respondents (44.3%) reported that they had ever received a speeding ticket. Of those respondents, 32.4% had received a speeding ticket within the last five years. Participants who had received a speeding ticket within the last five years were more likely to report driving more than 10km/h over the posted speed limit on a highway ( $M = 2.55$ ,  $SD = 1.31$ ) than those participants who had never received a speeding ticket/ received a speeding ticket over five years ago ( $M = 2.03$ ,  $SD = 1.10$ ),  $t(380.87) = 5.08$ ,  $p < .001$ , 95% CI [0.32, 0.71]. In addition, participants who had received speeding ticket were also more likely to report driving more than 10km/h over the posted speed limit in a town ( $M = 2.09$ ,  $SD = 1.20$ ) than those participants who had never received a speeding ticket/ received a speeding ticket over five years ago ( $M = 1.78$ ,  $SD = 1.02$ ),  $t(694) = 3.52$ ,  $p < .001$ , 95% CI [0.14, 0.48].

### **3.2. Self-report measures of deterrence and discounting the future**

Table 2 reports the mean scores for the three factors of classical deterrence (i.e., certainty, severity and swiftness) and three factors of Stafford and Warr's (1993) reconceptualized deterrence theory (i.e., direct punishment avoidance, indirect punishment avoidance, and indirect punishment). For the classical deterrence, respondents generally perceived the likelihood of apprehension as high, with 72.7% of respondents reporting that they *somewhat agreed*, *agreed*, or *strongly agreed* that the chance of getting caught for speeding was high: Mean = 5.30 ( $SD = 1.18$ ). Further, 61.4% of respondents reported that they *somewhat agreed*, *agreed*, or *strongly agreed* that the penalty for speeding would be severe ( $M = 4.97$ ,  $SD = 1.52$ ). Finally, 59.9% of respondents *somewhat agreed*, *agreed*, or *strongly agreed* that there was a very short time between getting caught and receiving the penalty ( $M = 4.74$ ,  $SD = 1.52$ ). To further explore if there were any significant differences between certainty and swiftness and between certainty and severity scores, two one-way repeated measure ANOVAs were performed. The findings revealed that the mean for certainty was significantly higher than the mean for swiftness,  $F(1, 696) = 89.87$ ,  $p < .001$ , and significantly higher than the mean for severity,  $F(1, 696) = 87.87$ ,  $p < .001$ .

For Stafford and Warr's (1993) deterrence factors, 34.3% of respondents reported that they *somewhat agreed*, *agreed*, or *strongly agreed* that they speed regularly without getting caught (direct punishment avoidance:  $M = 3.39$ ,  $SD = 1.87$ ). Over half (53.7%) of respondents reported that they *somewhat agreed*, *agreed*, or *strongly agreed* that their friends often speed without being caught (indirect punishment avoidance:  $M = 4.34$ ,  $SD = 1.76$ ), and 59.7% of respondents reported that they *somewhat agreed*, *agreed*, or *strongly agreed* that their friends had been caught for speeding (indirect punishment:  $M = 4.57$ ,  $SD = 1.80$ ). Direct punishment was measured with the following question, "have you ever received a speeding ticket?", with 44.3% of respondents reporting that yes that they had received a speeding ticket. Participants were statistically more likely to report having knowledge that their friends had been

convicted of speeding offense compared to them speeding while avoiding detection,  $t(692) = -3.41, p = .001$ . A similar analysis revealed comparable differences between indirect punishment and direct punishment avoidance,  $t(692) = -15.48, p < .001$ .

For discounting the future, the mean score for the total of the two items was 2.49 ( $SD = 1.33$ ). When considering the items were measured on a 7-point Likert scale, the descriptives indicate minimal support for a group tendency to discount the negative monetary consequences (e.g., penalties) associated with speeding behavior.

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Table 2 about here

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### 3.3. Gender differences and deterrence

A series of independent groups  $t$ -tests and a chi-square were implemented to determine if gender influenced deterrence ratings. For these analyses, a critical  $p$ -value of  $p < .01$  was applied to control for multiple comparisons. The results showed that compared to males, females were significantly more likely to perceive the likelihood of apprehension to be high (e.g., certainty) and to perceive apprehension to be severe (e.g., severity). Further, and compared to females, males were significantly more likely to report engaging in speeding behaviors without getting caught (e.g., direct punishment avoidance) (see Table 3). Further, the chi-square indicated a significant association between gender and direct punishment,  $\chi^2(1) = 12.33, p < .001$ . Based on the odds ratio, the odds of receiving a speeding penalty were 1.72 times higher for males than for females.

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Table 3 about here

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### 3.4. Associations between age, deterrence, and discounting the future.



In regards to the relationship between age and perceptual deterrence, as depicted in Table 4, there were significant small positive correlations between age and perceptual certainty ( $r = .081$ ) and between age and perceived swiftness ( $r = .098$ ), indicating that as age increases so too does the perceived likelihood of apprehension and the perceived swiftness of corresponding sanctions. Further, there were significant moderate negative correlations between age and direct punishment avoidance ( $r = -.206$ ) and between age and indirect punishment avoidance ( $r = -.248$ ). These findings indicate that as age increases, individuals were less likely to report speeding without getting caught and that their friends speed while avoiding apprehension.

For discounting the future, there were significant small to moderate negative correlations between the three factors of classical deterrence and discounting the future. Specifically, these findings suggest that as discounting the future tendencies increase, there are reductions in perceptions relating to the certainty of getting caught ( $r = -.374$ ), severity of punishment ( $r = -.381$ ), and swiftness of receiving a penalty ( $r = -.139$ ). Further, there were small to moderate significant positive relationships between Stafford and Warr's (1993) factors of deterrence (i.e., direct punishment avoidance, indirect punishment avoidance, and indirect punishment) and discounting the future. The findings indicate that as discounting the future tendencies increase so too does speeding regularly without getting caught, knowledge of friends speeding without getting caught, and knowledge of friends having been caught and punished for speeding behavior.

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Table 4 about here

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### **3.5. Previous Speed Tickets and Deterrence**

A series of independent groups *t*-tests were undertaken to assess if those who had received a previous speeding ticket within the last five years had higher deterrence perception levels compared to those participants who had never received a speeding ticket/ received a speeding ticket over five years ago. Table 5 shows that participants who reported receiving a speeding ticket within the last five years considered impending penalties to be less severe, were more likely to report that they sped regularly without getting caught, and that their friends had been caught and punished for drink driving than those participants who had never reported receiving a speeding ticket/ received a speeding ticket over five years ago.

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Table 5 about here

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### **3.6. Predictors of Perceptual Certainty of Apprehension**

A linear regression analysis was conducted in order to determine whether age, gender, the classical deterrence and reconceptualized deterrence factors as well as discounting the future tendencies predicted perceptual certainty of apprehension for speeding behaviors. Overall, the complete model was significant and accounted for 38.0% of the variance in perceptual certainty,  $F(9, 676) = 46.52, p < .001$ . Table 6 shows that gender (e.g., being female,  $\beta = .139, p < .001$ ), reporting higher levels of severity ( $\beta = .346, p < .001$ ) and swiftness of sanctions ( $\beta = .221, p < .001$ ), and lower levels of direct punishment avoidance ( $\beta = -.218, p < .001$ ), and lower levels of discounting the future tendencies ( $\beta = -.117, p < .001$ ) were shown to be significant unique predictors of higher levels of perceptual certainty for being apprehended if they were to speed.

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Table 6 about here

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#### 4. Discussion

This study aimed to examine the influence of age, gender and discounting the future tendencies on levels of perceptual certainty of apprehension (for speeding) among a sample of Queensland motorists. More broadly, the research also investigated which perceptual deterrent constructs (e.g., Classical Deterrence versus the Reconceptualized Model) have the greatest influence upon self-reported speeding behavior.

A key theme to emerge from the self-reported data was that while speeding (over 10km/h) was not prevalent among the largest proportion of the sample, 73.9% of the drivers admitted to speeding on highways at least “occasionally” with 60% acknowledging a similar occasion in towns. The result is similar to previous Australian-based research (Pennay 2005) and provides further support for the assertion that speeding remains a major road safety problem (BITRE, 2016). Those most likely to report speeding were younger males, which is again consistent with previous research (Fleiter et al., 2006; Livingstone, 2011; Stradling, Meadows, & Beatly, 2004; Watson, Watson, Siskind, & Fleiter, 2009). Approximately one third of the sample reported incurring a speeding fine in the past five years, and this group were more likely to report engaging in speeding behaviors (both on highways and in towns).

An examination of the sample’s perceptions of legal sanctions (for both the Classical Deterrence theory and Stafford and Warr’s reconceptualized model) revealed that perceptual certainty was rated the highest. This is consistent with previous research (Fleiter, 2010; Freeman et al., 2006; Freeman & Watson, 2006; Watson, 2004) and is an encouraging finding that indicates motorists were generally concerned about being apprehended for a speeding offence. While there were statistically significant differences between the remaining Classical Deterrence constructs, the mean scores can still be considered relatively high, which indicates participants generally considered speeding related penalties to be certain, severe and swift. A complementary examination of Stafford and Warr’s (1993) reconceptualized constructs

revealed that indirect punishment (e.g., knowledge of others being sanctions) was rated the highest, and direct punishment avoidance (e.g., instances of avoiding detection while speeding) was rated the lowest. This latter finding is also encouraging given that punishment avoidance has consistently been demonstrated to be a significant predictor of engagement in offending behaviors (Freeman & Watson, 2006; Paternoster & Piquero, 1995; Piquero & Paternoster, 1998; Piquero & Pogarsky, 2002), including in the current study (see below).

A corresponding examination of the relationship between the sample demographics and perceptual deterrence revealed that females reported statistically higher perceptions of apprehension of certainty and severity. This is one of the first studies to indicate that males (compared to females), may be less influenced by the threat of legal sanctions in the context of speeding (which was also confirmed in the multivariate analysis). Given that males reported higher levels of punishment avoidance, further research is required to determine if an experiential effect (of avoiding detection) makes males less concerned about the consequences of apprehension, or alternatively, if other mechanisms are resulting in lower perceptual deterrence levels. It is noteworthy that males were also statistically more likely to report knowledge of indirect punishment avoidance, and thus, it would also be beneficial if future research endeavors examined if group dynamics influence perceptual levels. More broadly, a sizeable body of literature has revealed the powerful influence of group norms on a range of offending behaviors (Ogilvie, Newman, Todd, & Peck, 2014) even among young male speeders (Møller & Haustein, 2014; Sibley & Harre, 2009). Research has also demonstrated that younger males have less compliant attitudes towards traffic rules compared to other drivers (Bergdahl, 2005; Laapotti, Keskinen, & Rajalin, 2003) and perceive lower levels of risk with certain driving situations (Tränkle, Gelau, & Metker 1990).

In regards to age and perceptual deterrence levels, weak negative bivariate relationships were found that supports the assertion that younger motorists perceive lower

levels of apprehension certainty and less swift application of associated penalties. While age was not significant at the multivariate level, the results are still supportive of the small body of research in this area (Bushway et al., 2013; Sampson & Cohen, 1988) and warrants further investigation. Importantly, younger motorists were also more likely to report a higher frequency of direct and indirect punishment avoidance. These results provide further support for the assertion that younger drivers are not only more likely to speed (Cestac, Paran, & Delhomme, 2011; Deery, 1999), but also engage in such behaviours while avoiding apprehension and are aware of their peer group engaging in similar behaviour. The latter finding is in line with research that has demonstrated younger drivers are vulnerable to be influenced by their peer network (Møller & Haustein, 2014; Sibley & Harre, 2009), and it is noteworthy that the direct and indirect punishment avoidance bivariate relationship was the strongest of all correlations for the current study. Further research may benefit from disentangling this relationship to determine if vicarious experiences influence offending behaviors or if like-minded individuals socialize together.

The current study was one of the first to conduct an exploratory investigation into the extent, and influence of, discounting the future tendencies on speeding behaviors. The corresponding analysis revealed that participants did not report particularly high discounting tendencies regarding future speeding penalties, and a review of the literature to identify if discounting tendencies were widely common was difficult to determine. These preliminary results suggest that the sample perceive speeding penalties to be severe, and not easily discounted. However, it is noteworthy that a significant negative relationship existed between discounting tendencies and severity ( $r = -.381^{**}$ ). While this is the first study to report such a finding in relation to speeding, the relationship between the constructs is theoretically expected as those with higher discounting tendencies are hypothesized to report reduced

perceptual severity for future sanctions (e.g., discount the impact of sanctions; Nagin & Pogarsky, 2004).

Finally, the multivariate analysis revealed that males, as well as those with lower levels of perceptual severity and swiftness of sanctions, higher experiences of direct punishment avoidance and higher discounting tendencies reported lower levels of perceptual apprehension certainty for speeding offences. This finding supports the wider body of criminological research that has indicated severe sanctions are required to produce a strong deterrent effect (Grasmick & Bryjak, 1980; Klepper & Nagin, 1993; Paternoster & Iovanni, 1986; Teevan, 1976; Tittle, 1980; Waldo & Chiricos, 1972). It is also one of the first studies to demonstrate that the threat of severe sanctions can reduce self-reported speeding behaviors. Similarly, while perceptual swiftness has historically received little attention in the literature (Babor et al., 2003; Nagin & Pogarsky, 2001), the current findings provide support for models of learning and experimental psychology that advocate for a short period of time between stimulus and response (Nagin & Pogarsky, 2001). Given that the Queensland Police Service will soon implement new iPad technology that permits motorists to pay speeding penalties when initially apprehended on the roadside (e.g., QLiTE – QPS Lite Information Technology Exchange), further research is required to determine if shortening this time period further extenuates a strong deterrent effect. Finally, while the findings support the growing body of research that demonstrates committing an offence and avoiding detection (e.g., punishment avoidance) has a deleterious impact upon perceptual deterrence (Freeman & Watson, 2006; Paternoster & Piquero, 1995; Piquero & Paternoster, 1998; Piquero & Pogarsky, 2002), this research is one of the first to provide preliminary evidence that discounting tendencies can have a similar effect. It is also noteworthy that combining perceptual deterrence variables with a discounting construct increased the (accounted for) variance in the multivariate model compared to previous deterrence-based research (Freeman

& Watson, 2009; Lapham & Todd, 2012). This provides preliminary support for the assertion that deterrence-models need to extend beyond traditional concepts in order to increase understanding into the personal and environmental factors that influence offending behaviors (Nagin & Pogarsky 2001; Piquero et al., 2011).

This study is one of the first to assess the influence of age and discounting the future tendencies on perceptual deterrence in a road safety context. There are, however, a number of limitations that need to be addressed. First, the paper relied upon self-report data. Given that previous research has reported that self-reported data may be susceptible to biases, such as social desirability (e.g., King & Bruner, 2000), it is recommended that future research include more objective measures of speeding behavior (e.g., in-vehicle monitoring technology) to further assess the influence of age and discounting the future on deterrence. Second, the sample involved a large proportion of younger compared to older drivers, and thus, future research should include a more representative sample of the driving population. Thirdly, a focused concept of discounting was utilized (e.g., reacting only to speeding sanctions), and thus, future research may benefit from encapsulating a broader approach that is multifaceted in nature. Fourth, statistical analyses were parametric in nature and the use of non-parametric results may have produced different outcomes. Despite these limitations, the current research provides some support that age, gender, and discounting the future tendencies may influence how drivers perceive punishments associated with speeding behavior.

In conclusion, violating speed limits continues to create a tremendous social, economic and personal burden on the motoring population. Given that deterrence-based enforcement approaches will continue to be at the forefront of attempts to reduce the significance of the problem, future research is required to identify effective methods to not only amplify a strong deterrent effect, but also mitigate the range of human factor tendencies that dilute our ability to recognize high risk situations. In order to achieve this outcome,

the present study confirms that further scientific enquiry needs to extend beyond traditional deterrent concepts.



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