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The speed paradox:

the misalignment between driver attitudes and speeding behaviour

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Abstract

This paper reports on a study investigating preferred driving speeds and frequency of speeding of 320 Queensland drivers. Despite growing community concern about speeding and extensive research linking it to road trauma, speeding remains a pervasive, and arguably, socially acceptable behaviour. This presents an apparent paradox regarding the mismatch between beliefs and behaviours, and highlights the necessity to better understand the factors contributing to speeding. Utilising self-reported behaviour and attitudinal measures, results of this study support the notion of a speed paradox. Two thirds of participants agreed that exceeding the limit is not worth the risks nor is it okay to exceed the posted limit. Despite this, more than half (58.4%) of the participants reported a preference to exceed the 100km/hour speed limit, with one third preferring to do so by 10 to 20 km/hour. Further, mean preferred driving speeds on both urban and open roads suggest a perceived enforcement tolerance of 10%, suggesting that posted limits have limited direct influence on speed choice. Factors that significantly predicted the frequency of speeding included: exposure to role models who speed; favourable attitudes to speeding; experiences of punishment avoidance; and the perceived certainty of punishment for speeding. These findings have important policy implications, particularly relating to the use of enforcement tolerances.

NOTATION

ATSB   Australian Transport Safety Bureau

DT   Deterrence Theory

SLT   Social Learning Theory

Introduction

Excessive speed has been identified as a long-standing and significant contributing factor to death and injury on the road in motorised nations worldwide. Australasia is no exception [1]. The consequences of speeding, in terms of both crash incidence and severity, are well documented and include: increased crash risk due to reduced reaction time of the driver, increased risk of the severity of the crash, greater difficulty with vehicle control, increased stopping distance after application of brakes, greater impact forces in the event of a crash, and decreased reaction times for other road users [2-4]. Despite extensive research linking excess speed with road trauma, the prevalence of speeding remains high, and the behaviour remains pervasive, and arguably socially acceptable [5-7].

This presents an apparent paradox in relation to the mismatch between beliefs and behaviours, in that drivers may subscribe to one belief (that speeding is wrong or dangerous) yet regularly exceed the posted speed limit. This paradox highlights the need for a greater understanding of what the term 'speeding' actually means to drivers if interventions are to be successful in changing driver behaviour and community perceptions in relation to travel speeds.

A recent Austroads report highlights that Australian speed limits are among the highest in the world, particularly when compared with European nations that utilise harm minimisation principles as the basis for setting speed limits, and further, that many Australian jurisdictions indicated that they were currently reviewing speed limits "with a view to lowering posted speeds" [2, p. iii]. The current study sought to gain a greater understanding of driver perceptions of posted speed limits (60km/hour and 100 km/hour) and further, how this in turn affects speed choice. It also sought to identify the relative importance of various factors in predicting frequency of speeding across two speed zones. Information of this nature will be vital if authorities are to successfully implement a downward change in posted speed limits and driving speeds [2].

Previous research has identified the misalignment between attitudes to speeding and speeding behaviour [8]. The most recent Australian Transport Safety Bureau's (ATSB) Community Attitudes to Road Safety survey (2004) reveals that speed is still the most frequently cited contributing factor to crashes. Overall, 59% of respondents named it as one of the three main causal factors, and 39% identified it as the primary contributor to road crashes. Further, 96% agreed that an accident at 70 km/hour would be more severe than one at 60 km/hour [7]. This level of agreement has increased steadily

over the past decade from 80% in 1985. This clearly shows a growing recognition of the risks associated with speeding among the general community. Three quarters of the same sample however, reported exceeding the speed limit by 10 km/hour or more (ranging from Just Occasionally to Always). What remains unclear is how people define and view speeding in relation to posted speed limits, as results in relation to actual and reported speeding behaviour seem contradictory to the attitudes expressed above.

While many studies use self-report measures, observational and follow up interview techniques have revealed similar findings. Fildes, Rumbold, and Leening reported that a surprisingly high number of motorists (28%) believe exceeding the speed limit by 30 km/hour was not dangerous, regardless of whether they reported driving regularly above or below the posted speed limit [1]. Together, these results suggest that while speeding is recognised as a significant contributor to crashes, the actions of many road users indicate that they remain unconvinced, undeterred, or perhaps, that they perceive speeding as acceptable until it reaches a certain threshold, or that it is a behaviour that is different to the way that they drive. There is clearly a need to better understand the factors that contribute to this mismatch of driver attitudes and behaviour.

Factors influencing speeding

A multitude of factors that impact on speed choice have been identified from previous research, making behaviour change a very complex undertaking. Four broad categories can be used to summarise these factors: legal, social, person-related, and situational factors. Legal factors include a range of enforcement initiatives (e.g. speed cameras and related sanctions) which aim to influence the perceived risk of detection and punishment [9]. Social factors include the influence of others and can incorporate pressure from family, friends, passengers, and the media, exposure to role models, and the behaviours and travelling speeds of others on the road [10-12]. Person-related factors relate to the individual characteristics of the driver including previous crash involvement, gender, age, attitudes and values, and personality characteristics such as a predisposition to sensation seeking [13,14]. Finally, situational factors refer to the circumstances of a particular driving episode including: running late, keeping up with flow of traffic, purpose of trip, and the opportunity to speed [13]. The first three factor types are explored in the current research. The exploration of situational factors is limited to investigating driving speeds across two speed zones - 60 and 100 km/hour.

Theoretical framework

While research into the prevalence and nature of speeding has been somewhat piecemeal and largely descriptive in nature, the lack of theoretical application has received the most criticism

[15]. As such, two theoretical models were used as a framework for the current research to examine self-reported speeding.

1. *Deterrence theory* (DT) has underpinned the development of many countermeasures in road safety and focuses specifically on the perceived risk of punishment (determined by a combination of the perceived risk of being apprehended and the perceived certainty, severity, and swiftness of legal sanctions) [9]. DT has been criticised for ignoring the social implications of speeding, the intrinsic rewards associated with speeding (e.g. thrill), the discrepancy between knowing something is wrong yet still performing the behaviour, the vicarious processes involved in learning about enforcement, and the role of successful law breaking in shaping behaviour [16]. To address some of these concerns, Stafford and Warr expanded DT to include punishment avoidance and vicarious learning concepts [17]. Punishment avoidance refers to performing a behaviour and escaping punishment (e.g. exceeding the speed limit without detection or consequence). The experience of avoiding punishment is said to undermine perceptions of the certainty and severity of punishments. Vicarious learning refers to the influence of other people's experiences of speeding and apprehension on an individual. Stafford & Warr's (1993) reconceptualised form of DT was used in the current study.

2. *Akers' Social Learning Theory* (SLT) is grounded in criminology and draws on the psychological principles of operant conditioning [18]. It suggests that the primary reason a person engages in deviant or illegal behaviour is the presence of an excess of favourable attitudes towards law breaking over unfavourable ones, primarily gained from a close group of intimate associates. Further, that deviance or conformity is learned the same way; with a balance of influence stemming from the way behaviour is punished or rewarded. Personal attitudes (definitions), models of behaviour (imitation), normative influences of significant others (differential association), and the balance of actual and anticipated rewards and punishments (differential reinforcement) are the key components of the theory.

SLT has been applied to a range of deviant behaviours (e.g. computer crime, substance abuse) with good predictive success [19], yet there has been limited application to road safety. DiBlasio studied factors that influence the choice of pre-driving adolescents to ride with a drinking driver [20]. Results indicated strong support for SLT with almost half the variance accounted for by SLT variables. Watson [16] compared the predictive capacity of DT and SLT in a study of unlicenced drivers. Results indicated that SLT offered a more comprehensive framework for predicting intention to drive unlicenced than did DT.

METHOD

Participants and procedure

A convenience sample of 320 participants was recruited from the Queensland University of Technology (QUT) psychology student pool (approximately 1/5 of total participants) and from the driving public of south east Queensland (via associates of the research team) in mid-2004. The sample included an equal number of males and females (i.e., 160 of each gender) and had a mean age of 37.25 years (SD = 15.28) with ages ranging from 17 to 79 years. Sample representation across age groups was: 15-24 years (28.8%), 25-39 years (27.8%), 40-59 years (35.9%), and 60-80 (7.5%). The sole criterion for inclusion in the study was that participants held a current Australian driver's licence. In line with approval from QUT's Ethics Committee, all participants completed an eight-page questionnaire and returned it to the research team anonymously.

Measures

Self-report measures have been criticised for potential inaccuracy of responses due to poor recall and the social desirability effect (i.e., reporting more favourably to present in a positive light) [6]. Others argue they are a valuable methodological tool for exploring illegal behaviours, particularly speeding, as they have been validated by independent measures (e.g., speed cameras), and because speeding behaviour is widespread and arguably socially acceptable [21]. The current study therefore, utilised a self-report methodology.

A 113-item questionnaire collected demographic data and used a range of scales constructed specifically for this study (see below). Four outcome variables were examined: 1) *Total frequency of speeding* was measured as a composite of how often, on Urban roads (50 and 60 km/hour) and on Open roads (100 and 110 km/hour), people reported exceeding the speed limit by less than 10 km/hour, more than 10 km/hour, and more than 20 km/hour (1 = *Never*, 2 = *Just Occasionally*, 3 = *Sometimes*, 4 = *Most Occasions*, 5 = *Nearly Always*, 6 = *Always*); 2) Preferred driving speeds was measured by asking participants to nominate the speed at which they preferred to drive in a 60 km/hour and a 100 km/hour zone, given fine weather and light, flowing traffic; 3) *Expectations of apprehension* was measured by asking participants to nominate the speed at which they would expect to be booked for speeding in a 60 km/hour and a 100 km/hour zone; and 4) *Expectations of permissible speeds* was measured by participants nominating the speed that people should be allowed to drive in a 60 km/hour and a 100 km/hour zone.

The deterrence variables listed below were measured, drawing on constructs within the classical and the reconceptualised forms of DT :

- perceived risk of apprehension if speeding (measured on seven-point Likert scale);
- direct exposure to speeding enforcement (number of speeding offences in past 3 years);
- vicarious exposure to speeding enforcement (number of family/friends with speeding offences in past 3 years);
- perceived certainty, severity and swiftness of sanctions for speeding (each one measured on a seven-point Likert scale);
- direct exposure to punishment avoidance – frequency of avoiding detection if speeding due to a range of strategies e.g. listening to radio broadcasts of speed camera locations (measured on six-point Likert scale);
- vicarious exposure to punishment avoidance – number of people known to have avoided detection if speeding (measured on five-point Likert scale).

The operationalisation of the social learning variables was based on the work of Akers [18,19] and Watson [16] and included:

- personal attitudes to speeding (13 items measured on a seven-point Likert scale with a Cronbach's alpha of .88);
- imitation (models) – the number of people they know who regularly drive at 10 km/hour or more over the speed limit (measured on a five-point Likert scale with a Cronbach's alpha of .73);
- differential association[8] (norms) – attitudes of family and friends to exceeding the speed limit and to speed enforcement (12 items measured using a seven-point Likert scale with a Cronbach's alpha of .79);
- anticipated rewards and punishments (social and non-social) for speeding (7 items per scale, measured using a seven-point Likert scale with Cronbach's alphas of .86 and .84 respectively).

RESULTS

Attitudes to speeding

Two thirds of participants (66.6%) mildly to strongly agreed that exceeding the speed limit is not worth the risks. Similarly, 62.2% mildly to strongly disagreed that it is OK to exceed the posted speed limit. More than half the sample (58.2%) mildly to strongly agreed that exceeding the speed limit under any conditions is dangerous, while 56% mildly to strongly disagreed that exceeding the speed limit is OK as long as you are careful. Together, these results suggest that the majority of the sample held unfavourable attitudes towards speeding.

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8 Whilst in previous studies differential association generally included both a normative and behavioural dimension, it was limited to measurement of only the normative component in this study, as the behavioural component was reflected in the imitation (models) construct (Akers & Jensen, 2003).

Table 1 - Mean Response for Questions Relating to Frequency of Speeding*

	Urban Roads	Open Roads
Exceed limit by less than 10km/hr	3.09	3.41
Drive 10 km/hr or more over the limit	2.05	2.40
Drive 20 km/hr or more over the limit	1.34	1.52

*Measured using the following scale: 1 = Never, 2 = Just Occasionally, 3 = Sometimes, 4 = Most Occasions, 5 = Nearly Always, 6 = Always.

Table 2 - Percentage of Drivers Reporting their Preferred Driving Speeds in Both Speed Zones

Preferred speed	In 60 km zone	In 100 km zone
At limit or below	65.6	41.6
Less than 10 km/hr above	24.4	25.0
10 km/hr or more above	9.3	28.2
20 km/hr or more above	0.7	5.2

Table 3 - Expectations of the Speed at which You Would Expect to be Booked

	Mean reported speed	SD	Range
60 km/hour zone	66.85	3.3	60-80
100 km/hour zone	109.39	4.5	100-130

Expectations of permissible speeds

Frequency of speeding

The mean responses for each question reported in Table 1 indicate that participants reported exceeding both the 60 and the 100 km/hour speed limits less frequently as the speed increments increased. Overall, frequency of speeding was greater in the faster speed zone.

Preferred driving speeds

The preferred driving speeds reported by participants in the 60 km/hour zone ranged from 50 to 80 km/hour (M = 61.97 km/hour, SD = 4.09) and in the 100 km/hour zone, from 80 to 140 km/hour (M = 104.93, SD = 6.37). Overall, these mean preferred speeds seem to indicate that this sample of drivers prefer to drive above the speed limit (albeit remaining within close proximity to the posted limit) when the driving scenario indicates fine weather and light flowing traffic. Table 2 reports the percentages of preferred speeds for both speed zones.

Table 2 shows approximately one third (34.4%) of participants preferred to drive above the limit in the slower speed zone (60 km/hour). Interestingly, more than half (58.4%) indicated that they preferred to drive faster than the limit in a 100 km/hour zone. Similarly, more drivers reported preferring to speed excessively in a 100 km/hour zone than in the 60 km/hour zone (10% prefer to drive 10 – 20+ km/hour above in 60 km/hour zone and 33.4% in the faster speed zone). These findings suggest that there is a difference in the way that exceeding the posted speed limit is viewed across the two speed zones.

No significant gender differences in preferred driving speeds in a 60 km/hour zone were found, t (318) = .382, p = .703. *Males* however, reported preferring to drive at significantly faster speeds in the 100 km/hour zone than did *females* (t (318) = 3.416, p = .001). Age was negatively related to preferred driving speeds, such that younger drivers preferred to drive faster in both 60 and 100 km/hour zones (r = -.34 and r = -.33, p < .001 respectively). Both of these findings are consistent with the findings of previous research.

Expectations of apprehension

Participants nominated the speed at which they'd *expect to be booked* for speeding in a 60 km/hour and 100 km/hour zone.

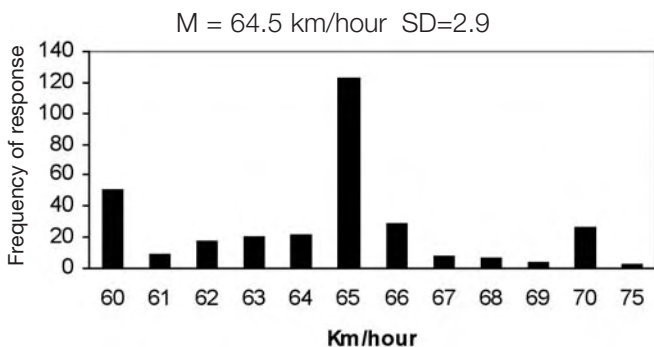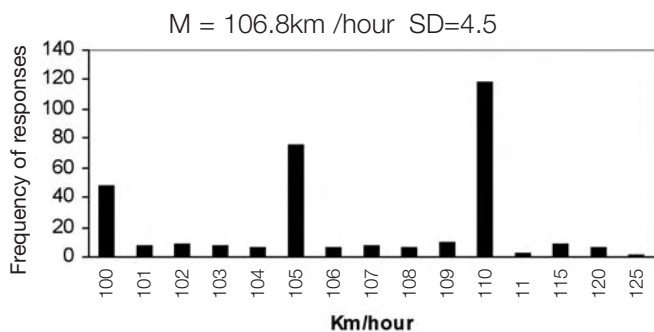Figure 1 - Speed that People Should be Allowed to Drive in a 60 km/hour zone

M = 64.5 km/hour SD=2.9

Figure 2 - Speed that People Should be Allowed to Drive in a 100 km/hour zone

M = 106.8km /hour SD=4.5

Results from Table 3 suggest that people appear to "build-in" to their expectations a tolerance of approximately 10% of the posted speed limit (i.e. 66 and 109 km/hour in the 60 and 100 km/hour zones, respectively).

Participants nominated the speed that *people should be allowed to drive without being booked for speeding* in both speed zones. Figures 1 and 2 provide information on the distribution of actual reported speeds and means and standard deviations for each question.

Figures 1 and 2 show mean reported speeds (64.5 and 106.8 km/hour) are less than the 10% reported for the previous question on expectation of apprehension. Results indicate however, that drivers tend to nominate speeds of 4-7 km/hour above the posted limits. This suggests that actual posted speeds are not perceived as something to be strictly observed[9].

Factors predicting frequency of speeding

The results of a hierarchical regression undertaken to study the relative capacity of DT and SLT in predicting total frequency of speeding are reported in Table 4. DT variables were entered in Step 1 of the analysis, followed by SLT variables as Step 2. Deterrence variables as predictors accounted for 33.5% of the variance in total frequency of speeding, $F_{(8, 311)} = 19.6$, $p < .001$. Table 4 shows the significant deterrence predictors were Perceived Certainty of Punishment (, = .11, $p < .01$) and Direct Punishment Avoidance (, = .19, $p <.001$) which uniquely accounted for relatively small amounts of the variance in total frequency of speeding (1% and 2% respectively). This suggests that the more certain a person is of being fined or losing points if apprehended for speeding, and the more frequently they had avoided punishments in the past, the more frequently they reported speeding. Social learning variables as predictors accounted for a significant additional amount of variance (25.3%) in total frequency of speeding, RÇ Cha = .253, $F_{(5, 306)} = 37.57$, $p < .001$. All social learning variables emerged as significant predictors. Models and Attitudes were the most important predictors (, = .36, $p <.001$ and .24, $p <.001$ respectively). Punishments and Rewards also made important contributions (, = -.22, $p < .001$ and .13, $p < .01$ respectively). The squared semi-partial correlations (srÇ) in Table 4 show the social learning variables contributed the following amounts of unique variance in predicting total frequency of speeding: Models (9%), Attitudes (2%), Punishments (2%), Rewards (1%), and Norms (1%)10. Results indicate that participants reported more frequent speeding when they: held more favourable attitudes towards speeding, reported a greater number of family members and friends who speed, and have experienced rewards and lack of punishment for speeding.

DISCUSSION

Factors affecting speeding

Results of this study provide some insight into the speed paradox (the apparent misalignment between attitudes and behaviour related to speed choice) and confirm that a range of factors influence speeding behaviour. Results suggest that drivers may perceive 'degrees of speeding', depending on the speed zone. For example, overall, drivers reported exceeding the speed limit more often, and by greater speed increments in the 100 km/hour zone than in the 60 km/hour zone. This suggests speeding is perceived by some as 'more acceptable' or perhaps 'less dangerous' in the faster zone. Similarly, in relation to speed preferences, more than half the sample reported preferring to exceed the speed limit in the 100 km/hour than in the 60km/hour zone (one third), with three times as many drivers reporting a preference to do so by 10-20 + km/hour above the speed limit in the faster zone than the slower zone. Even though holding attitudes favourable to speeding (that it is okay to speed) was a

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9 The 2004 ATSB Community Attitudes survey reports that 49% of respondents believed that people should be able to travel at 64 km/hour in a 60 km/hour zone, and 30% believed that one should be able to drive at 110 km/hour in a 100 km/hour zone without being booked [7].

Table 4 - Hierarchical regression of deterrence and social learning variables on frequency of speeding

Variables	M	SD	B	SE B	ß	sr^2	R^2	Adj R^2	ΔR^2
Step 1 – Deterrence									
Perceived Certainty of Punishment	12.51	2.2	.25	.09	.11*	.01			
Perceived Severity of Punishment	9.02	3.1	.01	.07	.004				
Perceived Swiftness of Punishment	10.18	2.3	-.14	.09	-.07				
Direct Punishment Avoidance	16.02	5.7	.17	.05	.19**	.02			
Indirect Punishment									
Avoidance	18.39	5.6	.06	.04	.06				
Direct Punishment	.56	1.02	.17	.20	.03				
Indirect Punishment	4.09	6.5	.003	.03	.004				
Perceived Risk of Apprehension	4.77	1.7	-.10	.12	-.03				
							.34**	.32	
Step 2 – Social learning									
Models	7.54	2.2	.84	.11	.36**	.09			
Norms	45.23	10.7	-.07	.02	-.15*	.01			
Attitudes to Speeding	45.33	14.8	.08	.02	.24**	.02			
Rewards	19.88	9.4	.07	.03	.13*	.01			
Punishments	31.93	8.7	-.13	.03	-.22**	.02			
							.59**	.57	.26**

*p < .01   **p < .001

10 Interestingly, Norms (the normative component of differential association) contributed significantly to the prediction, but in an unexpected direction. Despite this anomaly in the regression model, the bivariate relationship (r = .38, p < .001) confirms the influence of others' attitudes was in the direction predicted by SLT.

significant predictor of frequency of speeding, together these results indicate that drivers may perceive it as more 'acceptable' and 'tolerated' to travel above posted speed limits in faster speed zones.

Speed tolerances

Mean preferred speeds of approximately 10% above the posted limit across both speed zones suggest that the posted limit may be used as a baseline, or starting point from which to determine a speed. Although tolerances vary across jurisdictions, driver responses regarding perceived tolerances at a national level are reflected in the current findings – that mean speeds of up to 4-7 km/hour above posted limits are seen as the level at which drivers believe they should be allowed to travel without apprehension [7]. This highlights the need to re-consider what speed tolerances effectively communicate to the driving public. Elliott has outlined the potential legal ramifications of abolishing speed tolerances and has argued for tolerance levels to be made explicit [22]. Further, he suggested that attaching harsher penalties to those exceeding the tolerance level might achieve increased compliance with speed limits, and act to challenge the notion of speeding as socially acceptable in the longer term. To balance harm minimisation principles with public mobility, a recent Austroads report indicates that adopting minimal tolerance levels could assist in the reduction of casualty crashes without actually having to revise current posted limits [2]. As the driving public continue to demonstrate (through research findings such as the current study) that they operate within perceived tolerance levels, this strategy seems appropriate. Further, education strategies to convince drivers of the dangers of driving above the speed limit, regardless of the signed speed zone, should continue.

For those drivers who drive at or below the posted limit and express attitudes towards speeding that are congruent with this, no misalignment between beliefs and behaviour is evident. Other drivers however, may experience no dissonance between their seemingly opposing attitudes and actions (i.e., believe it wrong to speed yet still exceed posted limits regularly) for a number of reasons. Firstly, they may view speeding as something other than the legislated definition. That is, according to them, speeding does not refer to exceeding a posted limit, but rather, to something that is unsafe once it reaches a particular threshold, and may vary according to the speed zone in which they are travelling. Secondly, the results confirm that there are a range of factors, over and above personal attitudes to speeding, which influence speed choice. In other words, some may prefer to exceed the posted speed limit due to the perceived rewards (or lack of punishments) associated with the behaviour, despite holding attitudes that are negative, or at least neutral to speeding.

Detection and punishment

Punishment avoidance was a significant predictor of total frequency of speeding, suggesting that detection methods need to be improved if speeding behaviour is to be curbed. Opportunities for drivers to avoid detection, and therefore, punishment, need to be diminished. Stafford and Warr suggest that occasional episodes of apprehension and punishment may not act as an effective deterrent when the experience of punishment avoidance is common [17]. The influence of punishment avoidance on certainty of punishment may lead a person to perceive that they are immune to apprehension and punishments, even though they many have occasionally experienced them. Current results support this.

Exposure to role models who speed, and holding favourable personal attitudes to speeding also contributed significantly to predicting frequency of speeding in this study (and the wider literature). As Models was the most predictive factor, the impact of the speeding behaviour of family, friends, and others cannot be overlooked in the campaign to reduce driving speeds. Actual and anticipated rewards and punishments from speeding were also significant factors in predicting frequency of speeding. Public education campaigns may benefit by focussing attention on these areas. Messages that negate the rewards of speeding (e.g. arriving on time vs. losing licence) and increase the awareness of punishments for speeding (particularly social punishments such as public and peer disapproval) may assist in addressing the paradoxical nature of the speed phenomenon on the roads.

Limitations of the study

Several limitations must be considered when interpreting the results of this study including the use of self-report measures, a convenience sample that may not be representative of the general driving community, and a predominantly urban sample. As such, there is a need to replicate this study on a broader scale to achieve more general results. Despite these limitations, the findings of this study are consistent with the social/behavioural literature and the annual Community Attitudes surveys undertaken by the ATSB.

Conclusions

This study suggests that a range of factors appear to contribute to the apparent misalignment of attitudes and reported speeding behaviour including: unclear definitions of what is perceived as speeding; the use of posted limits as a baseline for speed choice based on perceived enforcement tolerance levels; the influence of others who model speeding; previous rewards and lack of punishments from speeding; and the perceived certainty of sanctions if detected. The influence of others (role models and normative pressures) and the costs/benefits of speeding all require further investigation to more fully understand the nuances of their contribution to the speed paradox.

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