Abstract

Despite increasingly sophisticated speed management strategies, speeding remains a significant contributing factor in 25% of Australia’s fatal crashes. Excessive speed is also a recognised contributor to road trauma in rapidly motorising countries such as China, where increases in vehicle ownership and new drivers, and a high proportion of vulnerable road users all contribute to a high road trauma rate. Speed choice is a voluntary behaviour. Therefore, driver perceptions are important to our understanding of the nature of speeding. This paper reports preliminary qualitative (focus groups) and quantitative (survey) investigations of the perceptions of drivers in Queensland and Beijing. Drivers’ definitions of speeding as well as their perceptions of the influence of legal factors on their reported speeds were explored. Survey participants were recruited from petrol stations (Queensland, n=833) and car washes (Beijing, n=299). Similarities were evident in justifications for exceeding speed limits across samples. Excessive speeds were not deemed as ‘speeding’ when drivers considered that they were safe and under their control, or when speed limits were seen as unreasonably low. This appears linked to perceptions of enforcement tolerances in some instances with higher perceived enforcement thresholds noted in China. Encouragingly, drivers in both countries reported a high perceived risk of apprehension if speeding. However, a substantial proportion of both samples also indicated perceptions of low certainty of receiving penalties when apprehended. Chinese drivers considered sanctions less severe than did Australian drivers. In addition, strategies to avoid detection and penalties were evident in both samples, with Chinese drivers reporting a broader range of avoidant techniques. Implications of the findings for future directions in speed management in both countries are discussed.

Key words

Speeding, enforcement, speed management, Australia, China, perceived risk, road safety

Introduction

Many countermeasures to reduce drink driving and speeding, and increase seat belt wearing rates have successfully contributed to improved road safety especially in countries such as Australia [1]. Despite this, speeding has been identified as one of the leading risk factors for road crashes internationally, with speed management described as ‘one of the biggest challenges facing road safety practitioners around the world’ [2]. The World Health Organisation (WHO), in conjunction with several key international agencies, has published a series of ‘how to’ manuals which provide information aimed at assisting authorities and road safety practitioners to implement effective and cost effective solutions to road safety problems. One of these manuals has been devoted entirely to speed management, highlighting the international significance of the issue.

The consequences of speeding are well documented and include: the increased likelihood of crashing due to the reduction in time available to the driver and other road users to take evasive action, greater difficulty with vehicle control at higher speeds, increased stopping distance after braking, and greater impact forces in the event of a collision [3,4]. Indeed, safer driving speeds have been identified as one of the top priorities of the most recent national action plan for Australia [5].

Those countries with longer histories of more intense motor vehicle use, generally referred to as ‘highly motorised’ countries, have arguably had the luxury of being able to develop methods of dealing with emerging road safety problems as these have developed. Australia falls into this category and is a nation with a substantial record of success in developing, implementing and evaluating countermeasures aimed at reducing road-related death and injury [1]. Countries that have rapidly motorised more recently are faced with the need to address serious safety issues in much shorter time frames. These issues include serious consequences resulting from the mix of large numbers of high velocity, motorised vehicles (e.g., trucks, buses and cars) with high proportions of low velocity, non-motorised road users (e.g., cyclists and pedestrians). China falls into this latter category and, as such, has many road safety challenges ahead.
China’s journey towards higher levels of motorisation is in its early stages with that nation identified as the fastest growing car market in the world [6]. Current rates of vehicle ownership in China are low: 2.4 per 100 persons [7] compared to Australia’s rate of 52.2 per 100 persons [8]. However, China shoulders a disproportionate level of the world’s road trauma: China’s 1.3 billion people own approximately 2% of the world’s vehicles, yet account for approximately 15% of global road fatalities [6].

In addition to differences in levels of motorisation, challenges in the road safety arena can also be related to many other factors including: the characteristics of the system of governance in which drivers operate, the standard of the road networks on which they travel, the resources available for road safety initiatives, the type of vehicles in use, and the mix of vehicles on the road. Each of these components can vary substantially from one country to the next. However, one constant is the role of the driver; the person behind the wheel ‘charged with the responsibility’ of behaving in a competent and safe manner. It is management of this human factor that all road safety authorities have in common.

**Speeding and speed management – the Australian context**

Despite increasingly sophisticated speed management strategies, speeding remains a significant contributing factor to road trauma in Australia. Approximately one in every four (25%) fatal crashes is directly attributed to excessive or inappropriate speeds [5]. However, determining the actual role of ‘excessive speed’ in crashes is problematic [9]. Therefore, the contribution of speed to fatal crashes in Australia is likely to be under-reported.

Enforcement is the key feature of current Australian speed management strategies and jurisdictions have developed, implemented and evaluated increasingly sophisticated speed enforcement techniques as their primary speed management tool over several decades. A detailed description of speed management in Australia is beyond the scope of this paper. The reader is referred to the following publications for greater detail [3, 10, 11, 12]. Enforcement relies on deterrence principles of persuading drivers that they are likely to be caught (i.e., increasing the perceived risk of apprehension), and once caught, that penalties are guaranteed, severe and delivered in a timely manner (i.e., increasing perceptions of certainty, severity and swiftness of penalties) [3, 13]. Though there is evidence that enforcement is effective in Australia, increasingly, there are calls for consideration of methods other than punishments for speeding to effect behaviour change [14, 15]. We agree, yet also recognise the need to better understand the way drivers respond to current punitive-based methods because of the likely longevity and importance of such methods in enhancing road safety [16].

Australian drivers have been exposed to a wide range of road safety initiatives over many decades in an effort to increase their competence and safety. However, annual road trauma statistics indicate that continued attention is still warranted in Australia. The extent to which China’s growing numbers of drivers are equipped to be competent and safe on the road is unknown and is an area deserving serious attention. The research reported in this paper offers preliminary findings from an investigation of speeding in an Australian and a Chinese setting.

**Speeding and speed management – the Chinese context**

In China, traffic-related mortality has escalated by 81% in the two decades since 1987 [17]. Estimates suggest that between 80,000 and 100,000 lives are lost each year on the road with traffic-related fatalities recognised as the leading non-disease killer in China [6, 18]. The number of annual road-related deaths in China has been estimated at 19/100,000 people [19], compared to the rate of 6.8 in Australia [20]. The ‘World report on road traffic injury prevention’ published by the World Health Organisation (WHO) identified speeding as the principal cause of road crashes in China [21]. Others have reported that 17.6% of all road fatalities result from speed-related crashes [22]. There are also concerns about under-reporting of speeding in China, although in this instance, the situation appears to be linked to factors such as reporting mechanisms and the absence of a national facility to cross-reference data [7]. It is clear however, that speeding makes a substantial contribution to road trauma. The strategies used to manage speeding in China include automated enforcement and mobile police patrols. However, the extent and consistency of these practices is not known. Similarly, we know little about the factors that influence Chinese drivers’ speed choice.

**Factors influencing speeding**

Figure 1, reproduced from the WHO’s speed management manual, demonstrates the broad range of factors that have been identified as exerting an influence on driving speeds [2].
Figure 1: Influential factors on speed choice

Speed choice is a voluntary behaviour. Therefore, driver perceptions are important to our understanding of the nature of speeding. In an effort to enhance our understanding, this paper addresses one of the factors in Figure 1: enforcement and sanctions. Driver perceptions regarding enforcement practices and sanctions are noted as a vital part of an overall speed management strategy with the WHO speed management manual advising that: 

*The more widespread the measures, particularly enforcement, and the greater the range, severity and implementation of sanctions against speeding, the more compliance will result. To achieve wide public acceptance of enforcement, speed limits need to be appropriate - and recognized as such by the public* [2, pg 11].

Thus, the aim of the current research was to provide information about public perceptions of speed enforcement and sanctions in Australia and China. This study formed part of larger qualitative and quantitative examinations of a range of factors influential on speed choice in the jurisdictions of Queensland and Beijing. This paper reports only the results pertaining to speed enforcement and sanctions. For the qualitative component, focus groups were used because they offer the opportunity, in a socially interactive setting, to gain multiple views on specific topics that could be clarified and challenged as discussions progressed [23]. For the quantitative component, questionnaires were used to elicit information on driver perceptions of speed enforcement as well as self-reported speeding behaviour. This offered the opportunity to compare the relative importance of factors relating to speed choice.

**Method - Qualitative phase**

**Participants**

In Australia, 67 Queensland drivers were recruited from the general driving public and a university population and ranged in age from 18-77 years. Recruitment strategies included advertising on public notice boards and accessing first-year psychology students. Students (n=34) were offered course credit and community participants (n=33) were offered the chance to win a retail voucher valued at AUD 30. In China, 35 Beijing drivers were recruited from the membership database of a large driver support agency (n=27) and a graduate university population (n=8) and ranged in age from 21-49 years. Staff of the agency contacted their members by email and invited them to participate. University students were recruited via associates of the Chinese research team involved with the project at the Chinese Academy of Sciences. Participants were paid RMB 150 for participating.

**Materials and Procedure**

Written consent was obtained from all participants and included permission to record group discussions. Focus group protocols were developed to elicit information about personal definitions of speeding as well as perceptions of speed enforcement practices. In Australia, the first author facilitated each group and transcribed the audio-recorded conversations as soon as possible, allowing early analysis whilst data collection continued [24]. In Beijing, discussions were conducted in Mandarin and facilitated by a member of the Chinese research team who is also fluent in English. The first author was present at each group but did not participate.
Analysis
The overall approach to analysis of the qualitative material adopted an interpretive framework [25]. Within this, thematic analysis was used to extract the main themes from transcripts of the focus group discussions. In Australia, analysis of the transcripts began immediately and emerging themes from each discussion were compared with previous ones, allowing for the discussion schedule to be modified so as to clarify or substantiate particular themes where needed [26]. This constant comparative approach was adopted to help validate the researchers’ appreciation of issues as analysis proceeded [25]. To overcome the difficulties in language, a different process was used for the Chinese discussion group phase. An intermediate step where audio recordings were transcribed into Chinese and then translated into English by Chinese native speakers was used. The Chinese group facilitator then checked all transcriptions and translations for content accuracy before the first author commenced the analysis. In addition, the Chinese group facilitator assisted in the analysis of the Chinese transcripts, providing the opportunity for the first author to discuss unfamiliar concepts, clarify ambiguous statements, and confirm the understanding of findings and themes as they emerged.

Method - Quantitative phase

Participants
In Australia, 833 car drivers were recruited from the food court areas of petrol stations in metropolitan and regional locations in Queensland. All recruitment sites were situated beside the major highway thoroughfare and venues on both sides of the highway were used to avoid bias in sampling one-directional traffic. A direct approach recruitment strategy was employed yielding a 29.09% response rate. Participants were aged between 17-85 years (\(M=40.49\) years, \(SD=16.62\)) and just over half the sample were male (55.4%). All participants were offered AUD 10 cash for their involvement. In China, a direct approach strategy was also used to recruit 299 car drivers in premises in Beijing where people can have their car washed. This figure represents a response rate of 55.76%. Participants were aged between 21-65 years (\(M=31.85\) years, \(SD = 8.67\)) and 69.6% were male. All Chinese participants were offered RMB 30 cash for their involvement.

Materials and Procedure
Similar but separate questionnaires were developed for each country. Item development was informed by previous road safety research including applications of deterrence theory that dealt specifically with perceptions about enforcement and sanctions in order to measure the same constructs. However, the Chinese version was different in two respects. First, some items on the Chinese version of the questionnaire were modified to reflect the qualitative findings from China. Second, the Chinese version was designed to ensure completion within 10 minutes (compared with 20-30 minutes for the Australian version); a constraint imposed by the businesses that agreed to allow data collection in Beijing. To meet this more stringent timeframe, it was sometimes necessary to alter the wording or scoring of questionnaire items. Appendix A contains the items used in both countries. In both countries, research assistants approached drivers and invited them to participate in a study relating to driving speeds. After explaining the purpose of the study and confidentiality issues, participants were left alone to complete the questionnaire, which was then collected by the research assistants.

Findings
The qualitative findings are presented first in order to show driver views about the concept of ‘speeding’. In the sections containing qualitative findings, participants are identified according to their gender, age and nationality (e.g., F30CN represents a 30-year-old female Chinese participant and; M18AU represents an 18-year-old man). “Int:” indicates facilitator comments. Following this, qualitative and quantitative findings relating to deterrence principles of perceptions about apprehension and penalties are presented together.

Themes from the qualitative discussions
Defining speeding. Participants were asked to describe what the word ‘speeding’ means to them. In both countries, initial general responses indicated that ‘speeding’ was recognised as travelling at any speed above the posted speed limit. Some drivers described how their speed choice matched this definition and seemed to be based on safety considerations as well as the belief that it is necessary to obey the law, sometimes expressed as a moral obligation. For example:

- “It’s [complying with speed limits] a choice to be as safe as I can be.” M39AU
- “If it’s not legal, then it’s morally wrong, that’s what I associate.” F37AU
- “I do not speed. 60 [km/hr] is fast enough for me.” M21CN
- “You are risking your life [if you speed].” M29CN
However, even though drivers in both countries acknowledged that speeding related to exceeding the posted limit by any amount, they also appeared to believe that individual drivers could still make their own assessments of speeds appropriate for them. For example:

“I don’t see it as speeding; I see it as road management. I don’t look at what speed I’m driving, I’m just going by instinct. I know when I’m able to drive fast.” M60AU

“Speeding is defined according to the traffic law and you are speeding if you drive above the speed limit. [However], every driver has his own feeling about speeding.” F30CN

These statements indicate that some drivers view compliance with the law as discretionary, rather than mandatory. A variety of reasons were discussed when drivers explained why they drove at speeds above the posted limit. Sometimes these reasons had the same descriptive labels as the reasons cited above by drivers who reported complying with speed limits (i.e., safe, necessary). However, for drivers who admitted to speeding, driving above the limit rather than at or below it, was viewed as safe and as necessary. This was particularly the case when drivers indicated a belief that speed limits were unreasonably low. This finding was common to both countries:

“The 60 km/hour mark is ridiculous and should be raised. Police use speeding[enforcement] as revenue. I think 70km/hour is pretty reasonable. 60 ks is unrealistic. It’s an old speed limit, made during the time when there were drum brakes, not as technologically advanced as we’ve got now.” M20AU

“Sometimes I drive at the speed of 180 [km/hour] when the speed limit is 110...even much faster. It is not about danger. Sometimes it’s not dangerous [to speed].” M28CN

In addition, for some drivers in both countries, exceeding speed limits, often by large amounts, was expressed as acceptable when they perceived that they and/or their car could perform ‘safely’. For example:

“If you’re driving a car that can really hug the road, it can brake fast, it’s like a race car on the road, you should be able to [allowed to by law] go faster...because you’re safer. Your stopping distance is a lot [better].” MAU32

“It’s often expressed that there is a leeway of 10%. “Who expresses that?” “My driving instructor did. So in a 100 zone, it’s viable to go 110 [km/hour] without being considered speeding, but any more than that would be breaking the law.” M23AU

“Sometimes I drive at the speed of 180 [km/hour] when the speed limit is 110...even much faster. It is not about danger. Sometimes it’s not dangerous [to speed].” M28CN

“[However], every driver has his own feeling about speeding.” M60AU

“Sometimes I drive at the speed of 180 [km/hour] when the speed limit is 110...even much faster. It is not about danger. Sometimes it’s not dangerous [to speed].” M28CN

In both countries, perceptions of enforcement tolerance levels appear to influence the speed choice of some drivers. In Australia, although there were some examples of using the figure of 10 km/hour above the limit as a guide to speed selection, the most common example was the perception that speed detection devices operate with a 10% tolerance level. Thus, some drivers indicated that they were prepared to drive at speeds not exceeding a level more than 10% above the posted limit. In China, perceptions of enforcement tolerances appeared higher than the Australian ones, ranging from 20 to 50% as shown here:

“This is called the [Speed] limit. I won’t exceed 50%, it is dangerous [you are likely to get caught by police, rather than unsafe] when you exceed 50% above.” M31CN

Perceived risk of apprehension. Overall, the perceived risk of getting caught while speeding, particularly by speed cameras, seemed high for both Australian and Chinese drivers. Drivers reported using strategies to try to reduce this risk. One strategy commonly reported in both countries to reduce this risk was site learning; knowledge of speed camera locations. In China, drivers described sharing this knowledge with friends via the Internet. They also described the process of actively seeking out camera locations from the Internet and/or friends through social networking sites before driving on an unfamiliar road. It is unclear who posts and/or maintains this online ‘resource’.

“[There should be a list of all the cameras that all of us] have found.” M29CN

“There is a list on the internet.” F30CN
Australian drivers did not discuss sharing their knowledge of enforcement locations in this way. This might be because general speed camera locations are regularly broadcast on commercial radio stations in Queensland and fixed camera locations are published on Queensland Transport’s website. Other strategies to reduce the likelihood of detection reported by Beijing drivers included tampering with vehicle licence plates so that police could not identify them. Examples of tampering cited by Chinese drivers included covering or removing existing plates as well as the use of fake plates. It was unclear how widespread such driver practices were in Beijing.

Quantitative results indicate that overall, perceptions about the risk of apprehension while speeding generally appear high in both countries. However, questions were asked in different ways in each location. In Australia, drivers were asked about the risk of being caught when driving less than and more than 10 km/hour above speed limits on urban and open roads (see Table 1). In general, speeding on urban roads or at higher levels was perceived as more risky.

More specifically, when comparing perceptions about the risk of getting caught when travelling at 10 km/hour or more above the limit across the two road types, results indicate a significantly greater perceived risk of getting caught on urban roads \( (M = 5.27) \) than on open roads \( (M = 5.03) \); \( t(827) = 80.56, p<.001 \). The result was the same for perceptions about driving at speeds of less than 10 km/hour on urban \( (M = 3.20) \) and open roads \( (M = 2.63) \); \( t(827) = 42.48, p<.001 \).

<table>
<thead>
<tr>
<th>Table 1: Perceived risk of apprehension scores for urban and open roads in Australia</th>
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</thead>
<tbody>
<tr>
<td>Urban roads</td>
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<tr>
<td>Less than 10 km/hr</td>
</tr>
<tr>
<td>Mean</td>
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<td>SD</td>
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</tbody>
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Scored using 7-point Likert scale (1=Extremely likely to 7=Extremely unlikely) where higher scores represent the perception of a greater risk of being caught when speeding.

In China, drivers were asked a more general question about their overall risk of getting caught when speeding (see Appendix 1). Scored using the same scale described above for the Australian risk of apprehension items, the mean score was well above the mid-point of the scale \( (M = 5.9, SD = 1.3) \) with only 5.1% of participants having scores below the mid-point. Almost half (45.6%) of the sample reported the perception that being caught was ‘extremely likely’. This suggests that drivers had a high perceived risk of being caught if speeding in Beijing; a very encouraging result. However, risk of apprehension is only one part of the deterrence equation and should be considered in relation to the other penalty perceptions. These other components will now be discussed.

Perceived certainty of punishment. In Australia, there was a high association between the driver perceptions that they would receive a monetary fine if caught speeding and their perceptions about receiving a demerit point penalty when apprehended \( (r = .931, p<.001) \). This indicates a consistent belief in the likelihood of receiving both types of penalty. Just over one in three drivers indicated that they think it is ‘extremely likely’ that they will receive a monetary (37.8%) and a points penalty (37.9%) when caught speeding. However, a similar percentage endorsed the response options of ‘somewhat’ to ‘extremely unlikely’ for receipt of a fine (35.8%) and demerit point sanction (37.6%) if caught speeding.

In China, drivers commonly discussed avoiding legal punishments when apprehended for speeding by police. Examples of how this is achieved included: negotiating with police at the time of the offence to reduce the penalty or to persuade officers not issue one, asking other people to assist in cancelling the penalty, and using the demerit points of other people. This last strategy was described as easy to accomplish because ‘there are many people who have a licence but no car’ [M37CN]. It is not clear how often these strategies are used. However, in each group discussion in China, this issue emerged without prompting, leading us to consider that such practices may be reasonably common. Australian drivers also discussed using, and in some cases, purchasing the demerit points of other people to avoid penalties for speeding [see 27 for further details]. There is, of course, no easy way of knowing how common these practices actually are because they operate outside the legal system and are therefore not recorded in official data.

Because Chinese drivers commonly discussed the possibility of avoiding sanctions, we examined perceived certainty of punishment in the questionnaire in a slightly different way in Beijing. Participants were asked how sure they were that they would have to pay a penalty if caught by either a speed camera, or by a police officer in...
Beijing. The majority of drivers reported moderate to high certainty associated with both forms of apprehension ($M_{Camera}=5.35, SD = 1.5$; $M_{Police officer} = 5.54, SD = 1.4$). Overall, the majority of drivers (66.8% for ‘caught by camera’ and 73.3% for ‘caught by police officer’) reported ‘moderate’ to ‘strong agreement’ that they would have to pay the fine if they were caught speeding in Beijing. However, this means that approximately 1/3 of drivers believed that they were not likely to receive a penalty if caught.

To examine this issue more closely, questionnaires in both countries contained items about speeding offences in the previous 3-year period. Results are presented in Table 2 and show that approximately one third of Australian drivers (32.5%) had received at least one speeding offence.

**Table 2:** Information about the number of speeding offences in the 3-year period prior to questionnaire completion.

<table>
<thead>
<tr>
<th></th>
<th>%</th>
<th>Mean</th>
<th>SD</th>
<th>Range</th>
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<tbody>
<tr>
<td><strong>Australia</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Received 1 or more speeding tickets</td>
<td>32.5</td>
<td>0.57</td>
<td>1.24</td>
<td>0 – 20 tickets</td>
</tr>
<tr>
<td><strong>China</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reported 1 or more times caught speeding</td>
<td>32.0</td>
<td>1.16</td>
<td>3.88</td>
<td>0-50 tickets</td>
</tr>
<tr>
<td>Received a penalty each time caught</td>
<td>68.8</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

In China, the question was modified slightly to account for the finding discussed above where the nexus between apprehension and punishment is not consistent. Chinese drivers were asked about the number of times they had been caught speeding and whether they had actually received a penalty on each of these occasions. Only 68.8% reported receiving a ticket when apprehended for speeding in China. Therefore, approximately one in three participants caught speeding appear to have avoided any legal punishment.

**Perceived severity of punishments.** There were mixed findings in the qualitative data regarding perceptions of penalties associated with speeding offences. In Australia, some drivers described monetary penalties are unfairly high but demerit point penalties not so. Conversely, others reported the belief that demerit point penalties were too harsh. This seemed particularly pertinent to those who drive more, with some suggesting that people who drive greater distances per year ought to be able to accrue a greater number of demerit point penalties before licence sanctions apply. In China, some drivers indicated that the current fines were reasonable and did not want to see them increased. Much discussion was generated about the use of the revenue from fines rather than the severity of the fines per se. Many Chinese drivers expressed an interest in knowing how the government uses this revenue: “I think it is okay to fine. But what do you do with this money? The government should tell us.” [F25CN]

In the quantitative phase, participants were asked about the harshness of current penalties. In Australia, participants were questioned about monetary and demerit point penalties separately. Overall, mean scores indicate that Australian participants viewed penalties for speeding as moderate. Demerit point penalties ($M=3.12, SD=1.05$) were scored as significantly more severe than monetary penalties ($M = 2.97, SD = 1.03$); $t(828) = 8.53, p<.001$. Approximately 10% of participants viewed both types of penalty as ‘not at all severe’ (monetary fine = 9.2% and demerit point penalty = 11.1%). A similar percentage of respondents viewed both penalty types as ‘extremely severe’ (monetary fine = 6.9% and demerit point penalty = 10.1%). Half the sample, however, viewed both penalty types as ‘moderately severe’ (monetary fine = 46.9% and demerit point penalty = 45.1%). In China, results indicate that the penalties for speeding were generally viewed as mildly to moderately harsh. For instance, half the sample (49.2%) reported that penalties for speeding were ‘minimal’ or ‘not at all severe’ ($M = 2.73, SD = 1.3$). However, 12.7% indicated their belief that penalties were ‘extremely harsh’.

**Perceived swiftness of punishments.** This issue relates to perceptions about how quickly a penalty will be received once the driver has been caught. This concept was not raised during the qualitative phase in either country. Approximately half the Australian sample (54.1%) did not agree that penalties are delivered within a short time frame ($M=4.59, SD=1.8$). See Appendix 1 for specific details of item wording and scoring. In China, the result was different in that three quarters of the sample (67.6%) indicated ‘moderate’ to ‘strong agreement’ that they would receive legal penalties swiftly ($M=5.4, SD=1.44$). This relevance of this finding is difficult to
interpret clearly without an in-depth knowledge of enforcement practices in Beijing. It is possible that it reflects a greater amount of police/driver interaction as opposed to a fully automated enforcement process.

Factors predicting frequency of speeding
Hierarchical regression analyses were used to examine the influence of demographic and deterrence variables on self-reported speeding (see Appendix B). Age and gender were also included in the analyses because of their links with speeding in the literature. These two variables were entered at step 1 and the four deterrence-related variables at step 2. For the Australian sample, the overall model with both sets of predictors was significant, \( F(6, 832) = 43.38, p < .001 \). Demographic variables as predictors accounted for 18.6% of the variance in frequency of speeding, \( F(2, 830) = 95.98, p < .001 \). The deterrence variables as predictors accounted for a significant additional amount of variance (5.2%) in frequency of speeding, \( R^2 \) Cha = .052, \( F(4, 826) = 43.38, p < .001 \). All predictors were significant. The two strongest predictors were age (\( \beta = -.339; p < .001; \text{sr}^2 = .12 \)) and gender (\( \beta = -.164; p < .001; \text{sr}^2 = .03 \)), followed by perceived severity (\( \beta = .15; p < .001; \text{sr}^2 = .03 \)); perceived risk of apprehension (\( \beta = -.146; p < .001; \text{sr}^2 = .03 \)); perceived certainty (\( \beta = .088; p = .005; \text{sr}^2 = .01 \)) and perceived swiftness (\( \beta = .063; p = .04; \text{sr}^2 = .01 \)). Age uniquely accounted for 12% of the variance in frequency of speeding with the other variables making much smaller unique contributions. The results suggest that in Australia, drivers who are younger, male, believe that speeding penalties are harsh, perceive a low risk of being apprehended when exceeding the speed limit1, are more certain that they will receive legal sanctions when caught, and perceive that penalties will not be delivered in a short timeframe, speed more frequently. It is noteworthy that the finding for perceived risk of apprehension is in the expected theoretical direction; the findings for perceived certainty, perceived severity, and perceived swiftness are not.

For the Chinese sample, the overall model with both sets of predictors was also significant, \( F(6, 285) = 4.21, p < .001 \) (see Appendix C). The demographic variables as step 1 did not make a significant contribution to prediction, \( F(2, 283) = 2.19, p = .114 \). The deterrence variables accounted for only 6.7% of the variance in frequency of speeding, \( R^2 \) Cha = .072, \( F(4, 279) = 5.47, p = .001 \). In the final model, only two variables made a significant contribution; risk of apprehension was the strongest predictor (\( \beta = -.136; p = .03; \text{sr}^2 = .02 \)), followed by age (\( \beta = -.126; p = .03; \text{sr}^2 = .02 \)). The negative \( \beta \) weights suggest that drivers who perceive lower risks of being caught when exceeding the speed limit or who are younger, speed more frequently. These two variables uniquely accounted for small amounts of variance in frequency of speeding (2% each).

Discussion
This research examined the way that Australian and Chinese car drivers define ‘speeding’ and the enforcement-related factors that contribute to their speed choices. Qualitative themes were similar in both countries and indicated that there were two distinct ways that drivers perceived the issues of ‘safety’ and ‘necessity’ with respect to speeding and speed limits. Firstly, drivers from each country described compliance with posted speed limits as a normal part of their driving because they believe this is safe and necessary. However, the second view, also expressed by drivers in each country, described travel speeds well above posted speed limits as ‘safe’ and ‘necessary’. Necessity to speed was coupled with perceptions that posted speed limits are unreasonably low in some instances. Though both views appeared in the transcripts of each country, only Chinese drivers expressed a desire to know how speed limits are determined and whether there are risks associated with faster driving speeds. This is an encouraging finding in that there appeared to be genuine desire to gain knowledge about safety-related driving issues in China. This type of information may be influential in lowering driving speeds. With increasing numbers of new drivers in China, this type of information could be considered for future public education campaigns. For some Australian drivers, the perception that current speed limits are unreasonably low was related to speed limits being out of touch with contemporary vehicle capability, particularly braking capability. This possibly reflects a lack of understanding about the risks associated with increased travel speeds and, as such, continued efforts to educate drivers about issues such as stopping distances and risks associated with impact at speed are seen as important. A recent Austroads report that examined the relationship between harm minimisation and mobility in relation to travel speeds noted that Australian speed limits are relatively high by international standards [3]. Attempts to reduce speed limits will need to address driver perceptions such as those reported in the current paper. This is a difficult task; one that requires further work to better understand why drivers do not necessarily equate increased speed with increased risk.

Enforcement is a key part of speed management in Australia and China. Understanding driver perceptions about and interactions with enforcement mechanisms is essential because perceptions are likely to be more influential

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1 *Perceived risk of apprehension* was measured with items relating to exceeding the speed limit by 10 km/hour or more.
on behaviour than actual enforcement levels and practices. Quantitative results indicate that in Australia, the perceived risk of being caught when speeding was higher on urban roads than on open roads, and also when exceeding the speed limit by more than 10 km/hour, irrespective of road type. This finding might reflect that drivers believe it is ‘safer’ (in terms of their chance of being caught) to speed on open roads because they are better able to predict the locations where speed enforcement happens and can adjust their speeds accordingly to avoid getting caught (i.e., site learning). Alternatively, it may reflect the belief that more enforcement happens on urban roads. This belief could stem from exposure to greater levels of enforcement in urban settings, or at least from perceptions of such. In Australia, more frequent speeding was associated with a lower perceived risk of getting caught. This finding is contrary to the results from work conducted in New South Wales where perceived likelihood of detection was not associated with a self-reported likelihood of speeding [15]. Different enforcement practices across jurisdictions may account for this finding. In China, a substantial proportion of the sample indicated agreement that their risk of getting caught when speeding was high. Also, this variable was the only deterrence-related predictor of speeding in China that reached statistical significance. Overall, the results suggest that efforts to convince drivers that they are likely to be detected and apprehended when speeding should continue. The role of covert (hidden) enforcement as well as public awareness campaigns about enforcement may assist this work.

Being sure that one will receive punishment when caught is theorised to reduce illegal behaviour. However, the current results do not support this. In Australia, one in three drivers indicated that they believe they are unlikely to receive legal sanctions when caught. This figure was surprisingly high; one that certainly requires further investigation. It suggests that there may be a considerable proportion of the driving population who believe that when apprehended for speeding, legal penalties are not guaranteed to follow. Moreover, for the Australian sample, greater certainty of punishment predicted more frequent speeding; a result that is contrary to the expected direction. It is possible that this finding simply reflects prior learning, particularly among ‘seasoned speeders’. For example, if a driver chooses to speed regularly and has, over time, been caught many times and received many speeding tickets, this is likely to reinforce the idea that being caught equals receiving a penalty (i.e., high certainty). However, the act of receiving penalties may not lead to a reduction in speeding, particularly if the penalties are not viewed as harsh and/or if they are able to be avoided in some way.

In China, findings in relation to certainty were somewhat mixed. Overall, the majority of drivers indicated moderate to strong agreement that they would receive penalties when caught speeding. However, approximately one third of the sample indicated that when caught in the past they did not receive legal punishment. The use of cautionary warnings rather than actual penalties for some offences could account for this finding. The exact nature of enforcement practices in Beijing is not known. However, it is also possible that these findings reflect previous success in avoiding penalties. In both countries, descriptions of practices used to avoid legal punishments were noted. Any steps that can be taken to strengthen the certainty of punishment seems warranted, even when considering the finding in the Australian data that increased certainty predicted more frequent speeding. It may be that certainty of punishment, in conjunction with other factors, is more influential than certainty alone.

Results relating to the severity of speeding penalties indicate that in both countries, legal penalties are not viewed as particularly harsh. In the Australian sample, demerit point penalties were reported as more severe than monetary penalties, but on the whole, penalties were viewed as moderate. This is consistent with growing community support for increasing the severity of penalties as tracked by the annual ‘Community attitudes to road safety’ reports [28]. In the most recent report, 31% of those surveyed in Australia indicated they were in favour of harsher penalties for speeding. This also accords with findings from an investigation of New South Wales drivers where penalties for speeding were not viewed as excessive [15]. Thus, there may be scope to consider increasing penalties for speeding offences.

With regard to perceived swiftness of delivery of penalties once apprehended, Australian results were mixed but generally indicated that drivers do not perceive penalties to be delivered quickly. Given the widespread use of speed cameras across the Queensland road network, this finding is not unexpected. Camera-detected offences are processed and then forwarded to the detected driver some time after the offence is committed. Therefore, it is reasonable to expect that drivers would perceive the receipt of penalties as less than immediate. Moreover, although this variable was a significant predictor of frequency of speeding in Australia, it only just attained the level of statistical significance and contributed only a small amount of unique variance overall. Thus, it appears that perceptions regarding the timing of penalties are not as important as the other variables. In China, results suggest that drivers generally perceive penalties to be delivered swiftly. This finding might reflect a higher proportion of ‘face-to-face’ rather than automated enforcement practices in Beijing. However, this variable did not contribute to predicting self-reported speeding.
Finally, the findings in relation to age and gender were different across the two samples and warrant brief discussion. In Australia, more frequent speeding was associated with younger drivers and with men; age and gender were the strongest predictors of self-reported speeding in the regression analysis. This finding is consistent with a wide range of literature from highly motorised countries and reinforces the need to continue the emphasis on graduated driver licensing schemes to assist with young drivers being over-represented in crash data. In the Chinese sample, the results for age demonstrated the same pattern as already described. Age was one of only two significant predictors of self-reported speeding. However, in the regression analysis, age, in conjunction with gender, did not exert a strong enough influence to produce a significant result in the initial regression model. From this we conclude that the influence of a driver’s age is minimal with respect to how frequently people speed in China. Gender, however, was not associated with self-reported speeding. The apparent lack of influence of this factor, which in other countries exerts a strong influence on speeding and risky driving in general, is interesting. The little work that has been conducted looking at risky driving in China also found a lack of association between these demographic characteristics, accident involvement, and driving violations [see 29]. Therefore, we conclude that other factors might be exerting stronger influences on speed choice by Chinese. In all, the variables reported in the current paper accounted for less than 7% of the variance in self-reported speeding. Further work is needed to better understand the situation.

This study addressed the important topic of factors influencing driving speeds across two cultural settings and adds to our limited understanding of such, particularly in relation to Chinese drivers. The use of multiple sampling techniques and community samples in both countries strengthens the generalisability of the findings. However, several limitations warrant consideration. The use of self-report measures might have led to under-reporting or over-reporting, depending on the context. With regard to China, the sample size in the quantitative phase was relatively small. Furthermore, it could be argued that drivers were less likely to report perceptions and behaviours because of the involvement of a foreign researcher in the team and because of the increased attention on China at the time the research was conducted (several months prior to the 2008 Beijing Olympic Games). In addition, we recognise that findings remain specific to the jurisdictions in which the research was conducted and therefore, do not automatically relate to all Australian or all Chinese drivers. Despite these limitations, the findings are generally consistent with previous work.

In summary, this paper discussed perceptions about speeding and factors relating to the apprehension and associated penalties in Australia and China. Overall, the findings indicate many similarities between the two countries, particularly with respect to a high perceived risk of apprehension if speeding, a moderate degree of certainty associated with receiving penalties, previous experiences of avoiding detection and penalties for speeding, and a view that the legal penalties for speeding are relatively moderate. Overall, findings suggest that it is likely that some people base their driving speed on an assessment of what they consider to be safe (i.e., not dangerous) and that such assessments are informed by past experiences of exceeding the speed limit without crash-involvement. In addition, it is possible that speed selection is influenced by the desire to be ‘safe’ from apprehension and legal penalties. The challenge seems to be one of convincing drivers that there are risks other than legal sanctions associated with speeding, even though this might be contrary to lessons learned from previous experiences. Future research in both countries should continue to focus on these issues to enhance road safety outcomes for all road users.

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References


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Appendix A

**Questionnaire items - Australia**

**Perceived risk of apprehension**
On a 100 km/h road today, if you were driving more than 10km/h over the limit, how likely is it that you would get caught for speeding?
On a 60 km/hr road today, if you were driving more than 10km/h over the limit, how likely is it that you would get caught for speeding?
(1=Extremely unlikely to 7=Extremely likely). Higher scores represent the perception of a greater risk of being caught.

**Certainty of punishment**
Suppose you were caught speeding today. How likely is it that you would be fined? How likely is it that you would lose demerit points from your licence?
(1=Extremely unlikely to 7=Extremely likely). Higher scores represent perceptions of greater certainty of being punished when caught speeding.

**Severity of punishment**
How harsh do you think the fines are for exceeding speed limits? How harsh do you think the demerit point penalties are for exceeding speed limits? (1=Not at all severe to 5=Very severe). Higher scores represent perceptions of harsher penalties.

**Swiftness of punishment**
There is a short delay between getting caught for speeding and receiving the legal consequences (fines, points deducted). (1=Strongly disagree to 7=Strongly agree). Higher scores represent perceptions of a shorter timeframe for receipt of penalties after being apprehended.

**Frequency of speeding**
Drivers were asked how frequently they exceeded the speed limit on typical 60 and 100 km/hour roads in the last month by the following increments: less than 10 km/hour, 10-20 km/hour, more than 20 km/hour. (1=Never to 6=Always). Responses were summed and higher scores represent more frequent speeding.

**Questionnaire items - China**

**Perceived risk of apprehension**
How likely is it that you will be caught if you are driving above the speed limit in Beijing today?
(1=Extremely unlikely to 7 Extremely likely). Higher scores represent the perception of a greater risk of being caught.

**Certainty of punishment**
How likely is it that you will be caught if you are driving above the speed limit in Beijing today?
(1=Extremely unlikely to 7=Extremely likely). Higher scores represent perceptions of greater certainty of being punished when caught speeding.

**Severity of punishment**
Generally, how harsh do you think the punishment is for exceeding the speed limit?
(1=Not at all severe to 5=Very severe). Higher scores represent perceptions of harsher penalties.

**Swiftness of punishment**
Imagine you are caught by a speed camera today. How much do you agree that I will get the ticket in a short time? (1=Strongly disagree to 7=Strongly agree). Higher scores represent perceptions of a shorter timeframe for receipt of penalties when apprehended.

**Frequency of speeding**
Drivers were asked how frequently they exceeded the speed limit on typical 60 km/hour roads in the last month by the following increments: less than 10 km/hour, 10-20 km/hour, 20-30 km/hour, more than 30 km/hour. For typical 80 km/hour roads, the increments were changed to less than 10 km/hour, 10-20 km/hour, 20-40 km/hour, more than 40 km/hour to reflect the reported perceptions of enforcement thresholds in Beijing. (1=Never to 6=Always). Responses were summed and higher scores represent more frequent speeding.
## Appendix B

### Hierarchical regression of demographic and deterrence variables on frequency of speeding - Australia

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*Scored 1=Male, 2=Female;  * p < .05, ** p < .001

## Appendix C

### Hierarchical regression of demographic and deterrence variables on frequency of speeding - China

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*Scored 1=Male, 2=Female;  * p < .05, ** p < .001