

Driver perceptions of the benefits of reducing their driving speed on safety, emissions, and stress and road rage

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Abstract

The existing literature shows driving speed significantly affects levels of safety, emissions, and stress in driving. In addition, drivers who feel tense when driving have been found to drive more slowly than others. These findings were mostly obtained from crash data analyses or field studies, and less is known regarding driver perceptions of the extent to which reducing their driving speed would improve road safety, reduce their car's emissions, and reduce stress and road rage. This paper uses ordered probit regression models to analyse responses from 3538 Queensland drivers who completed an online RACQ survey. Drivers most strongly agreed that reducing their driving speed would improve road safety, less strongly agreed that reducing their driving speed would reduce their car's emissions and least strongly agreed that reducing their driving speed would reduce stress and road rage. Younger drivers less strongly agreed that these benefits would occur than older drivers. Drivers of automatic cars and those who are bicycle commuters agreed more to these benefits than other drivers. Female drivers agreed more strongly than males on improving safety and reducing stress and road rage. Type of fuel used, engine size, driving experience, and distance driven per week were also found to be associated with driver perceptions, although these were not found to be significant in all of the regression models. The findings from this study may help in developing targeted training or educational measures to improve drivers' willingness to reduce their driving speed.

Introduction

Speed is an important factor affecting safety. Speed not only affects the likelihood of being involved in crashes, but also is related to the severity of crashes (Elvik, Christensen, & Amundsen, 2004; Nilsson, 2004). A review of studies examining the associations between driving speeds and risk of crashes (Aarts & van Schagen, 2006) showed that crash rate increases when speed increases. Reduction of speed limits was found to be associated with reduced average speed and crash rates (Nilson, 1982). Finch, Kompfner, Lockwood, and Maycock (1994) further reported that a speed reduction of 1 km/h corresponds with a 3% decrease in crash rate. Larger speed variance in a road section was also found to be related to higher crash rates, possibly because the variance influences the rate of overtaking in a traffic stream (Hauer, 1971). In the case of driving faster than the surrounding traffic, there is a higher risk of being involved in crash; however, the effects of driving slower than the surrounding traffic are inconclusive (Aarts & van Schagen, 2006).

Driving at high speeds, sudden acceleration and braking, and aggressive driving also result in sharp increases in fuel consumption and emissions (Eerens, Sliggers, & Van den Hout, 1993; LAT, 2006; Nie & Li, 2013). De Vlieger, De Keukeleere, and Kretzschmar (2000) found that an aggressive driver consumes 12-40% more fuel and produces 1-8 times more carbon monoxide (CO), 15-400% more volatile organic compounds (VOC), and 20-150% more oxides of nitrogen (NO_x) than a normal driver. Significant fuel savings can be achieved by encouraging drivers to drive at consistent speeds, imposing lower speed limits, and enforcing current speed limits. The European Environment Agency reported from a simulation study that reducing motorway speed limits from 120 km/h to 110 km/h would reduce fuel consumption by 12-18% for passenger cars when there is 100% speed limit compliance (EEA, 2011).

Drivers seem to understand that lower travel speeds are generally associated with reduced emissions. Results from a public poll reported that people are willing to reduce their speeds in order to reduce emissions (EEA, 2011), though this does not necessarily translate to compliant behaviour. The proportion of drivers exceeding posted speed limits is reported to be as high as 40-80% (OECD, 2006). Despite the demonstrated benefits of improved safety and reduced fuel consumption and emissions, there are a range of cognitive, motivational and emotional factors that mitigate against drivers adopting lower travel speeds.

From the cognitive perspective, drivers seem to misjudge the time saved when increasing speed or the time lost when decreasing speed (Fuller et al., 2006, 2008, 2009; Severson, 2008, 2009). Generally, the amount of time saved is underestimated when increasing from a low speed and overestimated when increasing from a high speed. On the other hand, the amount of time lost is underestimated when decreasing from a low speed and overestimated when decreasing from a high speed.

Driver motivations can contribute to higher travel speeds and other unsafe driving behaviours. Many studies around the world (see Peer, 2011 for a discussion) have reported that drivers are often in a hurry when driving and drivers often cite time pressure or being in a hurry to explain their delinquent behaviour (McKenna, 2005; Silcock, Smith, Knox, & Beuret, 2000). Hurry in driving is often associated with speeding, faster acceleration, sudden braking, aggressive driving, and feeling more stress (Oliveras et al., 2002).

The emotions of frustration and impatience can occur when traffic congestion forces drivers to travel more slowly than they want to, and this can lead them to select routes and speeds that they believe would shorten their travel time (Tarko, 2009; Fuller, 2005). Shinar (1998) proposed that frustrating on-road events, such as traffic congestion or delays, can act as a trigger to aggressive behaviours which are moderated by both person-related and situational factors. Aggressive driving has been defined in terms of deliberate traffic offences (e.g., failure to give way, cutting off other vehicles). The term “road rage” is used by the media and members of the public (and some writers) to refer to aggressive driving, but many researchers reserve this term for extreme cases of aggressive driving that usually involved goal-oriented acts of violence which are criminal offences (Goehring, 2000; Joint, 1995). Dukes, Clayton, Jenkins, Miller, and Rodgers (2001) reported that aggressive driving produces more road rage than impeding traffic does. Despite the large number of studies that have examined the benefits of reduced travel speeds, little is known about driver perceptions of the extent to which reducing their driving speed would improve road safety, reduce their car’s emissions, and reduce stress and road rage. It can be argued that without a proper understanding of drivers’ perceptions, deployment of speed reducing control measures will be less effective, because full compliance with posted speed limits would only be possible when drivers choose to drive at the posted limits. This paper examined these perceptions in 3538 Queensland drivers who completed an online RACQ survey. The driver responses were analysed using the ordered probit regression technique to examine how the perceptions vary with characteristics of drivers and their cars and travel behaviour.

Method

Perception Survey

The information reported here was collected as part of a larger survey entitled “Driving Costs, Attitudes and Behaviours study”, which assessed suitability of respondents for later participation in an eco-driving training program, conducted by RACQ and partly funded by the Queensland Government. The Centre for Accident Research and Road Safety – Queensland (CARRS-Q) provided advice on development and analysis of the study.

The preamble to the survey informed participants that the requisites of participating in the eco-driving program included being at least 18 years old, being the main driver of the car driven, the car needing to be privately owned, and agreeing to the conditions of participating in the eco-driving training program (using a fuel card for all fuel purchases from selected brand outlets for about six months, not intending to sell or modify their car during the study period). To support involvement in the survey and the training program, participants were offered two incentives: entry into a draw of 2 cash prizes of \$1000 each, and 4 cents per litre discount on all fuel purchases during the study period. RACQ membership was not a requirement for participation.

The results presented in this paper focus on responses to three questions comprising the Driver Attitudes section of the survey. The stems of the questions were “I believe I can improve road safety if...”, “I believe I can reduce my car’s emissions if...”, and “I believe I can reduce stress and road rage if...”. The same statements followed each of these stems: “I drive a car with the newest technology”, “Roads were smoother and wider”, “I follow the road rules”, “I walk, cycle or use public transport” and “I reduce my driving speed”. Only the responses for the last of these statements are presented in this paper. Respondents indicated their response to each item on a 6 point scale (1=strongly disagree, 2=moderately disagree, 3=slightly disagree, 4=slightly agree, 5=moderately agree, and 6=strongly agree). Demographic data and information about vehicle and travel mode usage patterns were also collected in the survey. No definition of “stress and road rage” was provided to the participants.

Recruitment and participants

An email invitation to participate in the survey was sent to 194,662 RACQ members resident in the Brisbane, Moreton, Logan and Townsville areas for whom RACQ held a valid email address. These areas corresponded with where the eco-driving training program would be held. Email recipients were encouraged to forward the invitation to friends and family who they thought might be interested in participating. The invitation was sent on 12 April 2011. As at 6 May 2011, 6705 potential participants had accessed the survey and 3585 complete and valid responses were received. These responses included all questions completed and agreement with the conditions of the survey. Further examination of the data resulted in having 3538 responses for the present study.

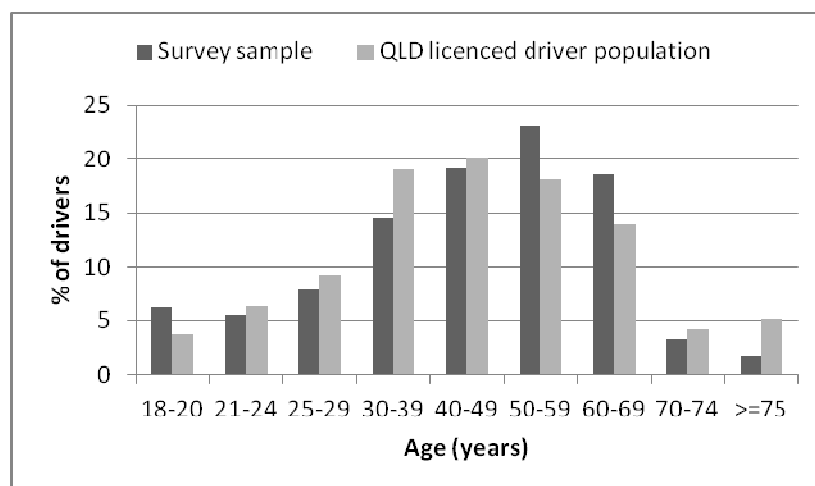


Figure 1. Comparison of survey sample and Queensland’s licensed driver population (TMR, 2013)

Participants had an average age of 46.3 (S.D. = 15.7) years with almost equal share of males and females. About 80% of the participants had driving experience of more than 11 years (only 10.5% had less than 5 years experience). While the response rate was low (1.8% if the unknown number

of surveys passed on to friends and family are ignored), Figure 1 shows that the distribution of participants by age groups generally follows Queensland's licensed driver population but with relatively fewer participants aged 30-39 and relatively more aged 50-69. The responses were analysed with respect to age group to allow for this discrepancy.

Statistical Analyses

The responses to the items regarding driver beliefs about effects of reducing speed were ordinal in nature but it was not possible to assume that the distances between the ordered categories are equal. The ordered probit and the ordered logit model are appropriate choices for such response variables (Long & Freese, 2006). In any case, both models produce very similar results, therefore, the ordered probit model is chosen for this study.

The ordered probit model is formulated as follows (see Snijders & Bosker, 1999 for detailed description of such model):

$$y_i^* = \beta_0 + X_i \beta_1 + \epsilon_i ; i = 1, \dots, N. \quad (1)$$

where y_i^* is continuous latent variable representing perceptions of drivers on a continuous scale, X_i is the vector of explanatory variables explaining characteristics of drivers and their cars and travel characteristics; ϵ_i is the random errors assumed to be normally distributed with zero mean and unit variance; and N is the total number of survey participants.

The measurement model, in which the latent variable y_i^* is mapped on to an observed ordinal variable y_i , perception of driver i , is formulated as:

$$y_i = m \text{ if } \tau_{m-1} \leq y_i^* < \tau_m ; \text{ for } m = 1 \text{ to } M \quad (2)$$

where M is number of ordinal categories in y_i and the threshold values (τ) define the boundaries of the levels of perception. To tie the observed discrete perception levels to the continuous latent variable, the perception levels are marked as 'strongly disagree = 1' to 'strongly agree = 6'.

In order to examine how perceptions of the benefits of reducing speeds vary with characteristics of drivers and their cars and travel behaviour, a set of explanatory variables was selected (see Table 1) which describe these characteristics. Driver characteristics are expressed through the variables: age of driver (categorical), gender (female = 1, male = 0), and driving experience (categorical). Variables used to describe characteristics of cars include age of car (categorical), type of transmission (automatic = 1, manual = 0), number of cylinders (2-4 cylinders = 1, 5-8 cylinders = 0), engine displacement (categorical), type of fuel used (categorical), and rate of fuel consumption (categorical). Travel characteristics of drivers are expressed as: total distance driven per week (categorical), number of drivers of the car owned by the respondent (multiple drivers = 1, single driver = 0), number of days per month used the transport modes (walk, cycle, public transport, car with no passenger, car with passenger, and car as passenger) for making trips related to commuting, education, shopping, personal business, leisure and other activities.

The formulated models were calibrated separately for driver perceptions of the effects of reduced travel speed on (1) improving safety, (2) reducing emissions, and (3) reducing stress and road rage. Hereafter, the models are referred as the 'safety-model', 'emissions-model', and 'stress-and-road-rage-model' respectively. In all three models, to identify the subset of explanatory variables which yield the best fitted model, a backward elimination procedure was employed to eliminate the non-significant variables one by one so that the Akaike Information Criteria (AIC) was minimized.

Significance of the explanatory variables was examined by using the z -test. To evaluate if the models have sufficient explanatory power, likelihood ratio statistics (G^2) were computed.

Results

Drivers most strongly agreed that reducing their driving speed would improve road safety (mean score = 4.44), followed by lower emissions (4.30) and reduce stress and road rage (4.00). While the mean values indicate high proportions of responses in the three 'agree' levels, their corresponding skewness values of -0.81 (safety), -0.67 (emissions), and -0.40 (stress and road rage) showed that all three distributions were left-skewed. These values imply that drivers in general have a positive perception of the effects of reducing their speeds. A comparison of responses to the road safety, emissions, and stress and road rage items produced a Cronbach's alpha of 0.767, suggesting that drivers who agree that reducing speed would improve their safety are likely to agree that reducing speed would reduce emissions, and stress and road rage.

To understand the trends in driver perceptions and how the perceptions vary with different characteristics of drivers and their cars and travel characteristics, the formulated ordered probit regression models were employed. The parameters of the models were derived using the maximum likelihood estimation method in the software STATA 11.2. The parameter estimates and their statistical significance are presented in Table 1. The AIC values of the best fitted safety-model, emissions-model, and stress-and-road-rage-model are 11332, 11271, and 11796 respectively. The corresponding likelihood ratio statistics are 123.8 (32 df), 105.9 (21 df), and 136.7 (35 df). The values are well above the corresponding critical values for significance at the 1% significance level, implying that the models have sufficient explanatory power. The statistically significant variables in the models are discussed in the subsequent paragraphs.

Table 1. Explanatory variables and regression estimates

Explanatory variables	Improve Safety		Reduce Emissions		Reduce Stress and Road rage	
	Beta	p-value	Beta	p-value	Beta	p-value
<i>Age of participant</i>						
18-20 years	-0.457	0.004	-0.360	<0.001	-0.462	0.003
21-24 years	-0.468	0.001	-0.370	<0.001	-0.526	<0.001
25-29 years	-0.327	0.004	-0.275	<0.001	-0.379	0.001
30-39 years	-0.131	0.035	-0.146	0.014	-0.167	0.006
40-49 years	-0.074	0.187	0.003	0.956	-0.039	0.477
50-59 years	-	-	-	-	-	-
60-69 years	-0.005	0.956	0.026	0.640	0.182	0.034
70-74 years	-0.050	0.698	-0.304	0.003	0.158	0.216
>= 75 years	-0.008	0.962	-0.101	0.470	0.175	0.268
<i>Gender^a</i>	0.169	<0.001	-	-	0.090	0.033
<i>Driving Experience</i>						
< 5 years	0.416	0.002	-	-	0.247	0.063
5-10 years	0.317	0.002	-	-	0.217	0.034
11-40 years	-	-	-	-	-	-
> 40 years	-0.068	0.438	-	-	-0.063	0.466
<i>Age of Car</i>						
< 3 years	-	-	-	-	-	-
3-8 years	-	-	-	-	-	-
9-13 years	-	-	-	-	-	-
>= 14 years	-	-	-	-	-	-
Transmission type ^b	0.088	0.026	0.084	0.026	0.094	0.016
Number of cylinders ^c	-	-	-	-	-	-
<i>Displacement</i>						
<= 1.9 litres	0.120	0.026	-	-	0.119	0.024
2.0 to 2.9 litres	-	-	-	-	-	-
>= 3.0 litres	-0.018	0.738	-	-	0.007	0.891
Unsure / Don't Know	0.028	0.601	-	-	-0.030	0.569

Explanatory variables	Improve Safety		Reduce Emissions		Reduce Stress and Road rage	
	Beta	p-value	Beta	p-value	Beta	p-value
<i>Fuel type</i>						
Diesel	0.001	0.984	0.028	0.615	0.039	0.507
E10 Unleaded	0.046	0.343	0.091	0.056	0.079	0.098
LPG	-0.141	0.340	-0.076	0.592	-0.009	0.949
Premium Unleaded	-0.190	<0.001	-0.117	0.012	-0.145	0.002
Regular Unleaded	-		-		-	
<i>Fuel consumption</i>						
< 8 L/100Km	-0.017	0.767			0.092	0.107
8.1-12 L/100Km	-		-		-	
12.1-16 L/100Km	-0.035	0.615			-0.011	0.877
> 16 L/100Km	-0.156	0.257			0.071	0.606
Don't Know	0.086	0.070			0.082	0.079
Number of drivers ^d						
<i>Distance driven per week</i>						
<= 100 km					0.186	0.001
101 - 200 km					0.083	0.052
201 - 400 km	-		-		-	
401 - 600 km					-0.060	0.282
> 600 km					-0.021	0.842
<i>Transport mode choice ^e</i>						
Walk			0.003	0.066		
Cycle	0.010	0.033	0.013	0.008	0.014	0.004
Public Transport	0.005	0.063				
Drive (no passenger)						
Drive (with passenger)	0.007	0.001			0.004	0.029
Drive (as passenger)			-0.006	0.112		
Boundary Thresholds	Beta	S.E.	Beta	S.E.	Beta	S.E.
T ₁	-1.462	0.073	-1.774	0.061	-1.347	0.074
T ₂	-0.989	0.069	-1.313	0.056	-0.839	0.071
T ₃	-0.585	0.068	-0.775	0.053	-0.233	0.070
T ₄	0.074	0.068	0.010	0.052	0.530	0.070
T ₅	0.842	0.068	0.856	0.054	1.264	0.072
Summary Statistics						
No of observations	3538		3538		3538	
LL (Null)	-5696.0		-5667.3		-5931.3	
LL (Model)	-5634.1		-5614.4		-5862.9	
df	32		21		35	
G ²	123.8	p	105.9	p <0.001	136.7	p <0.001
		<0.001				
AIC	11332.2		11270.7		11795.8	

- reference category; ^a Female = 1, male = 0; ^b Automatic = 1, manual = 0; ^c 2-4 = 1, 5-8 = 0; ^d Multiple drivers = 1, single driver = 0; ^e Number of days used each month, Regression estimates for the variables which were eliminated in the backward elimination procedure are not reported in the table.

Drivers aged between 18 and 39 years less strongly agreed that reducing their driving speed would result in improved safety, reduced emissions or reduced stress and road rage than drivers aged 50-59 years. Among these younger driver groups, the 21-24 year old drivers perceived the effects least positively, followed by the 18-20 years, 25-29 years, and 30-39 years age groups. None of the other age groups, except for 70-74 years regarding reducing emissions and for 60-69 years regarding reducing stress and road rage, showed statistically significant results. Compared to male drivers, females agreed more strongly that speed reduction improves safety and reduces stress and road rage, but there was no statistically significant effect of gender in relation to reducing emissions. Furthermore, the less experienced driver groups perceived the effects in improving safety and reducing stress and road rage more positively than the drivers with 11-40 years of driving experience. Results for reducing emissions were statistically non-significant though.

Among the characteristics of cars, age of car and number of cylinder were found non-significant in all models. However, drivers of automatic cars perceived all of the three effects more positively than those driving manual cars. Drivers of small-engined cars (1.9 litres or less) believed that they can improve their safety and reduce driving stress and road rage by travelling slower to a greater extent than the drivers of cars with 2-2.9 litre engines. Among the types of fuel used, only the premium unleaded type was found statistically significant. Premium unleaded users perceived that speed reduction improves safety, reduces emissions, and reduces stress and road rage to a lesser extent than the regular unleaded users. In terms of self-reported fuel consumption rates, no statistically significant results were found.

Drivers who reported driving fewer kilometres per week (up to 200 km) believed that they could reduce driving stress and road rage by reducing speeds to a greater extent than the drivers who reported driving 201-400 km/week. Among the variables expressing transport mode choice, only the number of days cycled per month showed significant effects on improving safety, reducing emissions, and reducing stress and road rage. Positive perceptions of the effects were found to increase with increasing number of days drivers cycled as an alternative mode of transport. Drivers who frequently drive with passenger(s) believed that they can improve safety and reduce stress and road rage by reducing speed. However, this was not true for the other variables, such as driving with no passenger or travelling in car as passenger. Surprisingly, public transport and walking as alternative modes of transport did not produce any statistically significant results.

Discussion

The aim of this paper was to examine the extent to which drivers believe that reducing their driving speed will improve road safety, reduce emissions and reduce road rage and stress. Overall, the results showed that drivers more strongly agree that reducing their driving speed will improve road safety than that it will reduce emissions or reduce road rage and stress. From the perspective of promoting potential improvements in safety, environmental and driver enjoyment outcomes, the overall high means for each of these outcomes is encouraging. However, the responses of drivers appeared to differ according to age, gender and some vehicle and travel characteristics.

In general, drivers aged under 40 less strongly agreed that reducing their driving speed would improve their safety or reduce emissions and stress and road rage than drivers aged 40 and over. This result is consistent with earlier research findings regarding relationships between travel speeds and aggressive driving. For example, Fildes, Rumbold and Leening (1991) found that younger drivers (under 34 years of age) were more likely to exceed the 85th percentile speed, whereas older drivers (aged over 45 years) were more likely to be the excessively slow drivers. Studies (e.g., AAA, 1997) have reported that the majority of aggressive drivers are men aged between 18 and 26 years. Age of driver has also been proved to be the most significant factor in crashes related to aggressive driving (Arnett, 1994; Jonah, 1986). Aggressive driving and thrill-seeking results in risky driving behaviours like speeding, sudden acceleration, and hard braking (Öz, Özkan, & Lajunen, 2010). While such behaviours are definite safety hazards, they also result in increased fuel consumption and emissions. Joumard, Jost, Hickman and Hassel (1995) demonstrated that vehicle emission rates increase not only with increasing speed, but also with increasing acceleration.

The results showed that the 21-24 year old drivers had the lowest level of agreement that reducing their speed would result in the three types of benefits. Perhaps drivers aged 21-24 years might have gained some confidence after driving for several years, as shown by White, Cunningham and Titchener (2011) that drivers with driving experience of greater than 3.7 years rate themselves as having greater driving skill than others. Therefore, they may start underestimating the effects of speed reduction (or become more confident to drive in speeds higher than those they used to drive at when aged 18-20 years, when most were novice drivers). These results suggest that young

novices and drivers older than 40 years may be better targets for speed reduction campaigns based on the three outcomes measured than 21-24 year olds.

Quimby, Maycock, Palmer, and Buttress (1999) concluded from a review of studies related to drivers' speed choice that the fastest drivers are usually the younger people who drive large cars and have high annual mileages. Drivers who commute alone in a car are also likely to drive at higher speeds than others. The results of the current study are in line with these findings. For example, drivers of small-engined cars (displacement less than or equal to 1.9 litres) were more likely to agree with the benefits of speed reduction (improving safety, reducing stress and road rage) than the drivers of larger-engined cars. Drivers who drove with passengers also perceived these benefits more positively than others. Those who have lower weekly mileage (up to 200 km) agreed more strongly in case of reducing stress and road rage than those having higher weekly mileages.

Crashes involving young drivers are frequently associated with voluntary risk taking. Clarke et al. (2005) showed that about half of the crashes involving young drivers were caused by deliberate risk-taking behaviours, including speeding, drink-driving and reckless or negligent driving. Young drivers are also prone to faster driving than others (Quimby et al., 1999) and young males are the most aggressive drivers (AAA, 1997). It is clear that young male drivers are the most aggressive group who are likely to choose higher speeds than others. This finding, as found in the published literature, matches the finding of this study that young male drivers possess lower perceptions of the benefits of reducing speeds than others. Education and licensing programs should target this group of drivers to assist them to better understand the benefits of travelling at lower speeds. Further research is needed to evaluate the effectiveness of such programs, though.

Drivers of automatic cars had higher levels of agreement that speed reduction improves safety, reduces vehicular emissions, and reduces stress and road rage. However, recent CARRS-Q research (Larue et al., 2013) suggests that eco-driving instructions may be less effective for automatic car drivers. In this study, eco-driving instructions (e.g., driving at consistent speed, avoiding jerky braking and acceleration) did not result in lower fuel consumption or CO₂ and NO_x emissions than in normal driving of an automatic car (although there were reductions of about 20% in CO and HC emissions). Therefore, there is a need to develop tailored and effective eco-driving instructions for drivers of automatic cars, given their positive perceptions related to speed reductions.

Vehicular emission rates depend not only on driver's choice of speed, but also on the size and age of vehicle, characteristics of engine, maintenance records, and type of roads (Pandian, Gokhale & Goshal, 2009). Older vehicles with more mileage are usually associated with increased emissions. However, drivers' perception data did not produce any significant results related to age of car in this present study. Perry and Gee (1995) further reported that fuel quality directly affects vehicular emissions. The only statistically significant results found from the perception data was that premium unleaded fuel users have less positive perceptions about the benefits of speed reduction than the regular unleaded fuel users.

Drivers who reported using a bicycle as an alternative mode of travel believed that there are greater benefits of reducing driving speeds. Being cyclists, they might understand how reducing car speeds could improve safety, particularly for cyclists. Cycling, being an emission-free transport mode could also help these drivers to become aware of the adverse effects of transport related emissions. However, it is noteworthy to mention that there might be some associations among the responses, such as those who believe reducing speeds would improve safety, may also believe that lower speeds would reduce emissions and stress and road rage. Examining the associations among the responses and how these influence perceptions of drivers would be a useful follow up study.

While this study has produced useful insights, it has some limitations. The response rate was low (1.8%, although the total number of observations was 3538) and the survey sample consists of

mostly RACQ members who are residents of Queensland. Thus, the results may be less generalisable to general driver population and residents of other parts of Australia. Another limitation is that some participants might have confused 'speeding' and 'driving speed' when the survey questions were stated as "... if I reduce my driving speed". This could have potentially resulted in some drivers who do not speed, not agreeing that reducing their speed would result in safety or environmental benefits.

Conclusions

This research provided useful insights into understanding privately owned car drivers' perceptions of the benefits of reducing speeds. In particular, driver perceptions of the extent to which reducing their driving speeds would improve road safety, reduce their car's emissions, and reduce stress and road rage were modelled using ordered probit regression models. Perception data were collected through an online survey conducted among drivers in Queensland.

The results showed that drivers perceived improved safety as the largest effect of reducing their driving speeds, followed by lower emissions and reduced stress and road rage. Younger male drivers perceived the influences less positively than older and female drivers. Drivers of automatic cars and drivers who are bicycle commuters perceived the influences more positively than other drivers. Education and licensing programs targeted to the young male drivers could help them to better understand the benefits of driving at lower speeds. Further research is warranted to evaluate the effectiveness of such programs.

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